

Impact of arts education on the cognitive and non-cognitive outcomes of school-aged children

A review of evidence

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Forward by Sir Kevan Collins

'All schools should be art schools.' This was the call from artist Bob & Roberta Smith when he stood against Michael Gove at the General Election in May 2015 election, in protest against what he termed the Coalition's devaluation of arts education. Whether or not you agree with his manifesto, a Turner Prize nominee running against a former Education Secretary gives us some idea of how politicised the future of the arts in our schools has become.

Much of the educational focus in recent years has been on prioritising literacy and numeracy, both as a sure route to employment for pupils, and as the mechanism for building a 'knowledge economy'. Concerned that creative subjects are becoming side-lined as extra-curricular add-ons dominated by the middle-classes, arts organisations have set out their defence.

The best argument – one I fully subscribe to – is one of “arts for arts’ sake”. All children, including those from disadvantaged backgrounds, deserve a well-rounded, culturally rich, education. However, many have gone further than this, arguing that arts education itself directly improves pupil attainment.

At the Education Endowment Foundation (EEF), we aim to start with the evidence of what we already know about teaching and learning in order to find out how – working together with schools and their local communities – we can best improve educational outcomes for children and young people from low-income backgrounds.

To explore the relationship between arts education, cognitive and non-cognitive outcomes, we commissioned this in-depth review from Durham University with a very specific brief: ‘to identify the most promising ways in which learning through the arts can support disadvantaged young people to achieve key educational outcomes’.

This comprehensive review examines over 200 pieces of existing academic research, covering a broad range of subjects including the traditional fine arts as well as modern dance and movement, hip hop, poetry and creative writing. The report identifies a number of strategies for which there is some evidence of positive impact on attainment. Learning a musical instrument, for example, is associated with improved wider educational outcomes for children, from their early years through to secondary school.

But there's a catch. Our understanding of how the skills we develop through arts activities can be transferred to other areas of learning is not straightforward. It's undoubtedly the case that, as the report notes, integrating arts in the school curriculum introduces fun into lessons, and that, in turn, leads to students experiencing greater enjoyment. What is a lot less clear is if or how that enjoyment necessarily results in better learning. The report concludes that, though there are promising leads, at the moment there just isn't enough robust evidence to be able to demonstrate a causal link between arts education and academic attainment.

The report provides at least two key lessons. First, the wider attainment gains sometimes claimed for arts education are not as clear-cut as we might like them to be. This means that if the arts are to be taught as a means to boost academic achievement then teachers and schools need to evaluate carefully whether that aim is actually being delivered. This is especially important for those schools using their Pupil

Premium funding – public money intended to help disadvantaged pupils to catch up with their peers – to pay for arts activities.

Second, it tells us that the current state of the evidence-base linking arts education and attainment is weak. In commissioning it, we never expected to find a 'silver bullet', some combination of drama, painting and poetry proven to boost academic outcomes. Of course, the absence of evidence is not the same as the evidence of absence. We will continue to invest in such work where there is good evidence of promise, ensuring that, when we do so, the activity is properly and independently evaluated. But it is essential to be honest about the current state of play, before commissioning further research.

Being clear eyed about the current state of the evidence on arts education enables us to reflect critically on what we want from our schools and why we engage in the work we do. In my view, schools should still find space in their day to ensure all children benefit from a stimulating arts education. We should continue to investigate links to other outcomes we value, but we shouldn't expect everything to link tightly to academic attainment. Instead, we should teach the arts for their own sake – for the intrinsic value of learning creative skills and the enjoyment they bring – while at the same time doing our level best to ensure our children and young people leave school with a good level of literacy, numeracy and scientific curiosity.

In this respect, all schools should be art schools.

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Impact of arts education on the cognitive and non-cognitive outcomes of school-aged children a review of evidence

1. SUMMARY

This literature review was commissioned by the Education Endowment Foundation (EEF) to assess the evidence of impact of arts education on cognitive and non-cognitive outcomes of children from pre-school to compulsory school age (ages 3 to 16). In this review, we considered arts education to include a broad range of subjects including the traditional fine arts (e.g. visual arts, music, dance, performing arts, theatre and dance) as well as modern dance and movement, hip hop, poetry and creative writing.

The EEF was looking to identify arts activities that have evidence of promise, as well as an overview of those where the results are inconclusive or which have not been evaluated. The summary results in this section pull together all the studies to arrive at an overall judgment of the strength of evidence. No high quality single studies were found. It is therefore difficult to state conclusively what the evidence of impact of arts activities in education might be. However, given that a large number of weak or medium quality studies do suggest positive effects more work in this area, taking into account the most promising avenues, would be justified.

- A total of 199 relevant studies were identified from a search of eleven educational, psychological and social sciences databases. The vast majority of studies were about music education and a combination of arts forms. Most of these studies were conducted with primary school aged children. Very few involved pre-school aged children.
- The review found no convincing evidence that demonstrated a causal relationship between arts education and young people's academic and other wider outcomes.
- There were a few interventions that showed evidence of promise. Pilot studies, or efficacy trials, could be conducted to improve the evidence base for these interventions. These largely relate to primary school age group.
- Music (instrumental, music education and music integration) shows promise across all age groups.
- The evidence for integrating multi-arts for primary school children is weak largely because the positive studies found were small scale (under 100) or lacked randomisation. They also tended to compare arts-focused schools or arts-trained teachers with non-arts specialist schools and teachers (who may differ in more than their subject expertise). There is potential here for more robust studies.
- Kindermusik, Orff and Kodaly methods of learning music have been shown to be effective on the cognitive development of young children.

- There is little evidence that visual art (painting, drawing, sculpture) had any positive effect on academic outcomes.
- More research is needed for the pre-school aged children as there are few studies for this age group.
- Few empirical studies were found about the use of poetry for school-aged children, especially for pre-school and primary school children. Although rhymes and rhythms are routinely taught in pre-school, its impact on children's literacy has not been evaluated. The gap means that this could be an area worth exploring.
- Most studies about poetry were about the beneficial effects of poetry in general or for older pupils and undergraduates or about the methods of teaching poetry, or about the author's or pupils' experience with poetry. The majority of empirical work about poetry in schools was conducted pre 1980 and was largely about the teaching and assessment of poetry
- Few studies have been conducted on creative writing as an activity to support general literacy at school. Most research in this area was either on creative writing as an outcome or for older students in higher education. It could be valuable to explore if creative writing has any impact in developing literacy for primary and secondary school pupils.
- Successful arts activities often involve professional artists. For successful implementation, professional training of teachers is needed on how to effectively integrate the arts activities be it drama, visual arts or music in the classroom.
- There is some suggestion that the mechanisms or factors that contribute to the learning processes in most arts education are related to elements of enjoyment, engagement and extension (e.g. DeMoss and Morris 2012). Otten et al. (2004) reported that the effect of dramatic art on acquisition of history knowledge was mediated by enjoyment. which in turn, predicted future performance on standardised tests.

Quality assessment of studies in the review

- Few studies gave detailed descriptions of the actual intervention in their reports. This makes it hard to assess how well specified they were. In most cases the arts activities were integrated in the curriculum as part of a pedagogical strategy, and details were only given about how teachers were either trained by professional artists or how professionals worked with classroom teachers to develop an arts-infused curriculum. In others comparisons were made with schools or classes where there was a focus on arts activities without specifying. In some cases, as in music learning, the methods of teaching instrumental music was mentioned (e.g. the Kodaly, Kindermusik and Orff) but no details of these programmes were given.
- Almost all the studies in this review were rated as providing 'weak' evidence because of serious design flaws. A large number of studies in the review were PhD theses which tended to be small-scale, using convenience samples drawn from one setting. This limits generalisation of the findings to wider contexts. Large-scale studies analysing state exam results in the US, on the other hand, tended to be cross-sectional or correlational in design, which could not establish causality. These also tended to compare schools with strong arts -focused with schools where

arts are not emphasised, or with pupils participating in the arts with those who did not. In the US, schools with rich arts activities tended to be high performing schools, so comparing arts-focused with non-arts focused schools meant that the comparison is with the type of schools rather than the arts activities. Art-rich schools are also more likely to be progressive schools with innovative teachers and programmes. In the US academically strong students are encouraged to study the arts, while in the UK, this is likely to be the reverse. Therefore, comparing the performance of students in arts and non-arts schools, or comparing arts with non-arts students would mean comparing children who are already different. Therefore, similar results may not be seen in UK schools. Longitudinal correlational studies in the US invariably show a strong association between arts participation and academic performance. UK studies, however, did not find similar results. Harland et al. (2000), for example, analysed 27,000 Year 11 pupils in 52 schools in UK, and found no evidence that participation in the arts was related to performance in English and maths in national exam (GCSE) at 16.

- Ten of the research reports were meta-analyses or reviews of studies which together included 442 studies. Few of these meta-analyses or reviews made an attempt to distinguish the strength of evidence of experimental studies and those of correlational design. They tended to give equal weightings to all studies even those with no control condition, or had no pre- post-comparisons and did not take account of size and attrition. Meta-analyses also tended to cover a range of studies with different outcomes, involving a combination of arts activities (or arts education in general), using different measures and involving children of different ages. It was therefore difficult to pinpoint the effectiveness of individual arts activities from these meta-analyses. Evidence from such reviews is considered under multiple arts or combination of arts activities.
- Experimental or quasi-experimental studies were invariably weak. Common design flaws included lack of comparison group, no baseline equivalence established, comparing arts with non-arts schools, or comparing students' post-test scores only with non-random samples.
- Few studies have included in their design a placebo to differentiate the real effect of the intervention from the Hawthorne effect. Integrating arts in the curriculum can introduce a certain amount of fun in the lessons. So it is not surprising that students report greater enjoyment of arts-infused subjects. In studies where enjoyment, engagement and attitudes were the outcome measures, these were invariably based on pupils' own ratings of their enjoyment or parents' reported observations of changes in behaviour. Very few studies looked at the transfer of enjoyment or changes in behaviour to learning.
- Lack of replication of similar studies was another reason why it was difficult to make any conclusive statements about some of the approaches.
- In several studies, the researchers were teachers delivering the intervention and collecting the data. There was therefore conflict of interest and teacher expectancy.
- Another key weakness in these studies was the use of unvalidated assessment instruments, most of which were based on teacher or pupil self-reports and their anecdotal accounts. This was especially so with assessments of non-cognitive outcomes like attitude, self-concept and

motivation. A number of studies also used tests that were inherent to the intervention. There were also instances where positive effects were reported even though the data suggested otherwise.

- Biased reporting is also not uncommon.

Summary of promising and unpromising arts activities by phase of schooling

| | Pre-school | Primary | Secondary | Across age groups |
|--|--|---|--|--|
| Arts activities that may have potential | <ul style="list-style-type: none"> Playing a musical instrument on cognitive skills | <ul style="list-style-type: none"> Integrating music and playing an instrument on learning outcomes | None | <ul style="list-style-type: none"> Music training |
| Arts activities with inconclusive evidence | <ul style="list-style-type: none"> Integration music in the curriculum Multi-arts integration Creative drama on reading | <ul style="list-style-type: none"> Visual arts Integration of combination of arts activities Creative drama | <ul style="list-style-type: none"> Learning an instrument and music participation at school (band, choir, orchestra) on academic and affective outcomes Integrating creative drama on academic outcomes, but not on behaviour or social outcomes Integrating multi-arts activities arts in the curriculum | <ul style="list-style-type: none"> Integration of combination of music and drama activities |
| Unpromising arts activities | <ul style="list-style-type: none"> Visual arts Dance Creative drama on theory of mind (empathy) Listening to music (Mozart Effect) | <ul style="list-style-type: none"> Creative arts as an extra-curricular activity School-based arts as a behaviour intervention Aesthetic appreciation Drama on affective outcomes Creative dance Poetry | <ul style="list-style-type: none"> Visual arts Dance Background music Creative writing Poetry Creative drama on as an enrichment activity | <ul style="list-style-type: none"> Visual arts Dance Drama |

ARTS ACTIVITIES WITH EVIDENCE OF PROMISE

These are arts activities where studies have shown consistently positive effects on students' learning and wider outcomes. However, none of these are ready for an effectiveness trial because of serious weaknesses in a number of these evaluations.

For pre-school pupils:

Learning to play an instrument has shown some potential impact on a range of outcomes: creativity, spatial-temporal ability, IQ scores, and reading and language.

For primary school pupils:

Integration of music in the classroom and playing an instrument has favourable effects on young children's learning outcomes, in particular cognitive abilities, and to some extent self-esteem and social behaviour. Again, because of design flaws in a number of the studies we are cautious about making recommendations for a full trial. Of the 30 studies, 20 suggested positive effects. Four of these were of medium weak quality. Individually the evidence from these studies may be weak, but taken together the positive effects suggest there is potential in this area that is worth pursuing.

For secondary school-aged pupils:

There is not enough evidence to suggest that any of the arts activities have beneficial effects on cognitive or non-cognitive outcomes.

For pupils across age groups:

Music training shows some potential beneficial effects. No negative studies were found. However, all the studies were rated weak for a range of reasons. For example, a large-scale analysis of standardized test scores in English showed that pupils who participated in school music programme performed better than non-music pupils (Johnson and Memmott 2006), but the effect was small and the influence of confounding variables could not be ruled out. Another study using brain scans of children of different ages with varying years of musical experience showed positive correlation between music training and visuo-spatial and motor co-ordination (Hudzial et al. 2014). The correlational design of the study could not rule out the influence of maturation.

Experimental studies were also weak as they were either small or did not randomly allocate participants to conditions (e.g. Strait et al, 2013). A meta-analysis of experimental studies provided tentative evidence of impact of music training on spatial-temporal reasoning, but only 5 of the 19 studies randomised participants to intervention conditions.

Although the individual studies may be weak, the evidence taken together is suggestive of potential.

ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE OF IMPACT BUT COULD BENEFIT FROM A FEASIBILITY TRIAL

For pre-school pupils:

Integrating music showed inconclusive evidence, mainly because of weaknesses in the studies. For example one involved only 14 children (McDonel 2013) and others did not randomize participants, so it

was not possible to attribute any effects on the intervention alone (e.g. Runfalo et al. 2012; Wellman 2007; Fisher 2011).

Integrating multi-arts. The evidence of impact for integrating multi-arts in the curriculum is also inconclusive because of the lack of replication of studies to confirm the effects. The intervention reported was the Kaleidoscope programme (Bowen et al. 2010) which showed large effect sizes on receptive vocabulary (ES = 1.7) and early learning (ES = 1.5). Only one paper was found and both the studies reported in the paper were flawed: one had only 63 participants but used a placebo to control for Hawthorne effect, and the other did not have a comparator.

Creative drama showed impact only for reading, but all the studies suffered from the same design flaws (small scale, no comparator and no pre- post-test comparisons).

For primary school pupils:

The evidence for *visual arts* is inconclusive. Three studies reported positive effects on cognitive outcomes and six studies showed mixed results. However, the positive studies had either very small sample, or had unclear samples with no random selection to participation. Two of the studies did not have a control group, so it was not possible to say if the children would have made the same progress without the intervention. In one study the intervention children also received additional enrichment activities, so it was difficult to attribute the effect on visual arts integration alone.

It is also not clear whether infusing a combination of arts into the school curriculum has any beneficial effect for primary school children. Four studies suggested positive effects, but eight studies showed mixed results for some subjects, some grades and certain children (e.g. SEN and low SES).

For secondary school pupils:

Music training and participation in music at school (band, choir, orchestra) may be beneficial for pupils' academic and affective outcomes, but the evidence is weak. Eighteen of the 20 studies were about music education. Fourteen of these suggested positive effects. Almost all were correlational in design, examining the impact of participation in music education in school (e.g. learning to play an instrument or music lessons). The results were also mixed. Two studies showed no differences between pupils who did music at school and those who did not. One was a large study of 15,630 pupils which controlled for background variables. A medium study suggested positive effects for younger children, but not for older ones.

Integrating creative drama in the classroom may have beneficial effects on academic outcomes but not on behaviour and social outcomes. Six of the eight studies suggested positive effects; five reported effects on academic outcomes. However, all suffered from serious flaws in design, so the evidence of impact is unclear.

The evidence for *multi-arts activities* in school is also inconclusive because of weaknesses in the studies (such as lack of randomization, no pre- post-test comparisons) or use of inadequate assessment instruments. One large-scale UK study found no evidence that participation in arts activities in secondary school can improve exam performance after controlling for prior attainment and social background.

For pupils across age groups:

There is mixed evidence about the effects of *integrating music and drama in the curriculum*. A majority of the positive studies were meta-analyses undertaken by the same authors and most were correlational studies comparing arts schools with non-arts schools. Studies with causal design tended to be small-scale with no randomization or no control groups. Results from experimental studies were mixed. Only two of the 18 studies reported positive effects.

More robust evaluations using large-scale randomization of participants to treatment conditions is needed to test the hypothesis of the beneficial effects of combined arts activities in secondary schools.

ARTS ACTIVITIES WITH NO EVIDENCE OF BENEFICIAL EFFECTS

These include arts activities where few studies have been conducted, and those where they have been evaluated but have shown no beneficial effects

For pre-school pupils:

There is not enough evidence to suggest that *visual arts, dance and listening to music* have beneficial effects on pre-school pupils. Very few studies were found (2 for dance and 3 for visual arts) and all were rated weak. They either did not evaluate outcomes or if they did, evaluation was based on teacher/parents' ratings.

If improving young children's cognitive skills is the aim, getting them to learn to play an instrument is more likely to succeed than getting them just to *listen to music* (Mozart effect). The evidence of listening to music is yet unknown. Only two studies were found; one apparently improved psychomotor skills and the second study showed no effects on memory. The two evaluations were also flawed.

There is also no evidence that using *creative drama* to develop pre-school children's theory of mind (understanding another person's intentions and behaviour) has been successful.

For primary school pupils:

There is no evidence that using *visual arts as an extra-curricular activity* can improve primary school pupils' cognitive and non-cognitive skills.

Using *school-based arts* as a behaviour intention has no evidence of success.

Training in aesthetic appreciation also has not shown to be effective in improving primary school pupils' metacognition and literary skills.

It is also not useful to use *drama* to develop the non-cognitive skills of primary school pupils. There is not enough evidence that it works.

Creative dance, poetry and creative writing have not been shown to be of any beneficial effects. Two of the studies on dance reported negative effects. The other studies were weak; one did not evaluate outcomes and one showed mixed results. The two positive studies were small (under 30), and had no comparison groups. Four of the five studies on poetry did not evaluate outcomes, and there was only one study on creative writing. There is therefore not enough evidence to justify trialling these arts activities.

For secondary school pupils:

There is not enough evidence that *visual arts, dance, background music, creative writing and poetry* work for secondary school pupils. All the studies about visual arts provided conflicting results. None of the studies on creative writing showed positive results. Only two of the ten studies on poetry reported positive effects. Two of the positive studies on creative dance were flawed. The other studies showed no benefits or mixed results.

Only one study tested the effects of background music on learning of secondary school pupils. Pupils performed worse on comprehension test after being exposed to background music. The study was poorly conducted. It had no comparison group and the kind of music used may be a contributory factor.

Integrating music in the curriculum also does not show evidence of beneficial effects. Only two studies were found, and both were flawed.

Creative drama as an enrichment activity does not show promise either. One study showed negative effect on behaviour, but there are concerns about the method of evaluation used in the study.

For pupils across age groups

Visual arts, dance and drama generally do not have evidence of useful benefits for children across age groups. Few evaluations were conducted on the effects of these arts activities for children across age groups. For visual arts, large-scale meta-analyses and experimental studies with causal design concluded no effect on cognitive skills. Only one study showed that exposing pupils aged 8 to 18 to visual art work in the museum had positive effects on their critical thinking skills. The test used for measuring outcomes may be related to the intervention.

There were only two studies on dance; one showed no effect on peer relationships and the second showed small effect using a very small sample.

Both studies on drama showed no beneficial effects on children across age groups, and both could not establish causal links.

2. RECOMMENDATIONS

Research to date in the area of arts education effects on cognitive and non-cognitive outcomes has been weak. A few medium quality studies were found. Many of these were correlational in design conducted in the US comparing arts with non-arts schools or arts specialist studies with non-arts students. As high performing schools in the US were encouraged to do arts, such studies cannot determine the effects of arts on academic outcomes. Experimental studies tended to be small-scale, with no clear random selection or allocation of participants to intervention groups. Some did not have comparators, so it was difficult to attribute any results to the arts activities in question. Others included a range of arts activities, so it was not possible to say which art forms were responsible for the results.

Below are some recommendations for research on arts education:

- More rigorous and robust evaluations of the impact of arts activities are needed. These should ideally focus on one or two art forms so that effect of the specific art activity can be isolated.

These should involve random allocation of sample, large scale (over 100 in each intervention arm). Where pupils' art products are assessed, judgements should be by independent expert judges who are blind to treatment allocation. In June 2015 the EEF published an evaluation of the intervention Act, Sing, Play (Haywood et al., 2015). This evaluation is not included in this review, but may provide a model for future studies in this area.

- As arts are often associated with fun and leisure activities, to make sure that any changes in outcomes are not due to the novelty effect, it is necessary to have an alternative innovative treatment for comparison, in order to separate the effect of the arts activity from the fun aspect. Is it increased enjoyment or is it the arts activity itself that lead to improved learning?
- Future research needs to think of more objective ways to measure non-cognitive outcomes.
- There is a need to develop rich measures to help evaluate whether arts can lead to the transfer of skills to other curriculum subjects.
- If interventions are to be carried out in the classroom by regular classroom teachers the teachers need to be trained accordingly, and willing to use the proposed strategies. Resistant from teachers can affect the successful implementation of the programme.
- Professional artists or certified drama or music teachers can be engaged who can incorporate, for example, mathematical concepts in their art lessons. These professionals can work together with classroom teachers to achieve the lesson objectives. Walsh-Bowers and Basso (1999) suggested that motivated group leaders who are skilled in group work and creative activity and familiar with school settings are necessary for successful implementation.
- Process evaluations are needed to understand the transference of arts learning or arts activities to other domains of learning (such as literacy or maths), and more importantly to understand the mechanism – and how this can be tested in future research.

What arts activities can be piloted?

Overall, there are no promising studies found, but there are a few arts activities that could be trialled to test their effects. On the other hand, there are some arts forms where few evaluations have been conducted. Preliminary research on these could be carried out before testing them.

1. Preliminary research

Preliminary research on the impact of arts is needed for the pre-school phase. There is currently very little research for this age group. For example, there is no study on the use of poetry or rhymes on the development of vocabulary and reading fluency for pre-school children.

There are very few evaluations of the impact of poetry and creative writing for school-aged pupils. This is an area that can be explored first with preliminary research before testing them on a larger scale.

2. Pilot trials

Instrumental music training using the Orff, Kindermusik and Kodaly methods could be pilot tested for children of all age groups.

Integrating creative drama in the classroom could be piloted for children of all age groups. Currently, the evidence of impact is inconclusive because of weaknesses in the study designs in most of the studies.

3. INTRODUCTION

This literature review was commissioned by the EEF to assess the evidence of impact of arts education on a range of cognitive and non-cognitive outcomes of school-aged children (ages 3 to 16). The purpose of the review was two-fold:

- Review the policy and practice in arts education
- Map and identify the types of arts education in schools both in UK and worldwide and evaluate and synthesise the evidence based on quality assessments of the security of evidence

3.1 Review of policy and practice in arts education

This section provides an overview of recent policy and practice developments in arts education looking specifically at music, dance, drama and visual arts education.

3.1.1 Music Education

A variety of political and sector-led initiatives supported by successive governments' policies have led to changes in the music education landscape in recent years. The Henley review of music education in England (Henley 2011) described the expectations of how music education should develop through a series of recommendations designed to ensure consistent music education provision for all children in English schools. Later in the same year (November 2011), the first National Plan for Music Education was published (DfE 2011). It aimed to ensure a high quality music education where children from all backgrounds and every part of England would have the opportunity to learn a musical instrument, make music with others through whole-class ensemble teaching programmes for a minimum of a term, learn to sing and have clear progression routes available. A short survey of music education partnership work in schools (Ofsted 2012a) commissioned by the Department for Education as part of the National Plan for Music Education, aimed to support schools in monitoring the effectiveness of music provision and developing musical partnerships by highlighting examples of best practice.

The National Plan for Music Education also introduced the new music education hubs which would take forward the work of local authority music services to help improve the quality and consistency of music education across England. These music education hubs were created in September 2012. An Ofsted report that was released in November 2013 entitled 'Music in Schools: what hubs must do, the challenging conversation with schools' (Ofsted 2013) urged hubs to reframe the nature of their relationships with schools and school leadership teams arguing that they were failing to support schools in raising pupil attainment standards. Even though the hubs visited were thought to bring new energy and vitality to musical work in schools, only a minority of pupils was reached. A recent collaborative research project commissioned by the Associated Board of the Royal Schools of Music (ABRSM 2014) recognised the wealth of initiatives that helped bring about real improvement in music education. However, similarly to the Ofsted report, it also raised areas of concern particularly in relation to children from lower socio-economic groups being significantly disadvantaged in comparison with children from more affluent backgrounds. Furthermore, the study found regional support to be variable and there were poorly supported progression routes available for learners. Similar observations were made in an independent review of music education in schools commissioned by the Paul Hamlyn Foundation (Zerserson 2014). The review found inconsistencies in the quality of music education in the UK with low teacher confidence and support but improved quality of music-making, diversity and inclusiveness in school music. The Musical Futures initiative was found to contribute positively to music education in schools enhancing

teaching confidence and professional satisfaction, as well as engaging teachers in peer learning and professional networks. Similar benefits of Musical Futures were reported in a case study investigation carried out over a three year period (Hallam, Creech & McQueen, 2011).

There are plenty of music education initiatives, various organisations and charities in the UK and worldwide that aim to support children's musical development in formal and informal educational contexts. Some notable examples in the UK include the *Sing Up* organisation which was launched in 2007 as the National Singing Programme for Primary schools in England under the UK Government's Music Manifesto and continues to offer singing resources, training and personalised support to schools. Furthermore, funded by the British cellist Julian Lloyd Webber, *In Harmon* is a commendable social and music education programme based on the international *El Sistema* movement that uses music to bring positive change to the lives of children in disadvantaged areas of England through ensemble musical participation. Other organisations that offer music education support in the UK include the *Schools Music Association*, the *Youth Music Network*, and the *UK Association for Music Education* (Music Mark) among others. Outside of the UK, *Musica Viva* seeks to offer musical support to schools in Australian schools and *Music Together* is an internationally recognised music programme for children from birth through age 7 offering a range of high quality music education and outreach programmes.

3.1.2 Dance Education

Concerns have been raised about dance being 'severely underfunded' as an art form that lacks adequate representation in the school system in England. Following Darren Henley's review of music in schools (Henley 2011), Sadler's Wells artistic director Alistair Spalding called for a similar initiative in dance in an attempt to seek the support of the government for the promotion of dance in education (Woolman 2011). In his Cultural Education in England Review (Henley 2012), Darren Henley recommended that Dance should be seen as a subject area in its own right and not as a supplement to Physical Education (PE). However, this recommendation was not followed through in the 2013 new National Curriculum in England. In a campaign to fight for the position of dance in schools and the curriculum in England, Linda Jasper, director of Youth Dance England, argued that dance should be an entitlement for all children and young people as part of a broad and balanced programme, whether it is taught within PE or Dance/Performing Arts contexts (Jasper 2012).

Frank Doran (Member of Parliament) strongly supported the role dance can play in educationⁱ arguing for the popularity of dance as an art form among young people, especially for girls. Effective provision of dance in schools could encourage women to exercise for their whole lives (Doran 2011). Similarly, Sir Ken Robinson urged schools to devote equal time to dance and maths arguing that it is important for children to learn to use their bodies as well as their minds: "You live in your body all day long. And... how we relate to ourselves physically is of fundamental importance to our sense of self" (Robinson 2014).

Recent sports funding provision to primary schools was expected to offer "a new lifeline for dance education in schools" (Fort 2013) and a number of dance-related initiatives aimed to increase dance educational opportunities for boys (Jobbins 2005) and participation in dance for young people in Scotland (Muldoon and Inchley 2008). An audit of dance provision in English schools recommended the improvement of dance facilities in schools, the provision of further opportunities for boys to engage in dance education in curriculum and out of schools hours, as well as greater availability of professional dance teachers in curriculum provision, more continuing professional opportunities for those providing dance education and more links with external organisations (Youth Sport Trust 2006/2007). The

importance of such improved dance provision is echoed in earlier remarks made at an earlier conference that took place in Westminster in 2002 (Hale 2002). The overriding message was that “The future of dance in Britain begins at school” and that

“...if children are to be encouraged to continue dancing after age 11 they need, above all, to be exposed to great dancing that moves, inspires and connects with them. They need to work directly with first-class artists to encounter the reality of dance as a career. And there needs to be continuity between dance in the curriculum and the informal and culturally diverse forms of dance that 10 million young people per week experience in their lives.”

A number of national and more localised organisations such as arts charities in the UK are available to offer support, training and expertise in dance education in schools (for example, Youth Dance England and Pavilion Dance South West). A variety of other organisations offer specialised expertise and workshops in a number of different dance genres, such as contemporary dance, French dance, multicultural and African dance.

3.1.3 Drama Education

Similar to dance education, drama has been the subject of heated debate in recent years with attempts made to help consolidate its place within the curriculum. Prior to the publication of the new National Curriculum, concerns were raised about the ‘disturbingly bleak’ future of drama in schools in England (Baldwin 2012) with no secure entitlement for children to learn about and take part in regular drama lessons as part of a broad and balanced curriculum. The poor image of drama as a subject was reinforced by the emphasis of the English Baccalaureate on ‘a core of academic subjects’. A report released from the Department for Education in October 2012 on the effects of the English Baccalaureate (Greevy et al.2013) mentioned that drama and performing arts were the most commonly withdrawn GCSE subjects having been dropped in nearly a quarter of schools. A letter sent in November 2012 from the Department for Education suggested that drama is not considered to be core knowledge as far as ministers are concerned - ‘it is more a question of pedagogy and therefore outside the remit of the (primary) curriculum review’ (Baldwin 2013).

Patrice Baldwin, chair of National Drama and a former Ofsted inspector, described the ‘rapid, irreversible damage’ that recent policy changes have brought about in drama education ranging from its secondary importance as a GCSE subject to PGCE drama specialist courses being cut and the new national curriculum that has further marginalised drama as a subject (Severs 2014). The Key Stage 3 new national curriculum in English hardly mentions drama and fails to provide drama with a programme of study. However, there was a positive addition in the English programmes of study for Key Stages 1 and 2 relevant to children’s learning and involvement in drama which was welcomed by the sector (Cultural Learning Alliance 2013). As with music and dance, a variety of organisations support drama teaching in schools through drama projects and training opportunities, such as Drama Education Network, National Gallery projects, Drama UK and Arts on the Move).

3.1.4 Visual Arts Education

The teaching of art and design in schools occupies a statutory place within the National Curriculum in England (DfE 2013). Its purpose of study is stated as:

“Art, craft and design embody some of the highest forms of human creativity. A high-quality art and design education should engage, inspire and challenge pupils, equipping them with the knowledge and skills to experiment, invent and create their own works of art, craft and design. As pupils progress, they should be able to think critically and develop a more rigorous understanding of art and design. They should also know how art and design both reflect and shape our history, and contribute to the culture, creativity and wealth of our nation.”

Engagement with art and design in school is considered important for the cultivation of a range of skills and competencies, such as the ability to be creative, the development of critical skills, the cultivation of a child’s cultural knowledge and aesthetic judgment. Supporting views about the value of art and design education have been shared in a number of publications (for example, Schnapp 2009; Earle 2013) including Darren Henley’s recent independent review of cultural education in England. A 2008 US report funded by the Wallace Foundation (Zakaras and Lowell 2008) argued that arts policies should help cultivate ‘demand’ for the arts in addition to ‘supply’ and ‘access’. Investing in demand should develop valuable engagement in aesthetic experiences:

“It is our view that without this investment, audiences for the arts will continue to diminish despite heavy investments in supply and access. We propose that policies be balanced to support supply, access, and demand, and that the overarching goal of these policies be to increase the number and quality of aesthetic experiences. These experiences are a better measure of the cultural health of a nation than are the number and quality of its works of art.”

Other recent writings are based on the ‘discipline-based arts education’ (DBAE) approach which was developed in the 1980s by arts educators in an attempt to clarify what should be included in an arts curriculum. A research report published in 2004 by the National Foundation for Educational Research entitled ‘*School art: what’s in it? Exploring visual arts in secondary schools*’ (Downing and Watson 2004), aimed to explore the content of the secondary school art curriculum and examined the range of approaches taken by different teachers and schools in relation to contemporary art practice in particular. A series of Ofsted publications in 2009 and 2012 (Ofsted 2012b) evaluated the strengths and weaknesses of art, craft and design education in schools and colleges in England making recommendations and putting together resources to help improve provision. One of the key findings in the 2012 “Making a Mark report” was the strong student enjoyment of the subject across the age and ability range which was marked by students’ positive attitudes in lessons, high attainment and the popularity of the subject as an option in Key Stage 4.

Support and resources are available for art and design teaching and learning through different organisations and programmes such as AccessArt, the work of the Arts Council England with initiatives such as *Bridge Organisations* and *Artsmark* in the UK or the Center for Arts Education, the Creative Classrooms Visual Arts Program as part of the *Reinvesting in Arts Education* initiative and the National Endowment for the Arts agency in the US among many others.

4. METHODS USED IN THE REVIEW

The studies in this literature review were identified from a search of eleven educational, social sciences and psychological databases: (ASSIA, ERIC, BEI, International Bibliography of Social Sciences, ProQuest dissertations and theses UK & Ireland, ProQuest dissertations and theses Global, Social services and Sociological Abstracts, Educational Abstracts, PsycInfo and PsyARTICLES fulltext

The search was limited to those reported or published in the English language, between the years 1995 and 2015. However, some older materials (pre 1990s) were picked up in the search. We kept some of these if we thought they might add to the evidence base.

The target age of children are those from aged 3 years to 16 or compulsory school age. Arts education refers to a broad range of subjects including the traditional fine arts (e.g. visual arts, music, dance, performing arts, theatre and dance) as well as modern dance and movement, hip hop and creative writing. We included only studies that relate to children in mainstream schools. Studies of interventions designed specifically for children with behavioural or learning disabilities and those who are in institutions or incarcerated were excluded.

This review considered studies on all types of arts programmes/initiatives or experiments that assess impact on cognitive and non-cognitive outcomes. Cognitive outcomes included academic performance on standard tests and teacher assessments, (Key Stage (KS) results and IQ (or any measurement of intelligence)). We included a very broad definition of non-cognitive outcomes (such as self-concept, motivation, locus of control, confidence, resilience, leadership skills, creativity) and non-academic school outcomes such as school attendance and attitude towards school or curriculum subjects.

This review was not intended to be comprehensive, but to identify the types of arts activities that have the potential to improve the school achievement and wider/affective outcomes of young people from disadvantaged backgrounds. The purpose was to provide evidence of the impact of visual arts (defined as painting, drawing, ceramic/pottery, sculpture and printing), music, drama and dance that will inform the EEF in their decision to call for projects.

A very broad search was conducted using the syntax below:

((art* or music, or drama or dance or fine art* or creative writing) AND (program* or initiative* or project or educa or instruct* or educati* or train* or learn*) AND (evaluat* or interven* or trial or experiment or review or meta analys* or cause* or effect* or determinant or regression discontinuity or instrumental variables or longitudinal or randomi* control or controlled trial or cohort study or meta-analys* or systematic review) AND (attain* or achiev* or outcome* or learning outcome* or school outcome* or cognitive outcome* or academic or other outcome* or critical thinking or key stage* or exam* of qualification* or school readiness or test score* or non cognitive or attitude or expectation or aspiration or behav* or intention or motivation or self-efficacy or locus of control) AND (child* or school))

Altogether 76,195 study reports were identified (63,195 from the Social Science databases and 13,000 from the Psychological databases).

Additional search for poetry and creative writing using:

((poetry or poem* or verse or rhyme* or limerick or stanza or creative writing or expressive writing or imaginative writing) AND (program* or initiative* or project or educa or instruct* or educati* or train* or learn*) AND (evaluat* or interven* or trial or experiment or review or meta analys* or cause* or effect* or determinant or regression discontinuity or instrumental variables or longitudinal or randomi* control or controlled trial or cohort study or meta-analys* or systematic review) AND (attain* or achiev* or outcome* or learning outcome* or school outcome* or cognitive outcome* or academic or other outcome* or critical thinking or key stage* or exam* of qualification* or school readiness or test score* or non cognitive or attitude or expectation or aspiration or behav* or intention or motivation or self-efficacy or locus of control) AND (child* or school))

Given the time frame and the wide range of subjects and outcomes, the search cannot be expected to be comprehensive in including all relevant material. It is possible that some studies, for example, commercial evaluations may be missed because they were not publicly available.

In assessing the evidence of impact, consideration was given to the research design of each study. For example, observational and ethnographic studies and those with no pre- post-test comparisons and no comparison groups by themselves cannot demonstrate impact. The evidence of impact was judged based on the research design and not the conclusion or reported effects in the study report. Hence, the positive results from these studies should be read in that light. The identified studies are classified by:

- phase of schooling (pre-school, primary and secondary)
- types of interventions broken down by subjects (e.g. music, art, dance and drama, creative writing and multi-arts). Art is broadly defined as visual arts which include drawing, painting, sculpture, ceramic/pottery work and fabric printing.
- approaches with high levels of supporting evidence of effect
- approaches with inconclusive evidence or which have not been evaluated
- approaches with little evidence of success

5. RESULTS

After reading abstracts, a total of 244 papers were identified as directly relevant to the review. Of these 199 were included for data extraction from reading the full paper. These were empirical studies that include description of the sample and the interventions. Ethnographic studies which were narrative accounts of the researchers' experience were largely excluded. However, a few ethnographic narrative studies on creative writing and poetry were included because of the sparsity of studies in these two areas. Advocacy pieces without data were also excluded from the review. We included all empirical pieces; those using experimental designs as well as observational pieces, but excluded those that espouse theoretical frameworks of how arts education might be beneficial to learning. The vast majority of research in this area was undertaken in the US, most of which were PhD theses. There was much less experimental research on arts participation in the UK. Biased reporting is not uncommon. As an illustration, we singled out some here for discussion:

James (2011) concluded that infusing arts was effective in enhancing maths engagement and achievement because of the big gains made by experimental children between pre- and post-test. However, the results showed that control children made even bigger gains but this was not mentioned in the discussion. The author then went on to cite positive effects on engagement using teacher reports. E.g. *"I think the kids really enjoyed the lessons'* and *'One of students who rarely turned in homework started to turn in his maths homework'*

In another study, Thomas and Arnold (2011) reported programme effects on pupils' interest and attitudes towards school and creative expression based on feedback from teachers and administrators even though effects on the affective outcomes of pupils were not assessed.

Bettencourt (2009), despite finding no effects concluded that the overall data showed that the intervention had positive benefits on students and educators, and that self-reflected learning was beneficial to students. The researcher then made recommendations for introducing writing activities into maths lessons stating that traditional methods of teaching maths had been shown by previous research to be ineffective.

Similarly, Ayers (1993) reported no significant differences between groups, but concluded that pupils in the treatment group showed greater retention of information. This was not substantiated by the data presented. In fact the data suggest that control children made bigger gains than those in the experimental group. In terms of retention, the data showed that both groups registered a loss in retention of information, but analysis of data 6 weeks after the intervention showed that control group retained more information than experimental group. Even after controlling for reading and maths pre-test, no significant results were found.

Another example is a study by Harland et al. (2000). The study showed no relationship between arts participation and performance at national exam when prior attainment and social background were accounted for. Yet they claimed that arts participation boosted general academic performance and also resulted in greater personal development. It has to be noted that positive effects on creativity, critical thinking, self-confidence and other personal and social development skills were assessed using interviews.

In another study, Gabhaainn et al. (2001) suggested that the increase in self-esteem in the 2 intervention groups were comparable, even though the data suggest that the control group actually made bigger gains. This was because one of the comparison groups participated in a self-esteem enhancement programme 'Circle Time', which was more effective than the community arts programme.

As each of the art forms involves a range of activities and also a range of outcomes, we discuss the effects separately. For example, under music we isolate the effects of listening to music and playing an instrument.

Since different activities affect different outcomes, we also aim to discuss their effects separately. For example, although integrating visual arts in the classroom may be beneficial for academic learning, arts as an extra-curricular activity may not be useful as a behaviour intervention.

Not all art forms have similar impact on children in different phases of schooling. For this reason, we synthesise the results by school phase.

Table 1: Number of studies for each arts form

| Types of arts | Number of studies |
|--|-------------------|
| Visual art/general art (drawing, painting, sculpture, pottery) | 26 |
| Music | 71 |
| Dance | 15 |
| Drama | 27 |
| Creative writing | 7 |
| Multi-arts | 38 |
| Poetry | 15 |
| Total | 199 |

The vast majority of the studies were about music education and its effects on young people’s cognitive, social, emotional, behavioural and academic outcomes. The next biggest group of studies was those that looked at combined arts activities in school – music, drama, visual arts and dance. Our search picked up very few studies on creative writing as an artistic activity. Much of the research on this area evaluates creative writing in higher education, and even then the evaluation was about creative writing as an outcome and not as an influencing factor on learning outcomes.

There were also proportionately more arts education studies for primary school children than any other age group (Table 2).

Table 2: Types of arts activities and phase of schooling

| | Pre-school (under 6) | Primary (6-11) | Secondary (12-16) | Across age groups |
|--|----------------------|----------------|-------------------|-------------------|
| Visual art/general art (drawing, painting, sculpture, pottery) | 3 | 12 | 8 | 3 |
| Drama | 5 | 12 | 8 | 2 |
| Dance | 2 | 6 | 5 | 2 |
| Music | 17 | 30 | 20 | 4 |
| Creative writing | - | 1 | 6 | - |
| Poetry | - | 5 | 10 | - |
| Multi-arts | 1 | 13 | 5 | 19 |
| Total | 28 | 79 | 62 | 30 |

We summarise the results by phase of schooling, reported impact and types of arts activities. To determine how much confidence we can place on the findings of the included studies, we assessed the quality of evidence based on the research design (sample size, selection and allocation of sample, attrition, threats to validity and reliability and appropriate analyses), and not solely on the reported outcomes. For example, several studies reported positive impact even though there was no data. There were a number which completely ignored the data and made their own conclusions independent of the data. We largely ignored the conclusions but based our assessment on the quality of the evaluation.

We then categorized the findings by three levels of evidence: those that have high levels of evidence of effect; those with inconclusive evidence and those with no evidence of beneficial effects. The latter included those that have no or negative effects or where effects were not evaluated, as well as those where there were too few studies to judge the strength of the evidence.

It is important to make a distinction between studies where we can trust the evidence of impact and those where the evidence is weak or non-existent regardless of whether the reported impact is positive or not. This is the purpose of the evidence rating. Studies that reported positive impacts and rated medium in evidence would have greater evidence of impact compared to those which reported positive impacts but rated weak in evidence. For example, there were reports that claimed that children had made significant gains at the end of the intervention without any comparison group. With no true counterfactual it is impossible to say if the children would have made similar progress if they had not been on the programme.

There were studies that compared children in one cohort with those from previous cohorts in one school. Any differences could be due to differences in pupil intakes. There were also studies that compared children who were selected by teachers for participation with those that were not, and some compared children in arts-focused schools with non-arts focused schools. These studies would be judged weak in evidence as the two groups of children are likely to be different so any improvements could be due to differences in the type of pupils and not necessarily the result of the intervention.

It is also not uncommon to find studies that reported big gains on teacher/researcher-developed tests or teacher surveys. A number of studies also reported significant improvements based on teachers' perceptions of impact, but no effects based on standardized tests. There were a number of large-scale correlational studies using national data. These were generally well conducted, and were rated medium weak, mainly because they suggest a link between arts participation and pupil outcomes, but on their own they cannot demonstrate causality. However, if there are enough studies suggesting a relationship and these are supplemented by randomised trials showing positive effects, then the evidence can be quite compelling. If no high quality controlled trials were found, then this can be an indication that trials could be conducted to test the positive relationship suggested by these large-scale correlational studies.

Details of these studies can be found in the Appendix. To facilitate reading, we have pulled out these studies and organised them first by phase of schooling and then by whether they have promise based on the level of evidence presented by the studies uncovered.

5.1 ARTS EDUCATION FOR PRE-SCHOOL CHILDREN (AGE 3-5/6)

There were relatively few studies that evaluated the impact of arts education on pre-school children's learning outcomes. Only 28 studies were found, most of which were on music education.

5.1.1. ARTS ACTIVITIES WITH SOME POTENTIAL

Music training

Table 2: Music (n=17)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|---|--------------------|
| No beneficial impact | 1 | | 1 | |
| Mixed impact | 2 | | 2 | |
| Positive impact suggested | 14 | | 8 2 (with promise) 2 not determined | 2 (medium to weak) |

The most promising arts activity for pre-school children is music training. The largest number of studies for this age group of children was about music integration and playing an instrument. Of the 17 studies, 14 reported positive results and 4 of these looked promising.

There is stronger evidence for playing an instrument than just listening to music. Three methods of learning to play an instrument have shown to have positive effects on very young children's cognitive development: Kindermusik, Orff and the Kodaly method of music instruction. Positive effects of music training (playing an instrument) were reported for a range of outcomes: creativity (Duncan 2007), spatial-temporal ability (Gromko and Poorman 1998), IQ scores (Kaviani et al. 2014; Nering 2002), reading and language (Myant et al. 2008; Harris 2011).

One study on monozygotic twins (Nering 2002) produced quite convincing results of the impact of music training on intelligence. Nering conducted a 7-month experiment on 10 sets of monozygotic twins aged 3 to 7. One of each set of twins received private piano instruction, while the other received no training. Experimental twin showed significant improvement in IQ and arithmetic scores on the Wechsler test of intelligence, but control twin did not.

5.1.2 ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE

Integrating music in the curriculum

The evidence for integrating music into the curriculum is weaker. Several studies reported positive impact but they had serious design issues. One involved only 14 children (McDonel et al. 2013), another included only children whose parents were academics in a University child care centre (Ritblatt et al. 2013). Others did not involve random allocation of participants (e.g. Runfalo et al. 2012; Wellman 2007; Fisher 2011), or based results on classroom observation of a small number of children (Wade 2011) with no comparison group. In Wade's study positive changes were observed in only 3 out of the 8 children and the results were not convincing. The assessments of impact were based purely on observations. Wellman (2007) reported higher post-test scores for experimental children, but it was not clear if experimental groups made bigger gains than control groups between pre and post-test. There were substantial differences in pre-test scores which could explain the higher post-test scores of the experimental group. The very small samples had implications for external validity.

Creative drama

Table 2b: Drama (n=5)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | | 1 | |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 3 | | 3 | |

Creative drama has shown potential but only for reading (Goodman 1990; Pelligrini and Galda 1982; Pelligrini 1984). The evidence, however, is not strong. Only three studies were found, and they were all small-scale (with fewer than 50 participants in each intervention group). One did not have a control group and two did not have pre- post-test comparisons, so it was not possible to say if improvement in reading skills was due to the drama activity or natural development of the children. Two other studies showed no effect on social-cognitive skills (Smith 2011; Mage 2008). Both were weak evaluations. One used an invalid test meant for older children, and the other did not randomize children to treatment groups. So any differences could be due to differences between children and not the intervention.

Integration of combined arts activities

Table 2: Multi-arts (n=1)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------------------|
| No beneficial impact | | | | |
| Mixed impact | | | | |
| Positive impact suggested | 1 | | | 1 (medium to weak) |

Only one paper on multi-arts integration was found for pre-school children (Brown et al. 2010). The Kaleidoscope integrated multi arts programme appears promising, but the two studies reported in this paper were flawed in their design; one did not have a true counterfactual, and the other had only a sample of 63 but used a placebo (alternative programme) to control for the Hawthorne effect. What is impressive are the large effect sizes reported for academic outcomes (receptive vocabulary and early learning) measured using standardised tests (ES =1.7; 1.5).

5.1.3 ARTS ACTIVITIES WITH LITTLE EVIDENCE OF EFFECT

Listening to music

There is no evidence that listening to music (so called Mozart Effect) is beneficial. The two studies showed conflicting results. Thompson (2005) suggested positive effect of listening to classical music on psycho-motor skills, while Bressler (2003) found no effect on children’s memory. Both studies were weak, involving very small sample (under 100) taken from one setting. This posed a threat to external validity. Bressler’s study was only a 10-minute session, too short for real effects (if any) to be realized. Thompson’s study did not involve random assignment of children. Children could be different in ability, motivation, prior musical experiences etc. The classes were also taught by different teachers – teaching quality and teacher characteristics may have influenced the results.

Dance, visual arts

Table 2: Visual arts (n=3)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | 1 | | |
| Mixed impact | 2 | | | 2 |
| Positive impact suggested | - | | | |

Table 2: Dance (n=2)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | 1 | | |
| Mixed impact | | | | |
| Positive impact suggested | 1 | | 1 | |

All the other arts activities did not show evidence of impact. Few studies were found for dance (n=2) and visual arts (n=3). These were all rated weak in evidence. Some did not evaluate outcomes (e.g. Hardy 2011 on visual arts; Cheung 2010 on dance), or where they did it was based on teacher/parents' ratings (e.g. Lobo and Winsler 2006).

5.2 ARTS EDUCATION FOR PRIMARY SCHOOL CHILDREN (AGE 6-11)

Arts education for primary school children was by far the largest group with 79 studies in all. A large proportion was on music education (n=30). The rest was on a combination of multi-art forms (n=13), drama (n=12) and visual arts (n=12), and a small number on dance (n=6) and poetry (n=5). There was only one study about creative writing for primary school children.

5.2.1 ARTS ACTIVITIES WITH POTENTIAL

There is some evidence that music has favourable effects on young children's learning outcomes, in particular cognitive abilities, and to some extent self-esteem and social behaviour. Of the 30 studies, 20 suggested positive effects. Four of these were of medium weak quality. Individually the evidence from these studies may be weak, but taken together the positive effects suggest there is potential in this area that is worth pursuing.

Table 3: Music (n= 30)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|---------------|
| No beneficial impact | 6 | 1 | 5 | |
| Mixed impact | 4 | | 3 | 1 medium weak |
| Positive impact suggested | 20 | | 16 | 4 medium weak |

Integrating music in the curriculum

Integrating music in the curriculum and playing an instrument hold the most promise. A range of positive outcomes was reported. Integrating music in the curriculum has consistently shown to have positive effects on reading (e.g. Cochran 2009; Lyons 2009; Register et al. 2007; Peters 2011; Bryant 2013; Walton 2013) as well as on maths (An 2013; Courey et al. 2012;). Two studies showed no effects, but both were weak. One had only 25 children taken from one school (Tendall 2010). The music and movement group already achieved the highest scores in the pre-test, leaving no room for improvements. The lack of difference between groups could be due to the ceiling effect. Another study reported that the groups were not statistically different on pre- post-test of reading attitude (Kingsriter 1998). The use of significant tests on such a small sample (n=2 classes) was inappropriate.

Music training/playing an instrument

Music training and learning to play an instrument also shows promise, although the evidence is weak. Positive outcomes were reported for speech (e.g. François et al. 2013; Moreno et al. 2009), brain development (e.g. Olsen 2010; Schlaug et al 2005; Schellenberg 2004; Degé et al.), academic outcomes (e.g. Harris 2008; Piro and Ortiz 2009) and other cognitive skills (e.g. Roden et al. 2014; Costa-Giomi 1999). All these studies apart from two were rated weak (François et al. 2013; Schellenberg 2004). The UK study (Harris 2008) involved 190 participants who came from one type of school. This limits the generalization of the findings to other populations. Crucially, there was no comparison of gain scores, and it was not clear if children were randomly allocated. The higher scores achieved by the music group may suggest that the two groups were not equal to begin with. Although brain scans showed changes in the brain development of musically trained children, there was no evidence that the changes translated to improvements in academic attainment (Schlaug et al. 2005; Olsen 2010). The well-conducted studies, tended to be small scale (e.g. François et al. n= 28; Moreno et al. n=33). Larger scale studies were invariably correlational studies that could not establish causality (e.g. Moinar 2012)

5.2.2 ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE

Creative drama

Table 3: Drama (n= 12)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|----------------------|------------------|
| No beneficial impact | 3 | 1 | 1 | 1 |
| Mixed impact | 4 | | 3 | 1 medium to weak |
| Positive impact suggested | 5 | | 5 (4 with potential) | |

For primary school aged children, creative drama appears to have some promise on academic outcomes though not for non-cognitive outcomes. Five reported positive effects, but were all rated weak in evidence (Hendrix 2011; Poulsen 1998; Parks & Rose 1997; Joseph 2014; Du Pont 1992). All had a small sample (under 50 in each treatment arm), and two did not randomly allocate participants (Hendrix 2011; Poulsen 1998). Four further studies showed effects for some measures and no effects on others (Goldstein 2010; Laurin 2010; Rose 2000; Fizzano). In most cases creative drama was integrated in the classroom as part

of an instructional strategy. Although the evidence from the individual studies is weak, the consistent positive effects on academic outcomes suggest there is potential for pilot trials to test the effectiveness of the intervention (e.g. Rose 2000; Joseph 2014; Hendrix 2011).

Visual arts

Table 3a: Visual arts (n=12)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 3 | | 2 | 1 |
| Mixed impact | 6 | | 6 | |
| Positive impact suggested | 3 | | 3 | |

There is also no clear evidence that visual arts can enhance the cognitive and non-cognitive outcomes of primary school children. There were three positive studies and six with mixed results. The three positive studies all reported effects on cognitive outcomes (history, creative thinking and maths) and all involved integrating visual arts in the lessons. However, all had either a very small sample or unclear sample (Phillips and Bickley-Green 1998), allocated by class to treatment groups. In one study the experimental children also received additional enrichment activities which were not available to the control group (Brugar 2012). Two of the four positive studies did not have a control group (Fountain 2007; Phillips and Bickley-Green 1998), so it was not possible to say if the children would have made the same progress without the intervention.

Finnan-Jones' study reported positive effects on standardised tests of maths for 194 English language learners. Children were allocated non-randomly by class (n=4). This study may be replicated using large randomised samples with proper counterfactuals and control for confounding variables. Luffing's (2000) study of SPECTRA+ (a creative arts programme) showed positive effects of SPECTRA+ on overall test of creativity but not on the subtest of elaboration. Positive effects were seen in one district on maths, reading and vocabulary, but not in another district, and among boys and only for some grades. Different assessments were also used in different districts which could explain the different outcomes, and conditions were nested within schools so there is a possibility of diffusion. This was a fairly large study involving 615 children. Catterall and Pepler (2007) found effects of visual arts on only some measures of non-cognitive outcomes. This was also a small study involving 170 non-randomly selected and allocated children. Differences in outcomes could be due to pupil characteristics or teacher effectiveness. Another study found no effect of visual arts on standardized tests of non-verbal intelligence (Stephens 1996).

Integration of combined arts activities

Table 3 – Multi-arts (n= 13)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | | | 1 |
| Mixed impact | 8 | | 7 | 1 |
| Positive impact suggested | 4 | | 3 | 1 |

It is also not clear whether infusing a combination of arts into the school curriculum has any beneficial effect for primary school children. The overall evidence is weak. Four studies reported positive effects (Venzen 2011; James 2011; Manning 2003; Clark 2007). Eight studies showed mixed results (Kinney and Forsythe 2005; Matthews 2001; Ffolkes-Bryant 2010; Smithrim and Upitis 2005; Van Nuys 1998; Yorke-Vinney 2007; Omniewski 1999; Luftig 2000). These studies reported positive impact for some subjects, for some grades and certain types of school and children (e.g. SEN and low SES).

One study found no beneficial effects of infusing arts on children's maths performance (Muehlbauer 2000). This was a study of the DWOK (Different Ways of Knowing) programme which integrated visual and performing arts in the curriculum. It was a large study involving 831 children comparing children in DWOK schools with matched non-programme schools. The study was rated medium weak because there was no pre-post test comparisons and no baseline equivalence was established.

5.2.3 ARTS ACTIVITIES WITH LITTLE EVIDENCE OF EFFECT

Creative arts as an extra-curricular activity

A large-scale study involving 400 children showed that arts as an extra-curricular activity in school had negative effects on primary school children's reading and arithmetic (measured on standardized tests). Experimental children made less gains in arithmetic scores compared to control children. In reading, both groups did worse in the post-test than in the pre-test, but the experimental group did significantly worse. Standardised tests on non-cognitive outcomes (achievement motivation, self-image and peer acceptance) also showed no obvious effects of participation in the extended school day activity. This study was rated medium because of the large sample. Although the groups were not randomly allocated, baseline equivalence was established.

School-based arts

An evaluation of a school-based creative arts programme (Wurzel 2012) reported negative effects on problem-solving behaviour. Although experimental children made bigger gains than control children on self-esteem and affective outcomes, the differences were not significant. This study was rated weak because of the very small sample (n=29) and no randomization to treatment conditions. Groups were not equal to begin with. 85% of control children had anger issues compared to experimental children (38%). The intervention was also not fully implemented because of non-compliance within groups due to disruptive behaviours.

Aesthetic appreciation of art

One study which involved teaching children aesthetic appreciation found no effect on metacognition and literary skills (Dennis 1995). This was also a small study (n=52) with no random selection or random allocation to groups. The study was rated weak because of serious flaws in its design. Both treatment groups were exposed to aesthetic appreciation prior to the study, so there is diffusion of intervention effects. There were no reliable measurements for assessing literary analysis. The assessments were specific to the instruction. The intervention involved getting pupils to practice making a concept map addressing the question: *What do you look for and think about in a work of art?* The test prompts used exactly the same practice questions that were familiar to the experimental pupils but not for the control children.

Creative drama on non-cognitive skills

All the negative studies showed no effects of drama on non-cognitive outcomes of primary school aged children (Schaffner et al. 1984; Roberts 2007; Freeman et al. 2003). Schaffner et al. (1984) did not evaluate the impact, but suggested and speculated on the possible effects. There was also no comparison group, so it was not possible to say if drama activities had any beneficial effect on language use compared to regular classroom activities. Roberts's (2007) study found no effect on self-concept. The evidence, however, was weak because of several issues with the study design. The sample included 30 5th grade children. These were non-randomly selected and allocated. The groups were not equivalent at the outset. Also, both groups were exposed to other forms of art, music and other innovative teaching instruction. All these could have diluted the effects. Freeman et al. (2003) also found no effects of creative drama on self-concept and other non-cognitive skills (social skills and behaviour). This was a well-conducted study and with proper randomization and pre- post-test comparisons. Although the sample was reasonably large (n=237), it was divided into four groups. Effectively, there were only 49 participants in the treatment group and 47 in the control with pre- and post-test data. All children received some kind of enrichment activities, but on days when the experimental group had drama, the control had music. As the control group was involved in music (also an arts activity) comparing music and drama may obscure the benefits of the treatment if participation in music influences the traits related to the outcomes measured. This study was therefore, rated medium to weak.

Other arts activities

Table 3: Dance (n= 6)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | 3 | 1 | 2 | |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 2 | | 1 | 1 (Medium weak) |

Table 3: Poetry (n= 5)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | 1 | | |
| Mixed impact | | | | |
| Positive impact suggested | 4 | 1 | 3 | |

The evidence of impact for the other arts activities (dance, poetry and creative writing) was weak. There were only six studies on dance for primary school children, five on poetry and 1 on creative writing.

There is no clear evidence that creative dance has any influence on primary school children's cognitive and non-cognitive outcomes. Six studies on dance were found, two showed negative effects (DiSanto-Rose 1996; Von Rossberg-Gempton date), one did not evaluate the effect (Giguere 2007) and one

reported effects on only some aspects of academic self-concept for girls only (Stratton-Gonzales 2008). All were rated weak in evidence. Both the positive studies had no comparison group and had a very small sample (one had only 10, the other 30 participants). Generally, dance was reported to benefit girls more than boys.

The evidence for the impact of poetry on young children's outcomes is generally weak. Only five studies were found, of which four reported positive effects on academic and non-cognitive outcomes. Of these 4, three did not actually evaluate impact but inferred effects from pupils' responses. Crozer's (2014) evaluation, for example, was based on interviews with 28 of the 803 pupils who were taught through the after-school programme. The pupils reported enjoying the lessons more than before. The sample could be a biased selection of the keen and enthusiastic ones. Friedman (2012) also interviewed pupils to get their feedback on the programme. The researcher was also the teacher, so this could have influenced pupils' responses. The study involved only 28 children from one class with no comparison group. Another study was based on a case study of five children from a class of 40. Children volunteered for the lunch time writing club. Positive effects on children's cognitive and linguistic development were deduced from the researcher's interpretation from the children's writing. Other non-cognitive effects were based on the pupils' self-report. The only positive study with proper evaluation was based on 16 children and case study report of six. The children volunteered to join the after-school club, so the results (if any) may not be achieved with less willing participants. There was no comparison group, so any improvements could be due to factors such as maturation, novelty effect or teacher effect. These confounding factors were not controlled, so it is difficult to say if the changes in reading behaviour were the result of the intervention. Assessments were also based on teacher or researcher-developed instruments, which may be intervention specific.

Only one study on creative writing for primary school children was found (Simle 1993). The study reported that children taught creative writing performed better than children in the control group and those not using any spelling words. The test was on spelling words used in the intervention. On standardized test of unfamiliar words, there were differences in results. The evidence of impact was weak because the test was not valid since it used spelling words that the treatment children practiced in the weekly session, but were not available to children in the other 2 groups.

5.3 ARTS EDUCATION FOR SECONDARY SCHOOL-AGED CHILDREN (AGE 11-16/17)

5.3.1 ARTS ACTIVITIES WITH POTENTIAL

No promising studies were found for this age group.

5.3.2 ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE

Music training

Table 4: Music (n= 20)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------------------|
| No beneficial impact | 5 | | 4 | 1 |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 14 | | 13 | 1 (medium to weak) |

Music education, including playing an instrument, appears to have some promise though the evidence is weak. 18 studies were about music training. 14 suggested beneficial effects on young people's school outcomes as well as other non-cognitive outcomes (e.g. self-concept, self-efficacy, motivation and behaviour). All apart from one was rated weak. Almost all were correlational studies (Degé et al. 2014; Wilson 2009; Rodgers 1999; Fitzpatrick 2006; Kurt 2011). Several compared students who opted for music as an exam subject with students who did not opt for music (Cabanac et al. 2013; Horton 2012; Van der Vossen 2013; Waller 2007). The correlational design of the studies can only suggest a link between music and outcomes, but does not determine the direction of causation. Students enrolled in music at school may be inherently different to those who did not.

Studies that showed no relationships were invariably small-scale involving one school. The evidence is thus inconclusive. One study involving 29 children (Charles 2014) found no differences between pupils who participated in music (instrumental music education in school) and those who received no music instruction in school on Graduate Exit Exam. Another study suggested that there was no relationship between school band involvement and social-emotional competence, but the analyses provided no evidence for this (Chase 2012). This study had only 37 pupils and 7 band members. Deer (2010) compared students in an outstanding music school with a non-music school. Positive effects were found for 4th grade children on both reading and maths, but for 8th grade pupils effects were found only for reading. This was a medium quality study. A small-scale quasi experiment found mixed effects of keyboarding on students' self-efficacy (Previti 2003). A large-scale secondary analysis of standardized test scores of 15,630 high school students in the US found no differences between students who did music at school and those who did not (Elpus 2013) after controlling for background variables.

Given the large number of positive relationships found between music participation and academic and affective outcomes from the large albeit localized correlational studies across many states in the US and in other countries, and the few small scale intervention studies, there is justification for large-scale

randomised controlled efficacy trials to test the causal effects of music education on secondary school aged children.

Integration of creative drama in the classroom

Table 4: Creative drama (n=8)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | 1 | | 1 | |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 6 | | 5 | 1 (medium weak) |

There is some evidence that creative drama may have potential benefits on the academic outcomes of secondary school children, but there is no evidence that they have beneficial effects on young people’s behaviour and social outcomes. Six out of the eight studies suggested positive effects. Five of these reported positive effects on academic outcomes (Catterall et al. 1999; Otten et al. 2004; Duatepe-Paksu and Ubuz 2009; Arieli 2007; Cormack 2004), and one on empathy and theory of mind (Goldstein 2010). However, they all suffer from serious design flaws in design, so the evidence of impact is less clear. In some studies assignment to conditions was unclear (Cromack 2004; Duatepe-Paksu and Ubuz 2009). Goldstein’s study involved volunteers and no comparison of gain scores. It was therefore not possible to say if the control pupils would have made the same gains. One UK study reported significant effect on self-concept using a multi-dimensional self-concept scale and teacher reports. A Canadian study using validated tests showed inconclusive results on social skills. A second Canadian study showed no effect on behaviour and peer relationships based on teacher reports. Observation and interview data suggested that drama intervention had a negative effect on adolescents’ attitude towards drama. The overall evidence is weak because of the use of the different outcomes and different instruments used for measuring these outcomes. The two Canadian studies had very small samples (one involving 24 children and the other had only 29). Participants were not randomly allocated.

Combined arts activities

Table 4: Multi-arts (n=5)

| | No. of studies | Not evaluated | Weak | Medium |
|---------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | | | | |
| Mixed impact | 1 | | | 1 |
| Positive impact reported | 4 | | 2 | 2 (medium weak) |

Five studies on combined arts were found for secondary school children. Four reported positive effects, but the evidence is weak. One had no control group and no pre- post-test comparisons to establish changes in attitudes (Poe 2000). The assessment involved rating of lessons from extremely boring to extremely joyful. The researcher was also the teacher who also collected the data. This could have influenced participants’ responses. Another study involved students who were not randomly selected or allocated (Konrad 1999). Outcomes were based on teachers’ and pupils’ self-reports which are highly

unreliable. Two other studies were by the same author (Catterall et al. 1999; Catterall 2012). Both were longitudinal studies comparing students' level of arts participation and their academic performance. There was also no differentiation between the different art forms, so it was not clear which art activities had the most influence.

One large-scale study of Year 11 pupils in the UK (Harland et al.'s 2000) found no evidence that participation in the arts boost performance in national exams after controlling for prior attainment and social background. Pupils reported improvements in creativity, critical thinking, self-confidence and social development. This suggests that self-reports may not be reliable and that improvements in well-being do not necessarily lead to better academic performance.

5.3.3 ARTS ACTIVITIES WITH NO EVIDENCE OF EFFECT

Background music

There is no evidence that playing background music facilitated learning. In fact it may have detrimental effects. One study of 334 fifth grade students found that students' reading comprehension performance declined when listening to music (Anderson and Fuller 2010). Those that expressed a strong preference for listening to music while studying also did particularly badly on the comprehension test. This was a weak study. It had no comparison group, and the kind of music played may be a factor rather than the music itself. Different types of music may produce different results. It is also conceivable that children respond differently to music according to their learning styles. These were not tested.

Music integration

There is little evidence that music integration has beneficial effects for secondary school aged children. Only two studies were found (Richardson 2009; Smolinski 2010). Both were small studies (under 100 in each arm) with samples drawn from one school. The findings therefore cannot be generalized to wider population. Participants were also not randomly selected or allocated to treatment conditions, so any effects cannot be attributed to the intervention alone. As the two treatment classes were taken by different teachers there was a possibility of teacher effect.

Creative drama as an enrichment programme

Creative drama as an enrichment activity may have a negative effect on children's behaviour (Danner 2003). The evidence, however, is not reliable given that there was only one study with a small sample (n=54). The groups were not equal as the treatment pupils were volunteers. The question items used in the assessment were similar to those addressed in the intervention. It is possible that the intervention encouraged pupils to be open and frank about their intention to take drugs or alcohol, hence the negative results.

Visual arts

Table 4 – Visual arts (n=8)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 3 | | 2 | 1 |
| Mixed impact | 2 | | 2 | |
| Positive impact suggested | 3 | | 3 | |

There is little evidence that visual arts have any beneficial effects on secondary school-aged children. Three studies suggested positive effects. A Turkish study suggested beneficial effects, but provided no information about the tests used nor about the results (Kalyonocu and Tepecik 2010). The second study provided no evidence that using arts-related ICT improved problem-solving skill. A large-scale longitudinal study involving 2,906 pupils was unable to show if it was participation in fine arts that contributed to higher grades or that pupils who took up fine arts were different from those who did not. It is also possible that they were more likely to be perceived as intelligent, and hence received more attention and assistance from teachers. Two reported mixed results (Alo 2009; Schultz 2011), and a further three showed no beneficial effects (Ben-Chetrit 2014; Webb 1985; third one?).

Creative writing

Table 4: Creative writing (n=6)

| | No. of studies | Not evaluated | Weak | Medium |
|---------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 5 | 2 | 3 | |
| Mixed impact | 1 | | 1 | |
| Positive impact reported | | | | |

There is no evidence that creative writing has any beneficial effect for secondary school pupils. Only six studies were found. All the studies were rated weak. None showed any beneficial effect on academic and other outcomes. Two did not evaluate outcomes (Irvine 2003; Deegan 2010) and one showed negative effects on retention and science performance (Ayres 1993). Two suggested positive results but the findings were not substantiated by the evidence. Bettencourt (2009), for example, found no effects but concluded that the overall data showed that the intervention had positive benefits on students and educators, and that self-reflection was beneficial to students. Rowick's (2001) study had only 12 pupils. These represented 63% of all invited, suggesting participants were self-selected. There was no control group, so although students showed improvements in reflective writing and critical thinking, it was impossible to tell if these improvements were due to natural developmental process or reflective writing. The regular science lessons also involved asking higher order thinking questions – the effect of this could not be separated from the effect of reflective writing.

Poetry

Table 4: Poetry (n=10)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 7 | 7 | | |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 2 | | 2 | |

There is no evidence that poetry has any beneficial effects on the cognitive and affective outcomes of secondary school-aged children. Of the nine studies only 3 evaluated outcomes. The rest were simply evaluations of the processes of delivery and interpretations of pupils' behaviour and writing. One was a manual of suggested activities. Only 2 reported positive effects. One used assessments that were specific to the intervention (Ball 1979). The other study did not compare gain scores, so it was not possible to determine if the programme worked. Moreover, the study appeared to be a test of the effectiveness of using feedback and success criteria rather than the use of poetry.

Creative dance

Table 4: Dance (n=5)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 2 | | 2 | |
| Mixed impact | 1 | | 1 | |
| Positive impact suggested | 2 | | 2 | |

There is no evidence that dance as a curriculum activity has any beneficial effects on adolescents' academic and non-cognitive outcomes. Of the five studies found, only two reported positive effects; one on creative thinking (Minton 2000) and one on stress (Roberts 2010). Both were considered weak. Roberts' study used raised body temperature as an indicator of reduced stress after dance activity. Applying the instrument immediately after physical activity like dancing may not be valid as such activity is likely to result in raised body temperature. There was no comparison group, so it was not possible to compare the effects with similar other activities. This was a very small study involving only 10 self-selected individuals.

5.4 ARTS EDUCATION FOR CHILDREN ACROSS PHASES

Twenty-seven studies on arts education covering children across age groups were found in this review. The majority of these were about integration of multi-art forms in the curriculum (n=16), most of which were reviews of studies covering a range of arts activities.

5.4.1 ARTS ACTIVITIES WITH POTENTIAL

Music training/playing an instrument

Table 5: Music (n=4)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | | | | |
| Mixed impact | | | | |
| Positive impact suggested | 4 | | 3 | 1 (medium weak) |

There were four relevant studies on music for children across age groups. No negative studies were found. The evidence suggests that music training has positive influence on a range of outcomes.

Analysis of state standardized tests of 4,639 children (n= 1,1119 primary; n= 3,620 lower secondary) showed positive association between participation in school music programme and English attainment (Johnson and Memmott 2006). The evidence of impact was not strong. The effect was small, and possible confounding variables could not be ruled out because of the correlational design of the study.

A meta-analysis of 19 experimental studies (Hetland 2000) provided tentative evidence that learning a musical instrument could improve students' spatial-temporal reasoning, but there was no evidence of transference to academic achievement. The effects were short term and no effects were found for the culture-free IQ test. Most of the music activities were in group format and involved using Orff or Kodaly method of instruction. Only in 5 of the 19 studies were participants randomised to treatment conditions. Most of the studies were also small scale. Total number of cases was 701 (averaging about 47 in each study). The study also found no evidence of Hawthorne and teacher expectancy effect using studies that included control group being given an alternative treatment.

Taken as a whole the evidence looks promising, and there is potential for large-scale randomised pilot trials comparing children given music instruction in school with children not receiving music (inside or outside school) and children given an alternative programme (this is to control for the Hawthorne effect).

MRI brain scans on 232 students aged 6 to 18 provided evidence of changes in the brain associated with visuo-spatial ability, motor coordination and emotion regulation (Hudziak et al. 2014). Again this was a correlational study comparing children of different ages and varying years of musical experience. It was not clear how much of the cortical thickening was the result of maturation (natural development of the brain) and how much was just due to musical training. The data and analyses were unable to clarify this.

Another study found positive effect of music training on speech encoding and auditory memory (Strait et al. 2012) of 31 children aged 7-13. Although this was an interesting study, the findings are not conclusive as the two groups of children were not randomly assigned. There may be pre-existing differences between the children. For example, children who began musical training at a younger age (and thus had more years of practice) might be genetically predisposed to have more robust auditory brainstem function.

5.4.2 ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE OF EFFECT

Table 5: Multi-arts (n=19)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | 5 | 1 | 4 | |
| Mixed impact | 6 | | 4 | 2 |
| Positive impact suggested | 8 | | 3 | 5 (medium weak) |

Combination of music and drama

19 studies relating to integration of a combination of arts activities were found for children across age groups. The majority of these studies were meta-analyses undertaken by the same authors and most were correlational (Hetland and Winner 2001; Winner and Cooper 2000; Vaughn and Winner 2000; Catterall 1998). Some also compared arts-focused schools with non-arts schools (e.g. Hetland and Winner; Vaughn and Winner 2000). In the US, high performing pupils are encouraged to take up arts classes. High performing schools are also encouraged to provide for arts classes and so were able to retain their arts programmes which the lower performing schools were unable to do. So comparing outcomes of high arts performing schools with low performing non-arts schools is not a fair comparison. Arts-focused schools may also appeal to different types of pupils. It is also possible that integrating arts in the curriculum makes learning fun and enjoyable for pupils and teachers. Further research using an experimental design is needed to test these hypotheses.

Results were mixed. In one review on multi-arts integration only 2 of the 18 studies with a strong or moderate causal design reported positive effects (Robinson 2013). Many of the studies rated as having strong causal design were small scale, had no random allocation and no control groups. There was also a possibility of conflict of interest as the author also writes and develops programmes in arts integration.

Another meta-analysis of 31 studies suggested positive effects of multi-arts experience on maths and verbal skills, but the results failed to reach statistical significance on some tests (Winner and Cooper 2000). Results from experimental studies were inconclusive. One limitation of such meta-analyses was the lack of standardisation of outcomes across the range of studies. There was also little information about the individual studies. We had little information about the kind of art forms and whether effects differed with different art forms and different age groups.

Another study of medium weak quality (Vaughn and Winner (2000) showed a strong positive correlation between arts participation and maths and verbal SAT scores. Effects on children for different age groups were not explored. It was not clear which art activities were beneficial for which age group of children. A review by Winner and Hetland (2000) found no causal links between integrated arts and reading, maths and verbal reasoning, but medium causal link between music and spatial-reasoning.

Other large-scale correlational studies also reported positive associations between arts participation and cognitive outcomes (e.g. Catterall 1998; Burton et al. 2000). These studies compared the levels of students' arts exposure with their academic outcomes and other wider outcomes. The positive associations, however, do not suggest causal relationships.

Five other reports showed mixed results for integrating multi-arts in school. One showed positive effects for young children but not for the older ones (Arthington 2002). There was no counterfactual so it was difficult to say if similar pupils would have made the same progress without the intervention. Reading grades were assessed by teachers which may not be consistent between teachers as demonstrated by the lack of progress between the first and second grade. The small sample (n=80) also weakens the evidence. Another study suggested that after-school fine arts programme might be effective for raising the self-esteem of disadvantaged children, but had no effects on behaviour (Rossini 2005).

Five other studies reported no beneficial effects of integrating fine arts on academic outcomes for children across school phases. Two studies (Garcia 2000; Thomas and Arnold 2011) found no overall effects on integrating fine arts on reading and maths. Both were rated weak in evidence. There was no random allocation to groups and no baseline equivalence was established. Using post-test only design with no random allocation of subjects seriously undermine the validity of the results. In Garcia's study comparisons were made with different cohorts of pupils. There was also a high mobility of children in and out of the school. Record of SES status of children was also not reliable due to incomplete or unreturned forms. Thomas and Arnold compared A+ (specialist arts) schools with non-arts schools.

5.4.3 ARTS ACTIVITIES WITH NO EVIDENCE OF EFFECT

Visual arts

Table 5 – Visual arts (n= 3)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | | | | |
| Mixed impact | 2 | | | 2 (medium weak) |
| Positive impact suggested | 1 | | 1 | |

There is no evidence that visual arts has beneficial effects on the learning and affective outcomes for children across all age groups. Two studies suggested mixed results (Haanstra 1996; Moga et al. 2000) and one positive (Bowen 2014). Both the large studies were meta-analyses of mainly correlational studies which could not determine causality. Haanstra's (1996) review of 69 studies concluded no effect of art education on visual-spatial ability, but medium effect on aesthetic appreciation. Correlational studies suggested positive relationship between arts and creativity (Moga et al. 2000), but the experimental studies showed no causal effect on verbal creativity. Positive effects were seen only in arts-related creativity and this was assessed based on subjective judgement of pupils' drawings. One study of over 3,811 pupils from aged 8 to 18 suggested positive effects of a half-day visit to the art museum where children learnt about the themes in the museum. When tested on critical thinking skills (evaluations, observations and interpretations of a previously unseen art work), museum children outperformed control children by 9% of a standard deviation. However, it is not clear if museum children were inadvertently exposed to critical analysis of art work in their discussions at the museum. So these pupils may have received indirect instruction on critical analysis which the non-museum pupils did not. The test was also specific to the intervention. Therefore testing pupils specifically on these skills may not be a fair test. The effect was even greater (33% of standard deviation higher than non-museum children) for the younger and disadvantaged children and those living in small towns

Dance

Table 5: Dance (n= 2)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|-----------------|
| No beneficial impact | | | | |
| Mixed impact | 2 | | 1 | 1 (medium weak) |
| Positive impact suggested | | | | |

There is also no evidence that dance has beneficial effects for children across all age groups. A German study showed no effect on adolescents' (age 10 to 15) peer relationships (Zander et al. 2014). The second study showed a small overall effect, but the results were inconclusive because of the small, heterogeneous samples (Keinanen, Hetland and Winner 2000).

Drama

Table 5: Drama (n= 2)

| | No. of studies | Not evaluated | Weak | Medium |
|----------------------------------|----------------|---------------|------|--------|
| No beneficial impact | 1 | | 1 | |
| Mixed impact | 1 | | | 1 |
| Positive impact suggested | | | | |

Integrating drama in the curriculum does not appear to benefit pupils' academic outcomes. Both studies on children across age groups could not confirm the causal link. One was about the effect of drama on literacy (Kratochvil 2006). Several of the studies in the meta-analysis had design flaws: lack of comparison groups; issues with selection of comparison groups and limited number of empirical studies. There was also no clear definition of drama activities. Definition of outcome measures differed between studies. Lack of objective measurements of outcomes was another issue with the studies reviewed. The second study provided mixed results; positive effects on some measures of literacy but no effect on vocabulary development. The quality of the studies reviewed was questionable. There were no consistent measurements of outcomes resulting in widely different effect sizes reported. Weaknesses in individual studies were also not identified. It was therefore difficult to judge the quality of the studies.

6. UNPROMISING ARTS ACTIVITIES

All these studies reported here have not shown enough evidence to suggest promise.

6.1 FOR PRE-SCHOOL CHILDREN

Visual arts

There is no evidence that visual arts (painting, drawing, sculpture, ceramic or pottery and printing) have any beneficial effect on pre-school children's cognitive and non-cognitive outcomes. Only three studies were found. Two showed mixed effects (Borman 2009; Burger and Winner 2000) on academic achievement. The third study did not evaluate outcome but based its evidence on teachers' views on what went well with the lessons (Hardy 2011). No positive studies were found.

Dance

Creative dance has not been shown to have favourable effects on pre-schoolers. Only two studies were found for this age group, one did not evaluate outcome (Cheung 2010), and the second showed positive impact on social competence and behaviour (Lobo and Winsler 2006). However, it was rated weak because of the very small sample (n=40), and the evidence of impact was based on teacher and parents' ratings of behaviour which did not concur.

Creative drama

Although CREATIVE DRAMA shows promise for pre-schoolers' cognitive skills, there is no evidence that it is beneficial for the development of theory of mind (the Wolftrap programme by Smith 2011; Mages 2008). The two studies on the Wolftrap programme both reported negative effects on theory of mind.

Listening to music

There is no evidence that listening to music has the same effect as playing an instrument. The belief that the so-called Mozart Effect (listening to Mozart) can enhance young children's memory has not been upheld by the evidence we have uncovered in this review. One study by Bressler (2003) randomly assigned children to listening and silent condition. Treatment children listened to Mozart being played in the background while engaged in colouring activity. Control children performed the colouring activity in silence. Pre- and post-tests of memory (recall of visual and verbal information) showed a negative effect of listening to Mozart. This study has its flaws. It involved only 24 children, and a very short exposure to the intervention. The 10-minute session is too short for real effects (if any) to be realised. [It would be interesting to test this hypothesis on a larger scale with longer term exposure.]

Another study suggested that listening to classical music had positive impact only on pre-school children's, psycho-motor developmental skills (Thompson 2005). The evidence is weak because of the small sample drawn from one childcare centre. There was no random assignment to intervention conditions and classes were taught by different teachers. Children could be different in ability, motivation, prior musical experiences etc. The classes were also taught by different teachers – teaching quality and teacher characteristics may have influenced the results.

6.2 FOR PRIMARY SCHOOL CHILDREN

Creative arts

Creative arts as an extra-curricular activity have no effects on children's academic and cognitive outcomes. One medium quality, fairly large scale study (Huizenga & Van der Wolf 1996) showed that arts as an extra-curricular activity in school had negative effects on primary school children's reading and arithmetic (measured on standardized tests).

School-based arts programme as a behaviour intervention does not work. One study (Wurzel 2012) reported negative effects on problem-solving behaviour.

Teaching art for aesthetic appreciation also has no effect on children's metacognition and literary skills (Dennis 1995).

Drama

There is no evidence that creative drama has any beneficial effects on children's non-cognitive outcomes. The 3 negative studies reported no effects on self-concept (Schaffner et al. 1984; Roberts 2007; Freeman et al. 2003) and social skills and behaviour (Freeman et al. 2003).

Creative dance

There no evidence that creative dance has any beneficial effects on primary school aged children. Six studies on dance were found, two showed negative effects (DiSanto-Rose 1996; Von Rossberg-Gempton), one did not evaluate the effect (Giguere 2007) and one reported effects on only some aspects of academic self-concept for girls only (Stratton-Gonzales 2008). All were rated weak in evidence. Both the positive studies had no comparison group and had very small samples (one had only 10, the other 30 participants).

Poetry

Generally there is no evidence that poetry can positively affect children's learning. Five of the six studies reported positive effects, but four of these did not evaluate impact but inferred effects from pupils' responses.

Creative writing

Only one study on creative writing for primary school children was found. So there is no evidence that creative writing is beneficial for this age group of children. The evidence is also weak because the assessment used spelling words that the treatment children practiced in the weekly session, but were not available to children in the other 2 groups.

6.3 FOR SECONDARY SCHOOL-AGED CHILDREN

Visual arts

There is little evidence that visual arts have any beneficial effects for secondary school-aged children. Three studies suggested effects, but one did not evaluate impact. Two reported mixed results, and a further three showed no beneficial effects. (Ben-Chetrit 2014; Webb 1985). Large-scale studies found no effects of visual arts on academic outcomes (Nagel, Ganzeboom, Haaanstra & Oud 1997; Ben-Chetrit 2014).

Dance

There is no evidence that dance as a curriculum activity has any beneficial effects on adolescents' academic and non-cognitive outcomes. Of the five studies found, only two reported positive effects; one on creative thinking and one on stress. Both were considered weak. One study showed no effects on academic and cognitive skills, and another showed no effect on self-efficacy. A South Korean study reported positive result for creativity but not critical thinking. This was a weak study involving only 2 classes. The test of critical thinking had no parallel version so the same test was used for both pre- and post-tests. Since the interval between pre- and post-test was only 2 months, there was a possibility of practice effect. There was also the possibility of contamination as half of one class and half of the other used Form B at pre-test. This was then switched over at post-test.

Creative drama as an enrichment activity

One study (Danner 2003) showed that drama as a behaviour intervention had an adverse effect. A range of outcome measures were assessed before and after the intervention. These ranged from pupils' intention to use drugs, intention to engage in sexual activity, self-esteem using the Rosenberg Self-Esteem Inventory (RSE) and future expectation, problem. Overall, there were no changes observed with the comparison group, but significantly worse for the treatment group in several areas. In fact, pupils showed declining behavior in several areas.

Music

Playing background music whilst engaged in learning does not have any beneficial effects on students' learning outcomes. One study involving 334 students Anderson & Fuller (2010) conducted a study on 334 7th and 8th grade students from 5 schools in Arizona, US. In one study (Anderson & Fuller 2010) students were exposed to 2 conditions: non-music environment and listening to music from Billboard Magazine's (2006) top hit singles. Reading comprehension test on the Gates-MacGinitie test showed that performance declined significantly when listening to music. Those who expressed a strong preference for listening to music while studying also did particularly badly on the comprehension test. The findings of this single study alone cannot demonstrate that listening to music is detrimental. The type of music played may be a factor. Different types of music may produce different results. This was not tested. Nevertheless, there is not enough evidence to suggest that listening to background music in learning is a good thing.

Creative writing

Creative writing also does not appear to benefit secondary school aged children. Only six studies were found. Most of the studies were about creative writing as an outcome rather than as a possible influencing factor, and even then these were largely for older pupils in higher education or undergraduates. Of the few studies found none showed any beneficial effect on academic and other outcomes. Two did not evaluate outcomes, one showed negative effects on retention and science performance, and another suggested negative effect on writing. All the studies were rated weak.

Poetry

There is no evidence that poetry has any beneficial effects on the cognitive and affective outcomes of secondary school-aged children. Few studies were conducted in this area, and many did not evaluate outcomes. Almost all were simply evaluations of the processes of delivery and interpretations of pupils' behaviour and writing. One was a manual of suggested activities.

6.4 FOR CHILDREN ACROSS PHASES

Visual arts

There is little evidence to support the beneficial effects of visual arts for children across age groups. Only 3 studies were found, and all were rated weak. One tested pupils using items specific to the intervention. The other two were meta-analyses showing mixed results. The experimental studies in the meta-analyses assessed outcomes based on subjective judgements of pupils' drawings. Arts instruction was delivered in different contexts (different types of schools, by different teachers, some were integrated some non-integrated and some delivered by specialists and some by regular classroom teachers). This varied context makes it difficult to transfer successes from controlled experiment settings to real life classroom situations which could be quite messy (with a wide range of pupils with different needs).

Dance

The impact of school-based dance classes children across age groups is largely unevaluated. Only two studies were found for children across school phases. One large-scale German study found no effects on adolescents' peer relationships. The findings of the second study, a meta-analysis of 7 studies, were inconclusive.

Drama

Integration of creative drama in the classroom has no benefit on literacy and English language learning for children across age groups.

7. ARTS ACTIVITIES WITH INCONCLUSIVE EVIDENCE

In this category are interventions which have been evaluated but with mixed results. The evidence of impact is therefore inconclusive.

7.1 FOR PRE-SCHOOL CHILDREN

Integrating music

One study observed positive changes in only 3 out of the 8 children. Assessments were based purely on observations. 3 studies reported positive effects: one on literacy and problem-solving behaviour. Two studies showed mixed results. These were all small scale, ranging from 8 to 17, the largest involved 180 pupils.

Multi-arts integration

Only one paper on multi-arts integration was found. The Kaleidoscope integrated multi arts programme appears promising, but the two studies reported in this paper were flawed in their design; one did not have a true counterfactual, and the other had only a sample of 63 but used a placebo (alternative programme) to control for the Hawthorne effect. What is impressive are the large effect sizes reported for academic outcomes (receptive vocabulary and early learning) measured using standardised tests (ES =1.7; 1.5)

Creative drama

For pre-school children creative drama may have potential but the evidence is not strong. Three studies suggest beneficial effects on reading/decoding text and story recall (Goodman 1990; Pellegrini and Galda 1982; Pellegrini 1984). They were all small scale (with fewer than 50 in each intervention group). One did not have a control group and two did not have pre- post-test comparisons, so it was not possible to say if improvement in reading skills was due to the drama activity or natural development of the children.

7.2 FOR PRIMARY SCHOOL CHILDREN

Visual arts

There is no clear evidence that integrating visual arts in the school curriculum has beneficial effects on primary school aged children. There were three positive studies and six with mixed results. The three positive studies all reported effects on cognitive outcomes (history, creative thinking and maths) and all involved integrating visual arts in the lessons. However, all had either very small sample or unclear sample (Phillips and Bickley-Green 1998), allocated by class to treatment groups. In one study the experimental children also received additional enrichment activities which were not available to the control group (Brugar 2012). Two of the four positive studies did not have a control group (Fountain 2007; Phillips and Bickley-Green 1998), so it was not possible to say if the children would have made the same progress without the intervention.

Finnan-Jones study reported positive effects on standardised tests of maths for 194 English language learners. Children were allocated non-randomly by class (n=4). This study may be replicated using large randomised samples with proper counterfactuals and control for confounding variables.

Luffing's (2000) study of SPECTRA+ (a creative arts programme) showed positive effects of SPECTRA+ on overall test of creativity but not on the subtest of elaboration. Positive effects were seen in one district on maths, reading and vocabulary, but not in another district, and among boys and only for some grades. Different assessments were also used in different districts which could explain the different outcomes, and conditions were nested within schools so there is a possibility of diffusion. This was a fairly large study involving 615 children.

Catterall and Peppler (2007) found effects of visual arts on only some measures of non-cognitive outcomes). This was also a small study involving 170 non-randomly selected and allocated children. Differences in outcomes could be due to pupil characteristics or teacher effectiveness. Another study found no effect of visual arts on standardized tests of non-verbal intelligence (Stephens 1996).

Creative drama

The evidence for creative drama is inconclusive. Of the 12 studies 5 suggested positive effects on academic outcomes (maths, science and reading). All the negative studies showed no effects of drama on non-cognitive outcomes. In most cases creative drama is integrated in the classroom as part of an instructional strategy. Although the evidence from the individual studies is weak, the consistent positive effects on academic outcomes suggest there is potential for efficacy trials to test the effectiveness of the intervention (e.g. Rose 2000; Joseph 2014; Hendrix 2011).

Combination of arts

It is also not clear whether infusing a combination of arts into the school curriculum has any beneficial effect. The overall evidence is weak. Four studies reported positive effects (Venzen 2011; James 2011; Manning 2003; Clark 2007). Of these two had potential and were rated medium to weak (Manning 2003; Clark 2007). Eight studies showed mixed results – positive impact for some subjects, for some grades and certain types of school and children (e.g. SEN and low SES). One was rated medium to weak (Luftig 2000). One study found no beneficial effects of infusing arts on children's maths performance (Muehlbauer 2000).

The lack of replication of independently evaluated studies makes it difficult to determine the strength of the evidence. For example, there was only one fairly large-scale study of Arts Work for Kids, a fine arts integration programme for developing emotional intelligence. The study, which included 645 children across twelve schools, showed significant positive effects on all but one measures of emotional intelligence, particularly for dance and music (Clark 2007). However, schools were not randomised, so comparing arts-focused schools with non-arts focused schools is not a fair comparison as these schools may differ in pupil intake. There is a possibility of a pilot randomised controlled trial to test if the effects can be replicated with regular schools.

7.3 FOR SECONDARY SCHOOL CHILDREN

Music training

Of the 20 studies found for this age group, 14 suggested positive effects. A large majority of these studies examined the impact of participation in music education in school (e.g. learning to play an instrument or

music lessons). The evidence is inconsistent across studies. Almost all (15 out of 20) were cross-sectional studies or secondary analyses of state examination results comparing students who were enrolled in music and those who were not. Although they may show positive associations, they do not necessarily suggest causality. One study involving 29 children (Charles 2014), found no differences between pupils who participated in music (instrumental music education in school) and those who received no music instruction in school on Graduate Exit Exam. A medium study showed positive effects for the younger year group, but not for the older ones (Previti 2003). A large-scale secondary analysis of standardized test scores of 15,630 high school students in the US found no differences between students who did music at school and those who did not (Elpus 2013) after controlling for background variables. The evidence is this inconclusive.

Integrating creative drama

Integrating creative drama in the curriculum may have potential benefits on academic outcomes of secondary school children, but there is no evidence that they have beneficial effects on young people's behaviour and social outcomes. Six out of the eight studies suggested positive effects, and five of these reported positive effects on academic outcomes, and one on empathy and theory of mind. However, they all suffer from serious design flaws in design, so the evidence of impact is less clear. Nevertheless, the strong positive effects from some of these studies is worth further exploration (e.g. Otten et al. 2004; Catterall 1999 on the Chicago Arts Education Partnership Project).

Combined arts

The evidence for integrating multi-arts in secondary school is inconclusive. Four of these reported positive effects – four on academic (historical knowledge) and non-cognitive outcomes (empathy and behaviour) and another on attitudes towards learning and enjoyment. It is not clear if enjoyment led to better academic outcomes. The evidence of all the studies is weak. One had no comparison group, one did not involve random allocation (Konrad 1999). Assessment of outcomes were also weak. The same teacher taught both the intervention and control class (Poe 2000). The other studies were all large correlational studies, which by design cannot demonstrate causality.

7.4 FOR CHILDREN ACROSS AGE GROUPS

Music training

Integration of combination of arts shows some evidence of impact for children across age groups, but the strength of the evidence varied depending on the art forms. In general there is stronger evidence of positive effects of music and drama than visual arts. Only 5 of the 19 studies suggested no beneficial effects of integration of combination of arts activities. Most of the positive studies were meta-analyses.

As is expected, integration of multi-arts forms makes it difficult to isolate the impact of individual art activities.

A review of 44 studies on multi-arts integration suggested that drama integration was the only art form that had the strongest evidence of positive effects on a range of academic and cognitive outcomes. Multi-arts integration has also been shown to be beneficial for disadvantaged children's reading and maths

attainment, critical thinking and other measurements of well-being (motivation, self-efficacy and engagement).

All the meta-analyses seemed to suggest strong positive correlation between multi-arts experience in school and academic outcomes. Positive associations were also supported by other longitudinal and correlational studies.

The positive results from the reviews of experimental studies and the longitudinal, correlational studies together suggest that there may be promise in multi-arts forms even though individually the evidence may be weak.

Integration of music and drama

It is also not clear if integrating combined arts activities (music and drama) in the school programme can improve children's learning and affective outcomes. The evidence is inconclusive. Most were meta-analyses. In one review only 2 studies with a causal design showed positive effects (Robinson 2013). The experimental studies with causal design all had serious design flaws: small sample size, no random allocation of participants and no counterfactual. Another medium quality study suggested positive association between arts participation and maths and verbal scores (Vaughn and Winner 2000), but a review by one of the authors (Winner and Hetland 2000) found no causal links between integrated arts and maths and verbal reasoning. Five other studies showed mixed results (e.g. Arthington 2002; Rossini 2005), and five showed no effects. The evidence is therefore inconclusive.

8. PROMISING ARTS ACTIVITIES

No promising interventions were found. All the studies had at least one major flaw. However, there were some which may be worth exploring. We included these under promising arts activities

8.1 FOR PRE-SCHOOL CHILDREN

Playing an instrument

There is some promise that music activity is beneficial for pre-school children. Of the 17 studies, 14 reported positive results and 4 looked promising. There is stronger evidence for playing an instrument than just listening to music. The evidence on integrating music in the curriculum produced mixed results. Three methods of learning to play an instrument have shown to have positive effects on very young children's cognitive development: Kindermusik, Orff and the Kodaly methods. Positive effects of music training have been suggested on pre-schoolers' spatial-temporal ability, performance IQ maths and language skills, psychomotor skills and socio-emotional development.

One study on twins reported positive effects of music training on intelligence (Nering 2002).

8.2 FOR PRIMARY SCHOOL AGED CHILDREN

Integrating music in the curriculum and playing an instrument hold much promise for primary school aged children. There is fairly good evidence that music has favourable effects on young children's learning outcomes, in particular cognitive abilities, and to some extent self-esteem and social behaviour. Of the 30 studies, 20 suggested positive effects. Four of these were of medium to weak quality. Individually the evidence from these studies may be weak, but taken together the positive effects suggest there is potential in this area that is worth pursuing.

8.3 FOR SECONDARY SCHOOL AGED CHILDREN

No studies showing promise were found.

8.4 FOR CHILDREN ACROSS AGE GROUPS

Music training

Playing an instrument has consistently been shown to have some supporting evidence of beneficial effects on cognitive development for children across the age groups (from primary to secondary). One study (Strait et al. 2012) showed that early music training can enhance neural encoding of speech-in-noise. The evidence, however, was weak. As the two groups of children were not randomly assigned, the effects could be attributed to the pre-existing differences rather than solely due to music training. One way of testing this is to randomly assign children who had no exposure to music when they are young and then expose one group to music and one group to non-music to see if music exposure makes any difference.

MRI scans of children aged 6-18 also showed positive correlation between playing a musical instrument and cortical thickness which is related to motor coordination, visuo-spatial ability and emotion regulation.

The correlational study is unable to demonstrate if cortical thickening was the result of age (natural development of the brain) or music training.

A review of experimental studies (Hetland 2000) for children aged 3 to 12 showed positive effects of participation of music on spatial-temporal reasoning. Most of the music activities were in group format and involved learning a musical instrument using Orff or Kodaly method of instruction. However, only in 5 of the 19 studies were participants randomised to treatment conditions. Most of the studies were also small scale.

Taken as a whole the evidence looks promising, and there is potential for large-scale randomised pilot trials comparing children given music instruction in school with children not receiving music (inside or outside school) and children given an alternative programme (to control for the Hawthorne effect).

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APPENDIX

Visual Arts (n=39)

The main model used in most art integration programmes was the Chicago Arts Education Partnerships (CAPE) (Burnaford, Aprill and Weiss 2007). The CAPE model suggested 4 factors for arts integration, linking aesthetic experiences to enhance learning. Eisner's thoughts also contributed to arts integration (Eisner 1998). His idea was to make connections between the cognitive side of art and the educational experiences. He sees art as a vehicle to help process thoughts. Dewey's (2005) philosophy of an interdisciplinary curriculum also formed the basis for many of the integrated arts programmes.

1. **Alo, T. (2009)** *The effect of visual arts education on at-risk students' critical thinking skills and the Maryland English II High School Assessment*. US, ProQuest Information & Learning. 70: 4552-4552. (US)

Intervention: Visual arts on English proficiency

Age: 14/15

Alo (2009) examined the effect of participation in visual arts on English proficiency (using state criterion referenced tests) of ninth grade students from 5 school districts (n=5,473). Pupils who were enrolled on visual arts course were compared with those who did not. Multivariate ANCOVA analyses showed significant effects on English performance for the weakest pupils, but not for the more able pupils. In fact, for the middle and high performers, visual arts participation had a negative effect on their English performance (measured as gain scores between 8th grade and 10th grade).

Impact: Positive effect on weakest pupils, but negative effects on middle and high performers.

Evidence: Weak evidence for a number of reasons:

- High percentage of missing test scores(either high school or 8th grade English test scores). Consequently only data for 276 (out of 5,473) pupils were used in the analysis because of a high percentage of missing data.
- The study did not consider other confounding influences that may affect performance on English language test. Performance may be affected by teacher quality which was not taken into account. Control students may take art lessons outside school. This was not controlled for.
- The use of significant test with a non-random sample is also inappropriate.
- Sample was not randomly selected, which means that visual arts pupils may be inherently different to non-visual arts pupils.

2. Borman, G. D., et al. (2009) Halting the summer achievement slide: A randomized field trial of the kindergARTen Summer Camp. *Journal of Education for Students Placed at Risk*, 14(2): 133-147. (US)

Intervention: Art on reading

Age: Kindergarten (age 5/6)

The KindergARTen Summer Camp is a 6-week programme to reduce the summer loss of low income pupils. A randomised trial of this summer enrichment programme involving 128 kindergarten pupils (93 treatment and 35 control) showed positive effects on some but not all measures of literacy skills of pupils. Impact was measured by comparing gain scores between pre- and post tests on the Developmental Reading Assessment (DRA) and the Word List A assessments. The programme was run 5 days a week for 7.5 hours per day. During the camp pupils spent 3 hours everyday learning and practicing literacy skills, and 80 minutes on science and art activities. On Fridays pupils went on field trips to museums, aquariums, and local community events. Classes were kept at below 10 pupils.

Impact:

- Mixed effects. Small positive effect on word list scores (ES = .27) and small to medium effect on developmental reading assessment scores (ES = .40).
- No effect on phoneme segment skills, letter naming skills, or dictation.

Evidence:

- Medium quality because of the small sample. As the full-text was not available, we do not know if there was any attrition, and whether number of sessions attended made a difference to outcomes.
- The evidence is inconclusive as the programme included instruction in literacy and science as well as participation in other arts-related enrichment activities. It is difficult to say if it was the art activities or direct instruction in literacy that had the impact.

3. Bowen, D. H., et al. (2014) Learning to think critically: A visual art experiment. *Educational Researcher*, 43(1): 37-44. (US)

Intervention: Visual art on critical thinking

Age: 8 to 18 (grades 3 to 12)

A randomised controlled trial involving 3,811 pupils aged 8 to 18 was conducted in 2013 to evaluate the effect of visits to Visual Art museums on the critical thinking skills of young people. Pupils were divided into groups with 35 groups being allocated by lottery to visit the art museum, while another 35 groups had their visit deferred. Prior to the visit, pupils' critical thinking skills were measured. During the visit, pupils learnt about some of the themes in the museum although no specific information on the works was shared. Two weeks after the visit both groups were given a previously unseen complex piece of painting to analyse and their critical thinking skills were assessed based on measures such as observations, evaluations,

interpretations and flexible thinking. On average, the museum pupils performed 9% of a standard deviation higher in their critical reasoning ability. The programme was particularly beneficial for younger pupils (aged 8-14) and the disadvantaged groups (defined as those eligible for free or reduced lunch and non-white). The strongest effect was for those living in small towns (fewer than 10,000 people). They performed 33% of a standard deviation higher than those who did not visit the museum.

Impact:

- Positive effect on critical thinking skills.
- Bigger effects on younger pupils, the disadvantaged groups and those living in small towns.

Evidence: Weak quality

- Museum pupils were exposed to pre- and post-visit curricula materials and spent half a day at the museum. We are not sure if pupils were inadvertently exposed to discussions about art works in the museum. So these pupils may have received indirect instruction on critical analysis which the non-museum pupils did not. The test was also specific to the intervention. Therefore testing pupils specifically on these skills may not be a fair test.
- Teachers were not blind to the intervention.

4. Brugar, K. A. (2012) *What difference does curricular integration make? An inquiry of fifth graders' learning of history through the use of literacy and visual arts skills.* Ann Arbor, Michigan State University. 3522910: 219. (US)

Intervention: Visual arts (includes traditional fine arts such as drawings, etchings, painting, printmaking, and sculpture, and the design arts).
Interdisciplinary approach.

Age: 5th grade (age 10/11)

This study examined the effects of using a 4-week interdisciplinary history-literacy-visual art curriculum in developing understanding of historical events. Each lesson began with the use of visual images, and through oral questioning, the teacher involved pupils in a discussion of the images using appropriate vocabulary. Participants included three teachers who volunteered for the intervention (two from experimental school and one from the comparison school) and 50 pupils whose parents consented to their participation. This represented 65% of the total number of pupils. Five pupils from each class were randomly selected for observations and detailed analysis of their work. Prior to the intervention a pre-test using researcher developed assessment (adapted from the state exam questions). Post intervention analysis showed that both groups improved in their test scores, but experimental groups made significantly greater progress (ES = 1.6). Experimental students were also observed to be more

engaged in the lessons. They asked and responded in lengthy and better crafted answers.

Impact: Positive impact on academic outcomes and engagement

Evidence: Weak evidence. Very small sample (3 cases)

- The questions used in the assessments were aligned with the activities used in the teaching. Two questions for which experimental group did not show improvements were those that required recall and did not have associated activities used in the classroom teaching. What the findings suggest is that if students are tested in what they were taught they are more likely to do well.
- The sample included 3 cases (2 experimental and one comparison teachers). It is not clear how much of the academic performance can be attributed to teacher differences – using strategies which were tested in the assessments. Experimental pupils also had the benefit of additional enrichment activities such as a visit to the museum.
- There was also the issue of time-tabling. Process evaluation suggested that in the comparison school, many lessons were missed due to professional development, marking period, course meetings. It seemed that there was a lack of administrative support given to social studies curriculum in the comparison school.

5. Burger, K., and Winner, E. (2000) Instruction in visual art: can it help children learn to read? *Journal of Aesthetic Education*, 34(3/4): 277-293.

Intervention: Visual art

Age: Kindergarten (5/6) to grade 5 (10/11) majority of studies are on grade 1 children

This is a review of 9 experimental and quasi-experimental studies (dating between 1968 and 1983) to test the hypothesis that visual arts instruction can improve reading ability. All were small scale studies with fewer than a hundred participants (between n= 22 and n=93). Majority had sample sizes under 50. The number of sessions ranged from 30 min per week to 120 min per week. Duration of intervention varied between 10 days to a year with median duration of 14 weeks. The study concluded that integrating arts instruction in reading teaching was more effective in improving reading achievement than a non-integrated arts curriculum.

Training in visual arts had no effect on reading achievement, but a moderate effect on reading readiness. Studies that assessed reading achievement showed a negative mean effect size. Only studies that assessed reading readiness showed small positive effects. The authors explained that this was probably because reading readiness assessments

tended to be figural rather than linguistic. This demonstrated a degree of transfer of art to reading readiness where the transfer is from visual skill to visual skill, but no transfer from art to reading achievement where the transfer is from visual skill to linguistic skill.

Impact: Mixed

No impact on reading achievement, but moderate effect on reading readiness. Integrated arts curriculum was more effective than non-integrated curriculum where the focus of the arts curriculum was on the reading outcomes.

Evidence: Medium to weak

All studies reviewed were small-scale (fewer than 100). Teachers were trained in administration of the curriculum and there was an expectation that the arts instruction should lead to improvements in achievements. The studies also could not demonstrate whether it was the arts activities or the greater engagement as a result of the arts programme that led to heightened motivation to read more books. Even if this was true the indirect effects would still be beneficial (Possibility of scaling up to test the hypothesis).

- 6. Campbell, E. F. (1988)** The effects of a method of art instruction on the visual perception ability of kindergarten children. US, ProQuest Information & Learning. 48: 1629-1629.

[Excluded – Abstracts and text are not available]

- 7. Catterall, J. S., and Peppler, K. A. (2007)** Learning in the visual arts and the worldviews of young children. *Cambridge Journal of Education*, 37(4): 543-560. (US)

Intervention: Visual arts

Age: 3rd grade (9-10)

This study evaluated the effects of two arts programmes on the self-efficacy, self-concept, attributions for success and creativity of disadvantaged children in deprived areas in the US. The programmes were the Inner City Arts (ICA) and the Center of Contemporary Arts (COCA) programmes. ICA classes held in the arts centre and consisted of drawing, painting and sculptural work and were conducted by professionals. Each session lasted 90 minutes and was run twice a week for 20 weeks. At the end of each session, pupils critique and made comments about each other's work. Discussions of higher order issues such as symbolisms and the aesthetics of line and colour were encouraged. COCA classes were held in the school and consisted of sculptural ceramic work conducted by a professional ceramic artist. The programme was conducted once a week

for 30 weeks. Each session lasted an hour. Children produced works related to a story or poem which they get to reflect and comment on. The instructor modelled techniques of craft, problem-solving and writing.

The arts programmes were offered to three third grade classes from two schools (n=103). Comparison children came from three non-participating 3rd grade classes in one school and three 3rd grade classes from a school adjacent to the second school (n=76).

Pre- post- test comparisons showed no differences in the gains in self-concept and success attributions of visual arts students and those of comparison children. However, visual arts students did make significant gains in self-efficacy and in one measure of creativity (originality).

Impact: Mixed effects.

- No impact on self-concept and success attributions.
- Positive effect on self-efficacy and originality.

Evidence: Weak evidence because of

- Small sample. Participants were not randomly selected or randomly allocated.
- There could be differences in teacher efficacy or pupil characteristics.
- The use of professionals rather than teachers means that there is less likely to be a teacher expectancy effect.
- Measures used for assessing the outcomes could be looked into and improved.

8. Dennis, F. C. (1995) *Aesthetic perception, metacognition and transfer: Thinking in the visual arts*. Ann Arbor, University of California, Los Angeles. 9541871: 251. (US)

Intervention: Visual arts on cognitive and academic outcomes

Age: 10-12 (Primary)

The study was to test the effect of instruction in aesthetic perception on the literary analysis skills of 10-12 year olds in one school. Participants were 52 children taken from two classes (treatment n=25; control n=27). Duration of intervention was 4 weeks (45 min per week), conducted by one of the teachers in the school with experience in aesthetic perception. Since the curriculum was implemented across the school, both groups would have been exposed to instruction on aesthetic perception to a certain extent prior to the study. The curriculum was tailored to train pupils to create a concept map and to apply this strategy to learning Literature. Pupils practiced making a concept map addressing the question: *What do you look for and think about in a work of art?* The test prompts used exactly these same questions. Children's responses to these prompts were then scored using a range of criteria. The researcher reported that

although treatment group achieved two to three percentage points above that of the control group, the difference was not statistically significant. In fact, three treatment pupils showed a 30% decline in measures of aesthetic perception. Observational and interview data also showed that the curriculum did not influence children's deeper understanding of aesthetic perception and awareness. Although the children understood that art was an expression of feelings and ideas, they were not able to connect the sensory elements with expressive elements. The curriculum was also perceived as not interesting or challenging enough for some children. A small positive effect was noted for low achieving pupils.

Impact: No impact on academic outcomes and no transference of training in Aesthetic perception on literary analysis.

Evidence: Weak

- Small sample, non-random selection and allocation.
- No reliable measurements for assessing literacy analysis. Assessments were specific to the instruction.
- Possibility of teacher expectancy as the lessons were conducted by a teacher with experience in aesthetic appreciation.
- Both groups had been exposed to aesthetic appreciation and the use of concept maps. There is a diffusion of effects.
- Should have used a clean counterfactual.

9. Finnan-Jones, R. (2008) *The impact of visual art instruction on the mathematics achievement of English language learners*. US, ProQuest Information & Learning. 68: 3317-3317. (US)

Intervention: Visual arts on maths achievement

Age: 4th and 5th grade (9-11)

[possibility of scaling up with proper controls of confounding factors]
This study examined the effects of visual arts instruction on the maths achievement of 4th and 5th grade English language learners. Ninety-four children from 4 classes took part in the study (47 from grade 4 and 47 from grade 5). One class from each grade received the arts instruction and the other class, which received no art instruction, formed the control group. The lessons were conducted once a week over 2 months. Each lesson lasted 45 minutes. Results showed that both grade 4 and 5 pupils who received art instruction outperformed those who did not (ES = 1.0 and ES = 1.35 respectively). Observational and interview data were collected to find out what aspects of the art lessons may lead to the development of mathematical concepts. It was observed that during the art lessons the teacher introduced vocabulary related to the activity, e.g. still life, contrast, light-tint, shadows, dark shade. Students were encouraged to describe

each other's work and then to use the descriptive words to write a poem. Specific observations to see how mathematical concepts were introduced in the process. In many instances the process was rather obscure. The only lesson where there was an apparent connection was when pupils were asked to build bridges using toothpicks and pieces of wood. Nevertheless, there were opportunities during art lessons to include language development activities that were specific to maths. This study shows potential in developing literacy and maths skills of pupils whose first language is not English.

Impact: Positive effects on maths achievement on the state standardized tests

Evidence: Weak because

- of the small and non-random sample (4 cases: 2 control and 2 treatment; total number of pupils is 94).
- Teacher taking the class was not blind to treatment, so there is an expectation of success. This could have motivated both pupils and teachers to do well. The positive effect may have been an indirect result of participation in the intervention. Learning through art presented a low-anxiety environment, which may have enhanced learning.
- Researcher was a teacher at the school, which poses a threat to internal validity. There is also a conflict of interest.
- There were also no controls for maths and art ability. There could be differences between groups which were not accounted for.
- Control and treatment classes were taken by different teachers. This could have accounted for the differences in performance.

10. Fountain, H.L.R. (2007) *Using art to differentiate instruction: An analysis of its effect on creativity and the learning environment.* Ann Arbor, Purdue University. 3278670: 307. (US)

Intervention: Art on creative thinking skills

Age: 3rd and 4th grade (age 8-10)

This was a one-year ethnographic study that examined the effects of differentiated art instruction on the creative thinking skills of 18 pupils in the 3rd and 4th grades. Pupils are in a class of mixed ability and age groups. Seven of them had disability statements such as ADHD. The class was taken by one teacher with experience in differentiated instruction and had special interest in using art in the classroom. Five pupils from the class were selected for case study reports. Creative thinking skills were assessed on the Torrance Test of Creativity Thinking using figures.

There was transformation at the end of year in the physical learning environment of the classroom with huge amounts of pupils' work displayed on the walls. These were not only art work but also works on maths, writing, literature, science and social studies. Pupils reported being comfortable, happy and apparently enjoying the new learning environment. All students interviewed said they liked using art to learn academic subjects like maths, science and social studies.

Analysis of the Torrance tests showed that grade 4 pupils made greater gains than grade 3 pupils. On average girls made bigger gains than boys, but the intervention appeared to affect different aspects of creativity for boys and girls. Boys seemed to perform better on internal visualization, storytelling articulateness and colour imagery

Impact: Positive impact reported

Evidence: Weak, because

- There was no control group. It is therefore not possible to say how much gains they have made in relation to other similar children not taught using art.
- Small sample (n=18)
- Also there was a conflict of interest as the teacher was specially selected because of her interest in the art. The researcher was a member of staff at the school and was also the developer of the programme. There is thus a conflict of interest.

11. Haanstra, F. (2000) Dutch studies of the effects of arts education programs on school success. *Studies in Art Education*, 42(1): 20-35. (Holland)

Intervention: Combined arts programme on reading and arithmetic

Age: 10 -11

This is a review of studies looking at the effectiveness of special arts programmes in primary school in the Netherlands and whether choosing art as an exam subject is detrimental to future academic career and socio-economic status. Two studies evaluated the effects of implementation of arts as an extra-curricular activity in primary schools. The first study (Huizenga & Van der Wolf 1996) involving 400 pupils aged 10 and 11 showed that experimental children performed worse than control children on both reading and arithmetic (measured on standardized tests). Experimental children made less gains in arithmetic scores compared to control children. In reading, both groups did worse in the post-test than in the pre-test, but experimental group did significantly worse. Standardised tests on non-cognitive outcomes (achievement motivation, self-image and peer acceptance) also showed no obvious effects of participation in the extended school day activity. Interview data from teachers and pupils

suggested improvements in relationships among participating pupils and their attitude towards school. The second study based on the opinions of 98 teachers' concluded that participating pupils were more confident after the experiment, worked more collaboratively with their peers and had stronger explorative attitude (van Erp, Koopman, & Voncken 1997). Overall, there was no empirical support for the effects of extended school day programme on the academic achievement of pupils. There was also the issue of implementation. The programme was not believed to have been consistently carried out nor well-thought out.

In the secondary school, art is an optional subject. Haanstra described one study by DiMaggio (1982) to test Bourdieu's theory that cultural capital is related to school success. Using data from a large scale study called Project TALENT, Di Maggio analysed the survey responses of 2,906 men and women when they were in the 10th grade and then again 11 years later. Measures of cultural capital included questions about respondents' interest in the arts, involvement in artistic activities, their occupation, their appreciation of art, music and literature. His analysis showed that cultural capital did have a positive impact on high school grades, especially for history, social studies and English, but less so for maths. He explained that this could be because pupils who were engaged in cultural activities were more likely to be perceived as intelligent, and hence received more attention and assistance from teachers. Cultural capital, he argued, is an asset that can be capitalized to impress. The implication is that participation in fine arts activities in schools can enhance ones cultural resources.

A longitudinal study to assess the long-term effect of art (Nagel, Ganzeboom, Haaanstra & Oud 1997), compared the careers of pupils who took art as an exam subject at school to those of their peers who did not take art exam. Participants were taken from 31 randomly selected schools. A total of 1,035 pupils (50% of the original cohort) were traced and agreed to the interview. Results suggest those who did music at school had the highest average exam grades and those who did visual art had the lowest compared to those without art as an exam subject. The analyses showed that art participation in school had a positive effect on students' participation in cultural activities in later life. However, it has to be mentioned that art elective pupils were already actively engaged in art activities and art consumption. They also come from culturally active families. Early cultural participation had a small effect on highest educational level attained. Such correlational studies cannot rule out other

confounding factors, so the direct effects of arts participation in school on educational attainment cannot be ascertained.

Impact:

- No evidence of impact on academic and non-cognitive outcomes of primary school children.
- No evidence that arts education in secondary school contributed to upward mobility.

Evidence:

- Medium quality for the evaluation of primary school art although the sample was large, there was no random allocation of children to experimental and control groups, but baseline equivalence was established in pre-test. It was not clear how the groups were allocated.
- Evidence from the longitudinal study is weak because of the high percentage of missing data and pupils who opted for fine arts subjects are different from those who did not in terms of their background.
- Evidence from the study on secondary school aged children is also weak because the analyses can only show association between interest and participation in artistic activities and exam grades. It cannot show that one causes the other.
- Possibility of a selection effect, i.e. brighter students more likely to participate in cultural activities at young age cultural. Such participation could also be an influence of friends and family background.

Study of association cannot determine direction of causal effect.

12. Haanstra, F. H. (1996) Effects of art education on visual-spatial ability and aesthetic perception: a quantitative review. *Studies in Art Education*, 37: 197-209. (US)

Intervention: Art in education on visual-spatial abilities and aesthetic perception

Age: Cross age

This was a meta-analysis of 69 studies (30 on visual spatial ability; 39 on aesthetic perception) to establish whether art in education can increase students' visual-spatial ability and enhance their aesthetic perception. These studies, published between 1960 and 1990 were experimental studies. The review found no significant effect of art education on visual-spatial ability, but a medium effect on aesthetic perception. Art education was most effective in improving the visual-spatial ability of young children, but least effective on aesthetic perception. Haanstra concluded that a combination of art works and studio works was the most effective way in developing children's aesthetic perception.

Medium to weak

Impact: Mixed results

Evidence: Medium to weak

13. Hardy, W. L. (2011) *Arts in early childhood education and the enhancement of learning*. Ann Arbor, Walden University. 3478542: 178. (US)

Intervention: Integrated arts curriculum

Age: 3-5 (pre-school)

This was an observational study to test the feasibility and effectiveness of integrating arts in literature for pre-schoolers. 16 teachers from one school were involved. Eight of the teachers were asked to choose two lessons from a manual to teach their class. It is not clear how the teachers were selected, and how they decide on which lessons to teach. Teachers recorded their thoughts and comments as well as those of their co-workers and pupils regarding the art activities. The 8 teachers then met 3 weeks later to discuss the effectiveness of the lessons based on the responses from their pupils. Classroom observations and anecdotal evidence from teachers suggest that art was not taught in an integrated way in pre-school classes. The study was more an evaluation of the manual and the process of implementing arts lesson. Little attention was given to the outcomes of teaching art. Much of the evidence on this was from secondary sources: review of literature.

Impact: No evaluation of outcomes

Evidence:

- Very poor as much of the evidence was based on what teachers thought went well with their lessons.
- Also, the school involved was a private school, and is therefore not representative of the general school population.

14. Kalyoncu, R., and Tepecik, A. (2010) An application of project-based learning in an urban project topic in the visual arts course in 8th classes of primary education. *Kuram ve Uygulamada Eğitim Bilimleri*, 10(4): 2409-2430. (Turkey)

Intervention: Visual arts on academic achievement

Age: 8th grade (Primary school in Turkey, not sure what age children are)

This aim of this study was to measure the effect of project-based learning used in visual arts course on the academic achievement of 61 primary school pupils in Turkey. The information reported in the paper was so lacking that it was difficult to tell how the children were randomised and what outcome measures and by what means they were assessed. The paper talked about achievement and permanence tests, but there was no information what these tests were. There was no result data presented. The findings simply state that there was a significant difference between the pre- post-test achievement scores of the students in the experimental, and although control group also showed improvements the gain was not

significant. Given that the sample was a convenience sample and random allocation was not clear, the use of significant test was therefore inappropriate. There was no data presented for comparison of gain scores between groups.

Impact: Positive effect reported

Evidence: Weak

- Small sample (n=61).
- Convenience sample.
- Threat to external validity as sample taken from 2 classes in one school.
- Randomisation unclear.
- No result data presented.

(Overall it can be said that there is no evidence of effect)

15. Liem, G. A. D., Martin, A. J., Anderson, M., Gibson, R., & Sudmalis, D. (2014)

The role of arts-related information and communication technology use in problem solving and achievement: Findings from the programme for international student assessment. *Journal of Educational Psychology*, 106(2): 348-363. (International)

Intervention: Arts related ICT on problem-solving skills

Age: 15 year old

This study used the 2003 PISA data of over 190,000 15-year old students to estimate the effects of frequency and quality of arts-related ICT use on 15-year old pupils' problem-solving skills and maths and science achievement. The study found that the quality of arts-related ICT use was associated with higher problem-solving skills and maths and science achievement, but the frequency of use was linked to lower levels of problem-solving skills and achievement. The analysis also showed that the negative effect of frequency use was more acute among pupils with low quality use. This suggests that it is not the frequency of use as such, but the quality that mattered. Arts-related use of ICT can have positive effects on cognitive abilities if it is used well. It is possible that students who are efficient and competent in using ICT are those who are likely to do well in maths and science. Therefore it cannot be concluded from this study that arts-related use of ICT can enhance cognitive skills.

Impact: Positive association between quality of arts-related ICT use and cognitive abilities

Evidence: Weak

No evidence that ICT use can enhance cognitive abilities. Study can only show association. There is a suggestion that the quality of ICT use is related to the competency of individual, which is also related to their problem-solving ability. In other words, those who are already good at

problem-solving are more competent in using arts-related ICT. The analysis does not show the cause and effect.

16. Phillips, P., & Bickley-Green, C.(1998) Integrating art and mathematics. *Principal*, 77: 46-49. (US)

Intervention: Arts integration in maths

Age: Grade 3-7 (age 8-9)

This is a study that investigated the effects of integrating art in maths curriculum on the maths performance of 146 pupils aged 8-9. Results showed that there was improvement in pupils' understanding of maths concepts in 81 of the 121 classes receiving art lessons.

Impact: Positive impact of integrating art on maths (not effective on all classes)

Evidence: Cannot be determined as full text is not available

- However, the abstract seems to suggest that there were 146 pupils from 121 classes, suggesting that there were fewer than 2 pupils from each class (could be a mistake in the abstract).
- There was no comparison group. Study design was a pre-post comparison. So it is not possible to say if similar children would also have made progress without the intervention.

Evidence judged from information given in abstract is weak

17. Schultz, K. A. (2011) *Reciprocal cognitive transfer between high school students' artistic interpretation skills and their reading interpretation skills*. Ann Arbor, Walden University. 3434190: 144. (US)

Intervention: Visual art lessons on interpretation and reading skills

Age: 10th grade (about 15/16 years old)

This study investigated the effects of participation in visual art lessons in ninth grade on the interpretation skills (mental focus, flexible purposing, and evidentiary reasoning) used in the 10th grade comprehension tests. Judgements of interpretation skills were based on the scores obtained in the art courses. Reading comprehension scores were taken from the state standardized assessment in vocabulary, comprehension and literature. Visual art classes included sculpture, painting, drawing, culture, history, media, general art and advanced art.

The author gave the impression the sample size was, 2,137. However, multiple regression analyses were performed on only 792 pupils. Results showed that the pupils' grade in art and the type of art classes rather than the number of lessons predicted their performance in reading comprehension. Reading comprehension scores were negatively correlated with general art, culture and painting. The only variable that correlated

strongly with reading comprehension performance was the final art letter grade.

Impact: Mixed

- Cannot establish causal impact, as the study only shows an association between final art grade and reading comprehension scores.
- Reading comprehension negatively correlated with general art, culture and painting.
- Performance in art positively correlated with reading grades. This may indicate that those who do well in art are also better academically.

Evidence: Weak

- There was no counterfactual.
- No control for prior achievement or inherent academic abilities of pupils. Therefore not possible to show if higher art grade led to better interpretation skills in comprehension, or if pupils who do well in art are also inherently better academically. They may be the more motivated ones with higher aspirations, and are more perceptive and have better interpretive skills. The correlational study design is unable to disentangle these confounding factors.
- Pupils were self-selected; those who chose to do visual arts may be different to those who chose not to do arts.
- Correlational study does not show the direction of cause and effect.
- 28% of eligible 10th graders were excluded for not meeting the eligibility criteria, another 63% were excluded because they failed to complete any art classes.
- Although it was reported that the sample was 2,137, analyses was performed on only 792 pupils.

18. Stephens, P. K. G. (1996) *Discipline-based art education as the structural support of a language arts intervention program: Documentation of cognitive changes in certain elementary-age students.* Ann Arbor, University of North Texas. 9714062: 150. (US)

Intervention: Discipline-Based Art Education (a remedial speech intervention programme)

Age: Primary school (children aged 10-12)

Mixed method: quasi-experimental

This study compared the effects of a traditional language arts approach and the discipline-based art education (DBAE) on the writing and arts performance of 11 primary school children identified as failing in language arts (English language). DBAE was a remedial speech intervention programme and involved children observing, talking about and write art images using a framework designed for programme. A lot of scaffolding in

the form of questions was provided to guide students' observations and discussions. All visual arts, some specialist teachers and general teachers received DBAE training.

Participants were children assessed as deficient in language arts. Remedial lessons were conducted twice a week for 30 minutes per lesson for one semester (total of 18 weeks, broken down into 3 cycle). Traditional method of language instruction and DBAE method were delivered in alternating lessons. At the end of each lesson students record their work orally and in written form using ACTS (Arts Cognitive Tracking System). This was used to assess their understanding of arts and language arts. Pre- and post-test of children's non-verbal intelligence using the standardised Test of Non-Verbal Intelligence (TONI-2) were also carried out and results compared with those of ACTS.

Pre- post- test of non-verbal intelligence revealed no change in non-verbal intelligence. Narrative evaluations by the pupils from ACTS suggested that they understood the process involved in art production and were able to empathise with artists. ACTS also provided instructional feedback to the researcher who then revised the words used in the lessons to enhance understanding of art terminology. The study reported that a slightly higher number of pupils indicated that they liked to look at works of art at the end of the study than at the beginning (an increase of one pupils). Responses to other post-interview affective questions were based on very small numbers to be meaningful.

Impact:

- No effect on standardized assessment of non-verbal intelligence.
- Small effect on art understanding and language arts based on subjective assessments by teachers.
- Small effect on attitude towards art and artists based on students' self report.
- Most of these were based on increase in one to two pupils indicating change in attitude.

Evidence: Very weak – poor design

- No real counterfactual. The same pupils were exposed to both the control and the experimental conditions
- Very small sample
- Threat to external validity as pupils were those identified by teachers – not representative of general pop.
- Measurements of attitudes and teachers' assessment of pupils' understanding of art and language of arts were based on subjective judgements. The only standardised assessment of non-verbal intelligence

suggests no effect.

19. Webb, N. R. (1985) *Right brain drawing instruction: its effect on the drawing skills and verbal fluencies of sixth-grade students (cerebral asymmetry, learning styles, lateralization, imagery)*. Ann Arbor, University of South Carolina. 8604287: 147. (US)

Intervention: Effect of drawing on verbal fluencies

Age: 6th grade (age 11/12)

This study was to test whether stimulating the right hemisphere of children's brain through drawing can affect the development of the left brain which controls verbal fluency. The intervention lasted 6 weeks. Sixth grade art students were randomly allocated to either receive the drawing instruction intervention or an alternative non-basic course. Another group of students not enrolled in art were randomly selected to form the control group. The intervention consisted of daily drawing instructions including contour drawing, inverted drawing and negative space. After 6 weeks a post-test was conducted to test pupil's skills in still life drawing, human figure drawing and their verbal fluency (from memory and from observation). Analyses of variance showed no significant effects of treatment on any of the dependent variables. The two drawing variables and the two verbal measures were each strongly but independently related to each other. Drawing and verbal skills were not related to each other. Human figure drawing was the only measure associated with achievement (measured on the CTBS).

Impact: No impact of drawing on verbal fluency

Evidence: Cannot be ascertained as the sample size is unknown

- Full text not available so we do not know how many pupils there were.
- Sample was taken from one school, therefore not generalizable to the wider population.
- From the abstracts we do not know how the two intervention groups compare.

20. Wurzel, J. (2012) *Learning to cope with stress through art: An evaluation of a school-based creative arts primary prevention program for children in elementary school*. US, ProQuest Information & Learning. 72: 2970-2970. (US)

Intervention: Effect of art instruction on reducing stress (CARING project) CARING stands for Children at Risk: Intervention for a New Generation

Age: Primary (3rd to 5th grades: age 9-12)

This study examined the effects of a school-based prevention project called CARING on a range of affective and wider outcomes: coping skills, self-esteem and problem-solving. For this study CARING integrated a

multicultural creative arts component into the programme, which is a psychosocial and behavioural prevention programme. A total of 29 (Experimental n= 16; Control n= 13) pupils aged 9-12 took part in the study. Outcome measures were assessed using The Self-Report Coping Measure and the Multidimensional Self-Concept Scale. The duration of the intervention was 15 weeks. Children in the CARING programme were identified as having experienced stress (academic, social, familial or health). Identified children were asked if they'd like to participate and parental consent sought. Participation was therefore voluntary and on consent by parents. Only 5 of the 15 grade 3 children identified agreed to participate. These were assigned to the control group. 12 of the 13 grade 5 identified agreed and were assigned to experimental group. Less than half of the grade 4 identified agreed. These were randomly assigned to treatment/control. Overall, slightly over half (51%) of those identified agreed to take part.

Results showed no significant differences between groups on all the outcome measures (self-esteem, affective, problem-solving, distancing, internalizing and externalizing). However, pre- post test comparisons showed that experimental children performed worse than control children on problem-solving, social support and distancing behaviours after exposure to the intervention. On the other hand, experimental children made bigger improvements over control children on affective and self-esteem outcomes. Integrating multicultural arts into the usual CARING programme had beneficial effects on some measures but not others.

Impact: No significant effects on outcomes

Evidence: Weak

- Small sample based in one school.
- Non-random assignment to treatment conditions.
- Only half of those identified agreed to participate.
- Groups were not equal to begin with: 84.6% of control group pupils had anger issues, compared to 37.5% in the experimental group.
- The programme was not fully implemented because of non-compliance within groups due to disruptive behaviours.

21. Ben-Chetrit, L. (2014) *The effect of high school arts classes on exit exam scores in measurement and geometry.* Ann Arbor, Walden University. 3637727: 176. (US)

Intervention: Visual arts on state mandated test maths test

Age: Secondary (15-16)

This study aimed to investigate the effectiveness on including visual arts in the teaching of maths. The theory is that visual arts help in the development of spatial awareness and visualization which are necessary for understanding mathematical concepts, especially for English language learners. This study was conducted on a group of 508 teenagers (15-16 years old) in one school who were included using a stratified purposive sampling. Results showed that no significant differences in exam scores between English language learners in arts and non-arts classes.

Despite showing no impact, the study explained that because visual arts contained many mathematical concepts and spatial skills that can contribute to critical and mathematical thinking, the lack of significant findings suggests that schools should all the more integrate mathematical concepts in their art classes.

Impact: No effect on maths

Evidence: Weak

- Fairly large sample (n=508)
- Arts and non-arts classes were not randomly allocated, so there may be differences between groups.
- Results were based on a post-hoc analysis – no pre- and post-test comparisons were made which could take into account initial differences between groups.

22. Krilov, L. (2008) *The impact of art augmented geometry instruction*. Ann Arbor, Wilmington University (Delaware). 3292901: 176. (country??)

Intervention: Use of art in teaching geometry

Age: 5th grade (10-11)

This was a quasi-experimental study of the impact of the use of art in geometry instruction in one school (n=69) on 5th grade pupils' achievement and attitude towards maths and geometry. Three other schools using the traditional approach formed the control (n=226). Outcomes were measured using the New Jersey Assessment of Skills and Knowledge. Experimental classes received Art Augmented Geometry Instruction from their art teacher and traditional geometry instruction from their maths teacher. Results indicated no overall differences between groups in terms of maths and geometry knowledge and skills, although experimental group showed significant gain in one of the attitudinal variables. Both groups showed a decline in test scores but control groups recorded a bigger drop. However, the difference was not statistically significant.

Impact: No overall impact on maths and geometry achievement, but positive change in one attitudinal variable.

Evidence: Weak

- Experimental school was predominantly White (78%) and very small proportion of pupils eligible for free/reduced lunch (5%). The finding, therefore, cannot be generalised to other schools with a large proportion of disadvantaged pupils.
- There is no random assignment to experimental conditions.
- The number of maths lessons using geometry instruction varied among schools from 2.5 weeks to 7 weeks. Experimental school had 6 weeks of geometry instruction.
- There was no control for fidelity of treatment. Comparison school teachers may also be using projects or assignments similar to the art-augmented lessons in the experimental school.

23. Moga, E., Burger, K., Hetland, L. and Winner, E. (2000) Does studying the arts engender creative thinking? Evidence for near but not far transfer. *Journal of Aesthetic Education*, 34(3): 91-104.

Intervention: Effects of visual arts in general on creative thinking

Age: Across age groups

This was a review of studies looking at the relationship between arts study and creative thinking. Studies included were empirical with a control/comparison group.

The 4 correlational studies showed a statistically significant positive correlation between study of the arts and performance on standardized test of creativity (effect sizes ranged from 0.09 to 0.43).

The 3 experimental studies on verbal creativity showed a positive effect (ES=0.05), but this was not significant. This suggests that the evidence of a causal relationship of arts study on verbal creativity is inconclusive. These were all short studies of 4 months duration with one of them being only 4 days.

Meta-analysis of 3 experimental studies on figural creativity (based on interpretation of pupils' drawings) showed a positive causal relationship (ES ranged from 0.12 to 0.3), but the test of significance produced mixed results.

Impact: Mixed

- Positive relationship between arts and performance on standardized test of creativity.
- Evidence of causal effect of arts study on verbal creativity is inconclusive.

- Positive causal effect of arts on figural creativity (based on subjective judgement of pupils' drawings), but not statistically significant.

Evidence: Medium to Weak

- The inclusion of experimental studies with control/comparison groups provides strong causal claims.
- However, the 4 correlational studies can only suggest correlation, but not causation
- The very small number of studies using different measures of outcomes and student population and research design makes it difficult to make conclusive statements about the findings.
- Also the 4 experimental studies included only 758 students.
- The authors concluded that there is evidence of transfer of skills especially in figurative drawing even though this was not apparent from the data given the small number of studies analysed.
- The validity of measuring creativity (e.g. subjective judgement of students' drawing) also weakens the evidence of transfer.
- Also the positive causal relationship is observed only in arts-related creativity, but not in creativity in non-art forms (e.g. verbal creativity).

Arts instruction is delivered in different contexts (different types of schools, differences in class teachers and whether it is integrated or not and whether it is delivered by specialists or regular classroom teachers). This varied context makes it difficult to transfer successes from controlled experiment settings to real life classroom situations which can be quite messy (with a wide range of pupils with different needs).

24. Gabhainn, S. N., et al. (2001) Community arts in schools: Effects on self-esteem and attainments in primary school children. *The Irish Journal of Psychology*, 22(3-4): 269-276. (Ireland)

Intervention: Community arts on non-cognitive outcomes

Age: 8-12 years old

This study assessed the effects of a community arts project (the Macleinn project) on the self-esteem of 8 to 12 year old pupils in Ireland. The programme involved community artists working with primary school pupils for 2.5 hrs per week teaching them art, in particular, sculpture. The participants were taken from 2 classes in one school, but there was no information about the number of pupils or the kind of pupils involved. The class above and below this class formed the comparison groups (but it is unclear whether this means the class one grade up and one below or in terms of ability). These were followed from 3rd grade to 5th grade. Self-esteem outcome measured on the Cooper-Smith self-esteem inventory

was assessed at baseline and at the end of the first and second year (when children were in graded 4 and 5). Academic attainment was measured using the Micra-T on reading.

At the end of year 1, comparison of means showed a significant increase in self-esteem of the intervention class, but not in both the comparison classes. However, at the end of year 2, control group 1's self-esteem increased significantly more than the intervention group. This suggests a negative long term effect of intervention on self-esteem. Reading scores of comparison group showed a significant improvement between year 1 and year 2. Data was not collected for the intervention group – so it is not possible to say if they have made the same improvements or not.

Impact: Positive impact reported on self-esteem reported even though data suggested the reverse in the 2nd year of the intervention.

Evidence: Weak

- This is a badly written paper with no details about the number of participants or non-response.
- High attrition – one class was excluded from analysis, one comparison group could not be tracked.
- No reading scores were collected from intervention group in the 2nd year, so it is not possible to evaluate the effect on attainment.
- Results showed that in the 2nd year the self-esteem scores of one of the comparison groups increased significantly while those of the intervention group remained constant. However, the paper reported that the intervention raised the self-esteem of the children.
- The authors reported that this was because the comparison class was, at the same time, participating in a self-esteem enhancement programme. Again although the authors suggested that the increase in self-esteem in the 2 groups were comparable, the data suggest that the control group actually made bigger gains. This means that the self-esteem programme 'Circle Time' was more effective than the community arts programme in raising self-esteem.

High attrition- Study began with 2 schools - one school was dropped from analysis because they did not have equivalent comparison classes; and one comparison class from the remaining school could not be tracked.

DRAMA

Creative drama is a form of drama where participants improvise using imagination to enact a scene or an experience, often guided by a leader. Pupils dramatise and role play. Terms used to describe drama for educational purposes include: creative

drama, child drama, play making, child play, theatre drama, performing arts and educational drama.

Theoretical literature supports the use of creative drama to improve self-concept, but only one experimental study was found to have positive benefits on self-concept (Hedahl 1980). Few empirical studies have been conducted. Kardash and Wright's review found that over 20 years of published research, only 2 studies used random sampling and 6 had an experimental design. Hedahl's study suggests that creative drama has the potential of improving the self-concept of middle class 5th and 6th grade students.

Explanation of mechanism: Schaffner et al. (1984) claimed that language use in drama activities encouraged thinking and cognitive development through speculation, reflection, explanation and evaluation.

1. Arieli, B. (2007) *The integration of creative drama into science teaching.* Ann Arbor, Kansas State University. 3291364: 183. (US)

Intervention: Integrating drama in science lesson

Age: 6th grade (age 11-12)

This is an action research case study with a pre- post-test control group design to examine the effects of integrating creative drama into a regular science teaching. The intervention involved integrating creative drama activities into the regular science lessons. These included the use of props and games. Students improvised, wrote scripts, performed dances or played musical instruments.

Participants were taken from 6 sixth grade classes from 3 primary schools. Two classes that received the creative drama treatment (n= 50 pupils) formed the treatment group, and 80 pupils from the other 4 classes formed the control. It is not clear how the classes were allocated to treatment, and whether the treatment groups all came from the same school. If not, there could be the issue of diffusion where both control and treatment teachers are in the same school. Although the author suggested a random assignment, it is not clear why the randomization was not split 50-50 (3 treatment and 3 control classes). Duration of intervention was 8 months. The unit chosen for the study was Mixtures and Solutions, and was to be taught in 15 lessons (or nine weeks) spread out over the 8 months. Teachers decide when and how many times a week they want to teach the unit.

Pre- and post-tests were in the form of questionnaires to test students'

knowledge and understanding of scientific concepts. The same students did not take the pre- and post-test. Pupils were randomly selected to either take the pre-test or the post-test. Comparison of pre-post-test results showed that both groups made significant improvements over time, but treatment groups made bigger gains than control groups. Selected pupils were identified for interviews (12 out of 50). Pupils generally reported that they enjoyed the lessons and creative drama helped them better understand abstract scientific concepts. It has to be mentioned that not all pupils answered all the questions. Teachers were generally positive about incorporating creative drama activities into their lessons. Classroom observations indicated that creative drama had a positive effect on classroom environment, improved self-esteem and social interactions.

Impact: Positive impact on knowledge and understanding of science concepts

Evidence: Weak

- Potential source of bias as the researcher was also the science teacher using the creative drama strategy.
- Teacher expectancy, as the teachers are not blind to intervention. Teachers agreed to take part in the study, so there is an expectation of positive effects.
- Pre- post-test comparisons were not with the same children.
- Tests were developed by the researcher and as the researcher was not blind to treatment allocation, there is potential for researcher to teach to the test, or to focus lessons on the test items.

2. Cormack, R. (2004) *Creative drama in the writing process: The impact on elementary students' short stories*. Ann Arbor, University of Northern British Columbia (Canada). MR04673:180. (US)

Intervention: Creative drama on writing

Age: Grade 6 and 7 (age 11-13)

[Full text of report not available]

The aim of this study was to evaluate the impact of a 10-week creative drama as a prewriting strategy on the writing ability of children in grades 6 and 7. Two groups of children were compared: one receiving drama instruction and the other a pre-writing instruction. Children's writing skills were assessed on ideas, details, audience awareness, sentence structure, language style, plot, character development and narration. The study reported that drama-taught children scored slightly higher than control children in the first two stories they wrote, and significantly higher on the 3rd story. Children demonstrated more writing skills, wrote longer stories and used more dialogue. These children generally reported having fun.

Impact: Positive impact reported on writing skills and enjoyment of writing process

Evidence: Cannot be determined as full text of paper is not accessible

- Generally weak because of the small sample (n= 2 classes).
- It is not clear how the classes were assigned to treatment group.
- It is also not clear how the writing skills were assessed – what instrument was used; was it developed by the researcher? Hence possibility of bias.

3. Danner, S. A. (2003) *Prevention through performance: A creative drama enrichment program for arts school students*. Ann Arbor, Bowling Green State University. 3099406:114. (US)

Intervention: Drama as an enrichment programme

Age: 7th grade (age 12-13)

Matched comparison study comparing affective outcomes of 47 seventh grade children exposed to a creative drama enrichment programme with 7 other children (representing 28% of all who were invited) in a private performing arts school not exposed to drama instruction. (Although the study described the design as a matched comparison, the two schools were clearly different: one was a charter school and the other a selective private performing arts school). The programme, named ACT IT (Adolescents Changing Through Improvisational Theatre).

This was a prevention intervention carried out twice a week (45 minutes each) over 12 weeks (18 lessons altogether). Children learnt theatrical skills, applying problem-solving skills and creating theatrical scenes which were familiar to the adolescents' experience. These activities focused on addressing issues like substance abuse, sexual activity, peer and parent-child relationship. A range of outcome measures were assessed before and after the intervention. These ranged from pupils' intention to use drugs, intention to engage in sexual activity, self-esteem using the Rosenberg Self-Esteem Inventory (RSE) and future expectation, problem. 41 of the 47 treatment pupils completed both pre- and post-intervention questionnaire. Overall, there were no changes observed with the comparison group, but significantly worse for the treatment group in several areas. In fact, pupils showed declining behavior in several areas. The author concluded that the programme may even be harmful to the participants.

Impact: Negative effect on behavior

Evidence: Weak

- Small sample (n=54).
- 15% attrition (treatment group).
- Groups were not equal to begin with.
- Experimental pupils were volunteers.

- Participants were not randomly allocated. Comparisons were made with children in a similar school.
- Question items asked pupils about their intention and habits; these were addressed in the intervention.
- It maybe that treatment pupils were more open about their behaviour after the treatment, hence negative results.
- The analysis used was weak and inappropriate; e.g. use of significant test for small non-random sample.

4. Duatepe-Paksu, A., and B. Ubuz (2009) Effects of drama-based geometry instruction on student achievement, attitudes, and thinking levels. *Journal of Educational Research*, 102(4): 272-286. (US)

Intervention: Use of drama to teach geometry

Age: 7th grade (age 12-13)

Paksu and Ubuz (2009) conducted a study to examine the effects of using drama to teach geometry. The outcome measures were geometry achievement, geometric thinking, attitudes towards maths and geometry and retention. Participants were 102 seventh grade pupils from one school. Children used role plays and make-believe plays to create an atmosphere of dramatic moments that require abstraction and imagination. The control group, on the other hand, were taught using a textbook-based approach with the teacher supplying the knowledge and pupils practiced problem-solving questions. Multivariate analyses revealed that drama-based instruction had a significant effect on all the outcome measures. Delayed post-test also showed that students who received drama-based instruction maintain achievement better than students taught the traditional method (effect sizes were medium to large). Pre- post- test comparisons of attitudes towards maths and geometry showed that experimental groups have made bigger improvements than control group. In fact, on 2 measures the control group showed a decline. Pupils also found that using drama in the classroom facilitated understanding and contextualisation of concepts and problems. They also reported enjoying the lessons more. Role plays also help in getting children to work collaboratively. Positive effect on the learning environment.

Impact: Positive effect on learning, achievement, attitude and enjoyment

Evidence: Weak

- Participants came from a socio-economically middle-class neighbourhood – limited generalizability to disadvantaged children (but could test this on a wider population).

- Small sample. Only three classes – one of two maths classes with lessons at the same time was randomly assigned to control group and the other two formed the control.
- Researcher was a drama trained maths teacher. It is therefore not clear if the effects were due to differences in teacher effectiveness or the intervention, and if similar results could be achieved with trained regular teacher.
- Analyses of maths and geometric achievement were based on post- test comparisons only.

5. Fizzano, W. J. (1999) *The impact of story drama on the reading comprehension, oral language complexity, and the attitudes of third graders.* Ann Arbor, Rutgers University. 9949891:159. (US)

Intervention: Story drama

Age: Primary (3rd grade; age 8-9)

[Potential to trial improving the study design using more reliable tests and bigger sample]

Story drama is the use of drama to get pupils to role play and act out a scene literature. Fizzano (1999) investigated the effect of the use of drama as a teaching strategy on the literacy and attitudes of 3rd grade children. The sample was taken from 6 third grade classes (n=150). There were four experimental classes; two of which employed teacher-directed drama, two used pupil-directed drama and the other two classes formed the control that used the traditional reading programme. The intervention period was 8 weeks, and drama -integrated lessons were conducted once a week each lasting an hour. Literacy achievement was measured using the Metropolitan Achievement Test of Comprehension (standardized test); Reading Retelling Test; Reading Rewriting Test and the Probed Recall Comprehension Test. Oral competency was assessed using the T-unit analysis of a corpus of a corpus of language elicited from the story retellings. Attitudes towards reading were assessed through interviews and observational fieldnotes. Story retelling and rewriting tests involved a piece of folk tales and points were awarded for eliciting relevant elements from the story (e.g. the time and place of the story, introduction of the main character and what happened to the character). Analysis of variance and post-hoc comparisons revealed that the two experimental groups outperformed control children on all measures apart from the standardized test. This is not surprising as the tests were based on similar stories used for the intervention. Comparing performance of children using tests which bear similarities to the intervention with children who have not been

exposed to the intervention does not constitute a fair test. However, it has to be noted that control group registered a decline in performance on MAT whereas the two experimental groups showed slight improvements.

Impact: Positive impact reported on all measures, but not on standardized test

Evidence: Weak

- Small sample (n=150) divided into 3 groups.
- It is crucial to understand that the folk tales used in the tests were similar to those used in the intervention.
- Children seemed to do well on methods-related test, but not on standardised tests.
- The researcher assessed oral complexity and observed classroom interactions– clearly looking out for elements that children were trained to do. As researcher was not blind to intervention, there is a possibility of bias.

6. Goldstein, T. R. (2010) *The effects of acting training on theory of mind, empathy, and emotion regulation.* US, ProQuest Information & Learning. 71: 2721-2721.
(US)

Intervention: Use of drama or acting to develop theory of mind, empathy and regulation of emotions

Age: Primary (ages 8-10); Secondary (ages 13-15)

Theory of mind is the belief that one's behavior is driven by one's beliefs, desires and intentions, and these are shaped by one's perceptions. An individual's social intelligence and emotional intelligence, manifested in the way we respond to people or situations, for example, are very much determined our perception of events.

The aim of this study was to determine if training in acting can help develop young people's theory of mind, their sense of empathy and appropriate emotions. Goldstein looked at the effects of acting training on two age groups of children. The first compared children aged 8-10 who completed a year of training in acting (n=31) with 37 children who completed training in visual arts at an arts school. Acting children attended three nine-week classes, each lasting an hour once a week, while visual arts children attended three ten-week classes, each lasting 90 min per week. Theory of mind was assessed using three instruments; two tested children's understanding of behavior and intentions using stories, and the third used static photos to test children's ability to gauge people's emotions. Empathy was assessed using a self-report scale of matching emotions which relate to their experience. The items were taken from widely established standardized measures. Emotion regulation was

measured using a vignette where the pupil was given a scenario and options on how they would react in such situations. The child's response indicates whether they are problem-solving, self-reliant, in denial or externalizing their behavior. There were few differences between children at pre-test. Acting children were more likely to show stronger emotions and externalizing responses. After a year of exposure to acting/arts, some differences were noticed between artists and actors in empathy and emotional responses, but not theory of mind. In general, non actors increased in vocabulary over actors; actors became less suppressive in their behavior while non actors remained the same and actors were more expressive and open about display of emotions than non actors. There was no correlation between the three skills: theory of mind, empathy and emotion regulation. This means developing one skill does not necessarily lead to the development of the other skills.

A second study was conducted on 13-15 year olds (n=50; 28 actors and 22 artists). Both groups received nine hours of training per week for a year. Participants were selected for admission into their respective course. Groups were fairly similar on most measures at the start of the experiment with some differences. Actors were more likely to experience intense emotions, but they were more likely to suppress their emotions than non actors. At post-test, both actors and non actors showed an improvement in their ability to read people's feelings (but for actors this was more so for boys than girls). Actors showed a significant increase in dispositional empathy, theory of mind and intensity of expressions of emotions, more so than non actors.

Impact:

- For 8-10 year olds: there was no impact of training in acting on theory of mind, but some effect on dispositional empathy and expression of emotions.
- For the 13-15 year olds, some differences were observed between actors and non-actors, suggesting that training in acting can help foster empathy, expression of emotions and understanding people's thoughts and feelings.

Evidence: Weak (Research design is unable to determine intervention effect)

- Small sample (under a 100, with fewer than 50 in each arm).
- Non-random sample.
- Self-selected.
- Sample is not representative of regular children in mainstream school, so there is question of external validity.
- Study design is unable to compare gains between groups in measures of emotions, empathy and theory of mind.
- There was no comparison of gain scores in any of the measures.

7. Hendrix, R. C. (2011) *Using creative dramatics to foster conceptual learning in a science enrichment program.* Ann Arbor, Auburn University. 3497489:199. (US)

Intervention: Creative dramatic

Age: Primary (grade 4 and 5; ages 9-11)

[Possibly a feasibility trial on larger randomised sample with independent evaluation for disadvantaged children]

This study analysed the effects of using creative drama as an enrichment activity on students' understanding concepts in physics and their attitudes towards science. Participants were 38 grade 4 and 5 pupils (treatment n=19; control n=19). Pupils were pulled out of the class for the science enrichment activities. Only data from pupils who consented to the study were analysed. All pupils received instruction using the inquiry-based Full Options Science System (FOSS) module. The only difference was that treatment pupils were taught using creative drama as an additional teaching strategy. Science attitudes were assessed using the Three Dimensional Survey of Science Attitudes (TDAS). FOSS pre- post-test survey was used for assessing pupils' comprehension of science concepts. Creative drama, which included role playing, was used to facilitate students' retention and comprehension of science vocabulary and concepts.

Comparison of gain scores between pre- and post-test showed that treatment pupils made greater gains than control children on the FOSS test (ES=0.93 for 4th grade and ES= 1.32 for 5th grade). The difference was reported as statistically significant. Both grade 4 and 5 pupils in the two groups showed a decrease in attitudes towards science.

Impact: Positive impact of creative drama science teaching on learning and attitudes towards science

Evidence: Weak

- Very small sample (n=38 with under 10 in each group for each grade).
- Non-random allocation.
- Participants were gifted and talented, so results may not be generalised to disadvantaged children with different needs and learning styles.
- Participants were also those who consented to participation.
- Researcher was also the teacher; potential for bias as they are not blind to intervention.

8. Hetland, L. (2000) *The relationship between music and spatial processes: A meta-analysis.* Ann Arbor, Harvard University. 9992322:237.

Intervention: Active participation in music (making music as well as listening)

Age: Primary 3-12

This was a meta-analysis of experimental studies evaluating the effects of active participation in music on spatial reasoning of young children based on studies conducted between 1950 and 1999. For the purpose of this review, we only analyse the results for young children, although the thesis also included studies for college students. The thesis reviewed 15 relevant studies looking into the effects of active music participation on performance of spatial tasks of young children aged 3-12. Typically the studies included in the meta-analysis compared 2 to 4 groups of children aged 3-7. Two studies were for older children aged 8-12. The duration and intensity of music instruction ranged from 4 weeks to 2 years, one to 5 sessions per week, each lesson lasting between 10 and 60 minutes. The majority of these lessons were in group format and involved learning a musical instrument using Orff or Kodaly method of instruction. Control children often either had no music instruction or were given an alternative programme. In one of the studies, control children had instruction on spatial-temporal reasoning or language instruction but without the music component. Spatial-temporal ability was measured primarily using the Object Assembly subtest of the WPPSI-R. Analyses were also conducted on 3 studies that used the Raven's Standard Progressive Matrices (RSPM) – a non-verbal assessment of general and logical intelligence. The author conducted a range of analyses comparing effects using different measures and different instruments.

Results suggest positive effect on measures of spatial-temporal reasoning (mental manipulation of shapes), but not for the Raven's Matrices tasks. Notation learning was found to enhance the effects. On the other hand, keyboard programmes were not more effective than other forms of active music making. The author cautioned that such effects may just be 'bonus' effects with short term benefits, and no implications for school achievement.

Impact: Positive effect of active music making (regardless of instruments) on children's spatial-temporal ability

Evidence: Weak

- It is not clear what effects such music programmes would have on disadvantaged children. No description of sub-group analyses was mentioned.
- Only in 5 of the 19 studies were the participants randomised to treatment conditions.
- Most of the studies involved very small number of cases. Total sample across the 15 studies was 701 (averaging about 47 cases in each study). Only 6 studies had sample size between 5 and 70.

- The study also tested and found no evidence of Hawthorne effect (using studies that included control group being given an alternative treatment) and teacher-expectancy effect.
- Given the small number of cases and number of studies, the wide range of outcome measures and instruments, it is difficult to make a convincing conclusion either way.

9. Joseph, A. (2014) *The effects of creative dramatics on vocabulary achievement of fourth grade students in a language arts classroom: An empirical study.* Ann Arbor, Seattle Pacific University. 3579799: 420. (US)

Intervention: Creative dramatics on vocabulary achievement

Age: Primary (grades 4; age 9-10)

[Potential for an efficacy trial using larger sample and standardised instruments]

An experimental study was conducted to evaluate the impact of integrating creative dramatics on the vocabulary achievement of 4th grade pupils in one school. The 20-day intervention was carried out over 5 weeks during the regular language arts class. Three classes/teachers were randomised to treatment conditions. Participants were 83 grade 4 pupils who were randomly divided to 3 groups (2 treatment groups and one control). Three grade 4 teachers were then randomly assigned to one of the 3 groups. Treatment groups were taught using creative dramatic instruction for 15-20 minutes each day, while the control pupils used the district's *Readers' Theater* format of learning vocabulary. One treatment group (T1) was taught vocabulary through improvisation using creative dramatics strategies. Treatment group 2 (T2) was taught vocabulary through story re-telling by enacting and reenacting stories using creative dramatics. Vocabulary achievement was assessed using a teacher-researcher developed criterion-referenced test on vocabulary covered in the curriculum. The school was a Special Learning Assistance Program school which catered to disadvantaged at-risk children. The study was generally well-conducted. It controlled for Hawthorne effect in that all the 3 groups believed that they were in the experiment. The researcher was not involved in the teaching, but observed the delivery of the lessons. Follow-up study conducted 5 weeks after the intervention period showed that all groups maintained their achievement scores between post-test and the follow-up, suggesting that the effects were sustained.

Results showed that both treatment groups made bigger gains between pre- and post-test compared to the control groups (ES =0.7 for T1 and ES=0.6 for T2).

Impact: Positive impact on vocabulary achievement

Evidence: Weak, but with potential

- Small sample (under 100) divided into 3 groups, meaning that each group has a sample of under 30.
- Study was based in one school classified as a Learning Assistance Programme school- results may not be generalised to other school population.
- Having only one teacher for each treatment condition has the potential of a teacher effect, which could be a confounding factor. A large sample can help to overcome teacher effects.
- The use of a researcher-teacher developed instrument may bias assessments as the researcher may inadvertently picked vocabulary words that were taught in the creative dramatics lessons.

10. Kratochvil, K. R. (2006) *The impact of educational drama on the advancement of English language learning*. Ann Arbor, San Jose State University. 1438575: 90. (US)

Intervention: Educational Drama on language arts

Age: Cross age

In this study Educational Drama includes both Drama in Education and Creative Drama, both of which involve improvisation where the participants respond to an imaginary situation and enact or play out the event, but not to an intended audience as in a theatre.

A meta-analysis of studies from 1983 to 2002 on the use of Educational Drama on language arts in California found the usual problems with research design in a number of the studies (such as having no comparison groups or issues with selection of comparison groups), limited number empirical studies, and lack of replication of studies. Lack of clear definitions of drama activities, wide range of definition of outcome measures and lack of objective measurements of these outcomes were other common issues associate with studies in the arts.

Impact: No causal links

Evidence: Weak because of design flaws in many of the studies

11. Laurin, S. (2010) *The effect of story drama on children's writing skills*. Ann Arbor, Concordia University. MR67265: 139. (Canada)

Intervention: Integrating creative drama in the classroom (use of Story Drama on Writing)

Age: Grade 3 (age 8-9)

This is an experimental study examining the effects of two strategies (discussion and story drama) on pupils' written texts. The sample consisted

of 45 children from two classes in one school, most of whom were from middle to high class families. One class was chosen as the control and the second class formed the experimental group. Half of the experimental children were taught using story drama (50 to 65 mins per session) and the other half were taught using discussions (40 to 60 mins) in phase 1 and then they swapped over in the phase 2 over a 8-week period. Every session was followed by a writing activity. Pupils' written ability was assessed using a judgement of the number of words, richness of the descriptions and the structure and organization of the texts produced by the children. Altogether a total of 206 texts were examined.

Analyses of texts showed that experimental children used more words than children in the control group, but the difference was not significant. There were little differences in terms of the use of adjectives or adverbs, although experimental children tended to use more adjectives and adverbs. However, control children seemed to use more different adjectives between pre and post test compared to experimental children. Comparing the two experimental groups, drama sessions seemed to be more effective in increasing the number of words used than discussion sessions. Girls also tended to use more and different adjectives than boys.

Impact: Positive effect reported on number of words used, but control children made bigger progress in terms of range of adjectives used.

Evidence: Weak

- Small sample (n=45).
- Classes were not randomised.
- There were missing data.
- Children were from one private school, mostly from middle to high class families – so results may not be generalised to wider population.
- Researcher was also the teacher.
- Assessment of quality of writing was based on subjective judgements. (Control children made bigger progress in the number of different adjectives used compared to the two experimental groups). It is possible that the results depend on what was emphasised in the lessons. If control teacher focused on getting children to use more varied adjectives, they learnt to use different adjectives.
- There is also a possibility of teacher effect since there were only 2 classes.

12. Mages, W. K. (2008) *Language and theory of mind development in the context of a Head Start theatre-in-education program*. Ann Arbor, Harvard University. 3319195:275. (US)

Intervention: Use of drama (theatre in education) on language and theory of mind

Age: Pre-school (age 4-5)

The programme being evaluated is the Creative Arts Team's Early Learning Through the Arts: New York City Wolf Trap Program. In this study, the intervention activities were implemented for 14 days (2 sessions per week). It is not clear how long each session was. The quasi-experimental study with a waiting-list design investigated the impact of a theatre-in-education curriculum (a creative dramatic instruction) on children's language, imagination and theory of mind (TOM). Participants were taken from 12 sites and the state's education administration determined which of the 6 sites to receive the Creative Arts Team (CAT) intervention first. Comparison schools were similar in demographics and offered the same curricula. Only those children whose parents gave consent were randomly selected to take part in the study. In total 155 children were assessed. Attrition was low at 7.2%. Main outcome measures were assessed using the PPVT (Peabody Picture Vocabulary Test), a researcher-developed test (Measure of Story Comprehension), and other tests of children's comprehension of emotions and perspective-taking (DELV), Rabbit-Fox test and Telephone task.

All children showed significant improvements between Time 1 and Time 2 (4-5 months apart) on all the tests on language, TOM and imagination skills apart from one test of emotion. Results were mixed. On measures of language, drama children showed bigger gains between pre and post-test than control on both the standardized measures but not on the researcher-developed test. On measures of TOM, control children outperformed drama children on 2 of the 3 measures. On test of imagination, drama children made bigger gains than control. However, the differences were not significant.

Impact: Mixed, control performed better than drama children on some measures and results differ depending on the kind of tests used.

Evidence: Weak

- Small sample (under 100 in each arm).
- No random allocation to treatment conditions.
- No standardised measures for some items assessed.

13. Otten, M., et al. (2004) Performing history: The effects of a dramatic art-based history program on student achievement and enjoyment. *Theory and Research in Social Education* 32(2): 187-212. (US)

Intervention: Dramatic art integration on achievement and enjoyment

Age: Primary to Secondary (5th grade; age 11-12)

The paper examined the effects of using drama in the class on pupils' history knowledge and enjoyment of the subject. The intervention involved

children performing historical information in a musical drama. 68 5th grade children from Marquez School were involved in the Performing History programme. 372 pupils from 71 other schools who did not take part in the musical history programme formed the comparison group. This was a 2hr per week supplementary programme which was in addition to the normal textbook-based history instruction.

Test of history knowledge in 6th grade showed that those children from Marquez School had significantly higher scores than children from the non-participating schools (two times more items correct than comparison children). Their pupils scored significantly higher on history test than every other feeder school – ANOVA showed a significant school effect. To ensure that the better performance in Marquez was not due to other factors other than participation in the musical programme, the authors compared the standardized test scores for other subjects. MANOVA comparing Marquez and all other schools on the standardized test scores showed that the difference was larger for history than all other subjects (reading, maths, language and spelling). Only in history did Marquez children did significantly better than other feeder schools.

Children from Marquez School also rated enjoying the lesson more highly than those from comparison schools. The author also suggested that the effect on knowledge was mediated by enjoyment, which in turn, predicted future performance on standardized tests. In other words, it was not the drama lesson as such, but the enjoyment of the lesson that contributed to better performance.

Impact: Positive effect reported on enjoyment and achievement

Evidence: Weak

- There is a possibility that the better history results could be the extra lessons given in addition to normal lessons.
- Although only in history did history musical children excelled, this could be due to excellent history teacher in the school. The school culture in promoting learning of history may be a factor. The study design could not control for other alternative possible explanations.
- Test items included topics covered in the musicals (which the children in non-participating schools may not have covered).

[The outstanding history results of the one school is perhaps worth having a look. An efficacy trial could be conducted to test the programme.]

14. Poulsen, J. C. S. (1998) *Efficacy of drama-based teaching on children with learning disabilities*. Ann Arbor, University of Calgary. NQ34693: 217. (Canada)

Intervention: Drama-based teaching on affective attunement and academic performance

Age: Primary (Grade 4; age 9-10)

[Affective attunement is understood to mean understanding other people's emotions and being in tune with their feelings]

The aim of the study was to determine whether drama-based teaching can improve academic performance and also to see if the effects would be different for children with and without learning disabilities. Participants included 48 children in matched pairs (one with learning disability and one without). These represented only 24% of all grade 4 children in the 6 schools, specially selected for inclusion in the study based on teachers' recommendations. Children were excluded if they left class for extended period (hence possibility of bias selection as these children may already be different to those who remained in class for the length of the lessons). They were then taught one lesson using either drama or traditional method. After the lesson they took a post-test. Children then swapped over and again post-tested after the lesson. Academic achievement was assessed based on performance on researcher-developed tests on social studies and maths. Question items were taken from topics covered in the syllabus.

Results showed that children taught using drama made greater gains in tests on maths and social studies than children taught using the traditional methods. However, there were no separate analyses for social studies and maths. Children's affective attunements were also observed to have improved after Drama instruction for both children with LD and without LD. Children reported greater satisfaction with the new teaching strategy. There were no differences in gains on academic achievement or satisfaction between LD and non-LD children.

Impact: Positive effect on academic achievement and affective attunement suggested

Evidence: Weak

- Participants were not randomly selected, nor allocated.
- Very small selected sample (n=48 divided into 4 conditions; drama and non-drama, LD and non-LD).
- There is a question about the validity of the measures used to assess outcomes.
- There is a possibility of diffusion since some of the children in the first group would have been exposed to drama instruction (unless a different

lesson on a different topic was presented). If this was the case the effects could be due to topic complexity rather than exposure to intervention.

- The pre-test for one class was used as the post-test for another. This means that children may not be taking the same pre- and post-tests. Also the post-tests were taken 1-3 days after the lesson. All these could cause further diffusion.
- Teachers who took part were those who expressed interest in the programme – there is a possibility of teacher expectancy.

15. Roberts, K. J. (2007) *Participation in musical theater as a vehicle for understanding of interdisciplinary work in the arts, improvement of self-concept, and music achievement among fifth-grade students.* Ann Arbor, Northwestern University. 3283491: 397. (US)

Intervention: Musical theatre participation on self-concept and achievement on music

Age: Primary (5th grade; age 10-11)

This study examined the effects of training children in musical performances on their self-concept and knowledge and achievement in music. Duration of the intervention was 7 weeks. Participants were 30 5th grade children from one school. Treatment pupils were taken from a class whose teacher was pro art and music, and only those whose parents consented to their participation were included (15 out of possible 26). Non-treatment pupils were from the other classes and whose parents consented to participation (15 out of a possible 79).

Classes had music, art, PE and computer on rotation at least once per week, but treatment pupils had music lessons twice per week, while control pupils had music only once. Each lesson lasted 45 minutes. Children were not equal to begin with. Treatment pupils had higher self- concept and overall music achievement scores than control pupils at pre-test. Children were pulled out of normal lessons for rehearsals.

Self-concept was measured using a children's self-concept scale. Knowledge and achievement in music was assessed on two Music Achievement Tests. These were all standardized tests. Analyses of results indicated a decline in treatment pupils' overall self-concept between pre- and post-tests, while control pupils showed no significant changes between pre- and post-tests. Both groups showed no significant differences between pre- and post-tests on measures of music achievement and knowledge.

Impact: No evidence of impact

Evidence: Weak

- There were several issues with this thesis: the sample size was small(n=30), not randomly allocated or selected.
- The groups were not equivalent at the outset.
- Both groups were exposed to other forms of art, music and innovative teaching instruction. These could have diluted the effects.

16. Rose, D. S., et al. (2000) Imagery-based learning: improving elementary students' reading comprehension with drama techniques. *Journal of Educational Research*, 94(1): 55-63. (US)

Intervention: Drama-based instruction on reading comprehension

Age: Primary (4th grade; age 9-10)

This was an experimental study to evaluate the effects of a drama-based reading instruction on the reading comprehension of 4th grade pupils in 4 schools. Two classes from each school were randomly selected for participation and the classes in each school were then randomly assigned to either drama-based instruction or traditional textbook-based instruction. A total of 179 pupils were involved, 94 of these were in the experimental group and the other 85 formed the control. The intervention involved 20 sessions spread over 10 weeks. Reading comprehension was assessed using the state standardized tests (Iowa Tests of Basic Skills). Only data for 111 pupils for some measures and 157 for another were included in the analyses.

The paper concluded that drama instruction had a positive and direct causal effect on reading comprehension. However, detailed analyses of the results showed that there was a small positive effect on overall comprehension and factual comprehension (ES=0.18 and 0.16 respectively). On test of inferential comprehension, control pupils made more gains than experimental children, although the difference was negligible (ES= - 0.02).

Impact: Mixed. Positive impact reported, but data suggest that the difference in gain scores were small, and on one measure control group made bigger gains.

Evidence: Medium

- Experiment was well-carried out.
- However, sample was small. Total number of pupils is only 179.
- High attrition (up to 38% for some measures).

17. Smith, H. (2011) *The effects of a drama-based language intervention on the development of theory of mind and executive function in urban kindergarten children.* US, ProQuest Information & Learning. 72: 3125. (US)

Intervention: Integrated drama-based language learning curriculum on social cognitive skills aka Theory of Mind and executive function

Age: Pre-school (3-5 years old)

The programme being evaluated was known as the Georgia Wolftrap program using drama-based strategies to develop children's social cognitive skills (e.g. empathy). Three schools were randomised to receive the intervention and another three served as waiting controls. However, only a subgroup of 83 children were considered for analysis (41 intervention and 42 control randomly selected). High attrition (24%) after pre-test and high proportion of missing data (42% from intervention and 33% from control). Only 52 children's data were analysed. The intervention included lessons on vocabulary development, story-telling and re-telling, exploration of character, discovery of meaning, and use and understanding of emotional expression. The activities involved elaborating on the story themes, creating new characters and plots, and role-playing. Control children received direct standard instruction. A range of tests were used to measure children's TOM and EF. Results showed that both groups improved between pre- and post-tests, and although experimental group made slightly bigger gains, no differences were detected after controlling for pre-test. Gains in neuropsychological development were likely to be due to natural maturation.

Impact: No effect on children's TOM and EF

Evidence: Weak

- Small sample (n=83), with a high proportion of non-response and missing data (42% from intervention and 33% from control).

18. Freeman, G. D., Sullivan, K., and Fulton, C.R. (2003) Effects of creative drama on self-concept, social skills and problem behaviour. *The Journal of Educational Research*, 96(3), 131-138. (US)

Intervention: Creative drama on social skills, self-concept and problem behaviour

Age: Primary (age 8-10)

This study examined the effects of creative drama on social skills, self-concept and problem behaviour on 237 children aged 8-10. Children were randomly selected and randomly assigned to groups. Experimental children took part in drama activities one day a week (40 mins each) for 18 weeks. Activities involved children acting out situations through role play and working cooperatively with each other to express actions and emotions. The aim was to improve self-concept, self-discipline and social skills. All the children had other enrichment activities on the other days on a rotation: music, library, PE, art and computer. On music day control children had general music taken by a qualified music instructor, while the experimental

children had creative drama activities taken by a qualified drama instructor. Children and the music instructor had no knowledge of the experiment. Since the instructor was not informed of the outcome to be measured, they were not able to select activities relevant to the objectives of the experiment. There was therefore some discrepancy between what was intended and what was taught and measured.

Validated, standardized Student Self-Concept Scale was used to measure children's self-concept (including academic self-concept and social self-concept). Social Skills Rating system (validated instrument) was used to measure social skills and problem behaviour. Attrition was low (12%). Analyses of results showed no significant differences between control and treatment groups on measures of self-concept, frequency of problem behaviour and social skills.

Impact: No impact on non-cognitive skills

Evidence: Medium

- Well-conducted experimental design with proper randomisation and pre-post-test comparisons.
- Although the sample was reasonably large (n=237), this was divided into 4 groups. Effectively there were only 49 in treatment group and 47 in the control with pre- and post-test. The other two groups had only post-test scores.
- Instructors were also kept blind to the outcomes measured, so the intervention may not be consistent with the outcomes intended.
- As the control group was involved in music, an arts activity, comparing music and drama may obscure the benefits of the treatment if participation in music influences the traits related to the outcomes measured.

19. Daykin, N., Orme, J., Evans, D., Salmon, D., McEachran, M., and Brain, S. (2008)

The impact of participation in performing arts on adolescent health and behaviour: A systematic review of the literature. *Journal of Health Psychology*, 13(2), 251-264. ISSN 1359-1053 (UK)

Intervention: Performing arts on health and behaviour

Age: Secondary (age 11-18)

The review looked at a range of arts (music, performance, dance and drama) in community settings and as an extra-curricular activity in mainstream schools. A total of 15 studies, of which only 3 RCTs and 3 quasi-experiments were identified. Most of the studies were on drama, and outcomes ranged from self-concept, social skills, behaviour to attitudes and knowledge about sexual health. For the purpose of our review, we

analysed only those which looked at cognitive and non-cognitive outcomes (but not those relating to sexual health).

One RCT of 122 at-risk children aged 11 in the UK (McArdle et al. 2002) reported significant improvements in self-concept (measured using a Multidimensional Self-Concept Scale and teacher reported assessments of behaviour among the drama group compared with the control. Intervention group involved a one-hour group drama session every week for 12 weeks. The control group attended classes on maths and English. The side effects of missing lessons on the national curriculum subjects were not tested.

A Canadian study using a range of validated instruments compared 24 children who participated in a 15-week drama intervention with another group of children in another school which were not involved in the drama intervention (Walsh-Bowers and Basso 1999). Results on validated tests were inconclusive although parents rating of social skills showed that treatment group made significant improvements over the control group.

Walsh-Bowers and Basso (1999) conducted another study on a group of 29 children who received the same drama intervention. Their outcomes were compared with children from 3 other classes that did not receive the intervention. Results showed no differences between groups in peer relationships, although teachers reported improvements in behaviour.

Observation and interview data suggest that the drama intervention had a negative effect on children's attitude towards drama. Children were reluctant to engage with the activities and one group eventually dropped out.

The evidence of the two Canadian studies is weak because of the small sample, lack of randomization and blinding and problematic use of comparison group.

Other ethnographic and action research studies did not evaluate outcomes. For example, a Scottish study involving 20 pupils aged 10 to 16 described the intervention and how it was enthusiastically received and its effects on young people's use and experience of health services (Jackson 2003). These were based on interview with the participants. There was no comparison with children receiving alternative programmes, such as through literature

or informative workshops about health services which may be equally effective.

Impact: Overall the evidence of impact of performing arts on young people's wider outcomes is weak.

Evidence: Weak, small sample, no random allocation nor blinding and problematic comparison group

20. DuPont, S. (1992) The effectiveness of creative drama as an instructional strategy to enhance reading comprehension skills of fifth grade remedial readers. *Reading Research and Instruction*, 3(31), 41-52.

Intervention: Creative drama on reading comprehension

Age: 5th grade (10-11)

This study looked at the effects of creative drama on the reading comprehension skills of 51 5th grade pupils in remedial reading classes. Children were divided into 3 groups: Groups 1 and 2 received a structured remedial reading programme, but Group 1 was taught using creative drama, while Group 2 was taught a 'traditional' non-remedial method to support story comprehension where they read the same stories as Group 1 and had the same vocabulary exercises followed by teacher-led discussions. Group 3 (the control) followed the usual remedial programme. Groups 2 and 3 were taken by their regular teachers, while Group 1 was taken by the researcher. Effects on reading comprehension were assessed using Metropolitan Achievement Test (MAT6). In addition, Groups 1 and 2 also took a weekly criterion-referenced test (CRT) to assess their story comprehension which was part of their instructional design.

Analysis of variance showed that the creative drama group was the only group that showed a significant increase in scores between pre- and post-test on the MAT6 assessment. Both Groups 2 and 3 demonstrated a decrease in MAT6 test scores. Creative drama group also scored significantly higher on the CRT than Group 2 (traditional remedial group). The study showed that children were not only able to comprehend what they have read when they acted out, but were also better able to comprehend what they have read even when they did not act out (as in standardized tests). The observations suggest that children's approach to reading may be influenced by the connection between dramatic enactment and reading. This is some evidence of transfer from one skill to another.

Impact: Positive impact on reading comprehension assessed on standardized tests

Evidence: Weak

- The small sample (n= 17 in each group), the use of intact classes with no random assignment and the use of researcher as the teacher all weaken the evidence.
- The use of a specialist drama teacher (researcher) in the experimental group may have motivated the children because of the novelty effect. The same results may not be produced if they were taken by their regular teachers.

The question is whether creative drama improves children's attitude to reading by associating reading with something fun, and also if it enhances their imagery of written material, which have been found to relate to comprehension of written text. Another question is whether such instructional strategies are effective for poor readers who tended towards kinesthetic-tactile learning styles, and whether such strategies will be equally effective for other children.

Possibility of extending this to non-remedial students. Further research needed to test if dramatic acting can also be used as a tool for comprehension in other curriculum subjects, such as maths and science.

21. Goodman, J. R. (1990) *A naturalistic study of the relationship between literacy development and dramatic play in five-year old children.* Unpublished EdD dissertation. George Peabody College for Teachers, Vanderbilt University, Nashville, TN. (US)

Intervention: Dramatic play on literacy development

Age: Pre-school (5 year olds)

This study was conducted in an intact pre-school classroom in a college campus. Participants were 17 predominantly white children of college employees. Dramatic play was used in lessons every day for 5 months. The plays were themed ranging from common familiar scenes house, family, stories to more unusual themes like farm and fishing. Data was collected through participant observations, informal interviews and document analysis. Classroom activities were videotaped, and literacy-related phenomena were recorded. Literacy here refers to children's ability to decode written texts and translating narrative into drama.

Observations indicated that children were able to read texts relevant to their play. They were able to use written artifacts within their play and compose scenes – decoding texts for play. Children demonstrated skills in translating stories into play texts – establishing settings, characters, relationships between characters and plots.

This study shows that dramatic play may be a vehicle for practicing and learning literacy skills which reinforce reading and writing. The study did not explore the relationship between creating play and writing abilities. This could be explored in future research for older pupils.

Impact: Suggested impact on children's reading (decoding of written texts) and use of written artifacts.

Evidence: Weak

- There was no counterfactual, so it is not clear if children would demonstrate similar skills using alternative methods.
- As the study involved only one class in one school catering to predominantly white middle class employees, it is not generalizable to wider settings involving a more diverse group of children.
- The sample of 17 children is also small.
- There is also no pre- and post intervention comparison so there is no way of telling if it was the drama activity that allowed children to develop the reading skills, or were children already predisposed to such skills.
- The participants were also largely girls (12 girls and 5 boys), and most of the examples cited were from girls. It is not clear if boys demonstrated similar skills.

22. Parks, M., and Rose, D. (1997) *The impact of Whirlwind's Reading*

Comprehension through drama program on 4th grade students' reading skills and standardized test scores. Unpublished Evaluation, 3D Group, Berkeley, CA 25. (US)

Intervention: Whirlwind Reading Comprehension through Drama programme on reading skills

Age: 4th grade (9-10)

This study was an independent evaluation of the impact of using drama in the Whirlwind programme on the reading skills of 4th grade children. Four elementary schools of diverse pupil population in the Chicago school district were selected for participation. Two classes from each school were randomly chosen for the study. One of the two classes in each of the four schools was again randomly picked to receive the intervention (n=94) and the other formed the control with no special programme (n=85). The intervention was carried out twice a week for one hour each over 10 weeks. The teachers worked closely with an opera singer and an actor focusing on reading and dramatic presentation exercises. These exercises were a collaborative effort between the professional artists and the teachers with emphasis on activities that would enhance reading skills. Each session comprised 3 components: "Game Time" which was the

warming up session; followed by “Acting” where pupils practiced acting skills and applying these to specific narratives, and the “Observation/Conversing” component where pupils wrote their observations in journals and discussed what they had done in the session. Pre- and post-test of comprehension on the Iowa Test of Basic Skills were used to measure the impact.

Drama class pupils showed significantly bigger improvements than control pupils (an equivalent to 3 months more in standard grade level metric). The biggest improvement was in identification of factual information from written text. The intervention appears to be more effective in enhancing pupils’ ability in non-verbal expression. In terms of verbal expression, drama pupils did not show improvement relative to control in contrast to written assessments. On other assessments (designed by the artists and the teachers), drama pupils showed significantly more improvements in reading comprehension, drama ability and understanding of non-verbal expression inferred from written texts. The results suggest that integrating drama in the curriculum can help develop reading skills and non-verbal communication skills.

Impact:

- Positive impact on reading skills measured on the Iowa Test of Basic Skills.
- Positive impact on comprehending non-verbal expression.
- No effect on 3 subscales of reading (reading fluency, factual recall and verbal inference).

Evidence: Weak

- The small sample (2 intact classes from 4 schools) means that other confounding variables such as differences between teachers cannot be ruled out.
- Although all teachers volunteered for participation (both control and experimental classes), there could be a demoralisation effect among those not chosen for participation, leading to a John Henry effect.
- There is also a possibility of diffusion where classes in the same school were randomly selected for participation. There may be sharing of information and techniques.
- The teacher and artists designed tests may not be valid as they tested skills that were taught only to the programme children (e.g. drama skills).
- Also on 3 subscales of reading there were no differences between groups. Differences were found only on the non-verbal subscales which tested pupils on skills taught only to the drama pupils.
- There is also the question of whether this was the result of a Hawthorne effect – i.e. if the children would do even better on reading comprehension

if they had ongoing classroom drama instruction where drama was part of the curriculum, rather than the special 10-week programme.

[However, given the impressive improvements made in the standardized ITBS, this study can be replicated using a bigger randomly allocated sample that would overcome any initial differences between classes and teachers/differential instruction.]

23. Pellegrini, A., and Galda, L. (1982) The effects of thematic-fantasy play training on the development of children's story comprehension. *American Educational Research Journal*, 19(3): 443-452. (US)

Intervention: Thematic-Fantasy play on comprehension

Age: Kindergarten to grade 2

This study compared the effects of 3 different ways of training story reconstruction to children in kindergarten, grade 1 (age 6-7) and grade 2 (age 7-8). The intervention involved adults (researcher) reading to children 3 stories on 3 different occasions. The first 2 stories were for training in listening and processing. The third story was used as a formal test. Test of comprehension was measured by a criterion test of story recall and children's evaluation of the story and its characters, and test of story-retelling.

A total of 108 children from one school (36 from each grade) participated in the study. Children were randomly assigned to one of three conditions: thematic-fantasy play, teacher-led discussions or drawing. Children exposed to thematic-fantasy play in kindergarten and first grade scored significantly higher in story comprehension than those in the discussion and drawing groups. There were no significant differences among 2nd graders. Further analyses showed that thematic-fantasy play children outperformed those in the other two groups in the number of events they can recall and in the recall of sequence of events. They were also better able in answering judgemental questions. The role that children played in the story also had an impact on kindergarten children's ability to recall the story.

The study concluded that active and interactive engagement in the story through acting out the scenes were effective in helping children to process information than adult-led discussions or drawing illustrating the scene of theme. The authors suggest that through fantasy play children take on the role and views of others which help them in recall of information much better than drawing or listening to discussions of the story itself.

Impact: Positive impact on very young children (kindergarten and grade 1), but no effect on grade 2 children measured on criterion-referenced test.

Evidence: Weak

- Small sample (n=108) from 3 grades further divided into 3 conditions means that the number is too small to overcome confounding factors such as differences between children and classes.
- There was also no pre-test to take account of initial differences between groups.
- There is also limited generalizability as the study was based in one rural school.
- There is also the question of the validity of the criterion-referenced test.
- There appears to be biased reporting as details of the analyses of variance were given for only one of the two factors tested (story-related and judgemental intelligence), but not for the second factor. Results for the second assessment of total recall and sequencing also did not provide a grade breakdown.

24. Pellegrini, A. (1984) Identifying causal elements in the thematic-fantasy play paradigm.

American Educational Research Journal, 21(3): 691-701. (US)

Intervention: Thematic-fantasy play on story recall and conflict resolution skills

Age: Kindergarten and first grade (5-7)

This study appears to be a follow-up of an earlier study (but now excluding the second grade which were found not to have benefitted from the programme). In this study 192 kindergarten and grade 1 children from a rural school were randomly assigned to one of 4 conditions: adult-directed play; peer-directed play; adult-led discussion or control. An adult then read a story to the children on 3 separate occasions. After each reading the children processed the story according to their assigned conditions. After the last story, the children were tested on recall of narrative details on a 10-item criterion-referenced test and retelling of story. A delayed test of narrative recall and story retelling was administered a week later to assess if the effects were sustained.

Analyses of variance showed that thematic-fantasy play (both adult and peer directed) were more effective than the other groups in facilitating children's recall of story. However, there was no evidence that thematic-fantasy play was effective in promoting sustained recall. Only one of the 6 recall tests was maintained for the thematic-fantasy group and only for the kindergarten children. This suggests that dramatic enactment of story was effective in helping children to comprehend story only for younger children

(kindergarten) and for weaker pupils, but not for older children. The study also suggests that in dramatic enactments children learn to work out differences and resolve any conflicts that may arise. This, however, was not tested.

The author suggested that it was the verbal interaction with their peers that helped children to construct the narratives which contributed to better recall. The fact that both adult and peer directed play achieved the same effect suggests that it was the interaction that mattered rather than who facilitated the interaction. This suggests that children do not need adults to help them in learning through fantasy play. They are quite capable of independent learning.

A large majority of other stories suggest that the effects of dramatic play may not be sustained.

Impact:

- Positive impact reported for story recall. No test of conflict resolution skills was carried out.
- No effect on sustained recall.
- Effects observed only for younger children (kindergarten) and weaker children.

Evidence: Weak

- The sample of 192 based in one school from 2 grade levels which was further divided into 4 conditions means that there were only on average 24 children in each condition for each grade.
- The study also has limited generalisation as it was based in one rural school.
- There was no pre-test and comparison of gains between pre- and post-test which could have taken into account initial differences between groups.

25. Podiozny, A. (2000) Strengthening verbal skills through the use of classroom drama: A clear link. *Journal of Aesthetic Education*, 34(3-4): 239-276.

Intervention: Classroom drama and verbal skills

Age: Across age groups

This was a meta-analysis of 80 studies on 3 dimensions of drama: enactment, plot and leader's level of involvement, covering a range of outcomes. Only studies that had an experimental design and included at least one measure of verbal achievement with sufficient information for calculation of effect sizes were included.

The results showed positive relationships between drama and understanding and recall of oral and written stories, reading achievement on standardised tests, reading readiness, oral language development and writing. Drama in the classroom, however, did appear to have an impact on the development of vocabulary. There also appears to be transfer of skills to learning in other areas of the curriculum although the transfer is not automatic. The skills need to be taught. For example, the enactment of text makes it easier for children to understand new text suggests that the skills developed in drama can be transferred to learning new materials.

Deasy's compendium suggests that the effects of drama appear to be stronger when children take on a leading role to direct and reflect on the process involved. Podiozny, however, did not find such effects of leadership in their meta-analyses.

Impact:

- Positive impact on oral and written recall of stories, reading achievement, reading readiness, oral language and writing.
- No effect on vocabulary development.

Evidence: Medium

- The meta-analyses synthesising studies on drama was well conducted, but there were questions about the strength of evidence of the studies included.
- Studies were rarely replicated.
- There were inconsistent measures used in assessing outcomes.
- There were also variations in the operational terms used, from drama, socio-drama to creative dramatics.

A side finding was that there were few studies that focused on reading readiness in pre-. In this meta-analysis only 2 of the 80 studies included reading readiness in their titles.

26. Schaffner, M., Little, G., and Felton, H. (1984) Nadie Papers No.1, Drama, language and learning: Reports of the drama and language research project, speech, drama centre, Education Department of Tasmania. National Association for Drama in Education. Education Department of Tasmania.

Intervention: Effects of drama on language development and moral values

Age: 5th and 6th grade (age 10-12)

This study examined the effects of drama on the language development of 280 5th and 6th grade pupils from 9 schools representing a range of provisions in Tasmania. Teachers from 11 classes volunteered for participation. Teachers attended a 2-day workshop, but had regular access

to the speech and drama coaches who worked closely with them throughout the programme. Teachers designed their own programme, and the number of sessions, frequency and themes used varied among teachers. However, all the teachers had to use “imaginary” drama and not use written texts. This was to encourage the use of expressive language. Most teachers used drama activities in their classrooms over the school year. Samples of children’s work documenting their language use and their verbal exchanges were collected and analysed. The author claimed that language use in drama activities encouraged thinking and cognitive development through speculation, reflection, explanation and evaluation. In contrast to regular classroom language use, imaginary drama language is more expressive and interactional, whereas regular classroom language is more informational (i.e. giving information as opposed to interactional language which focused on persuasion, control and command). Additionally, reflection used in imaginary drama provided opportunities for children to express their feelings and develop their opinions and thoughts. Reflection in drama also allowed children to reflect on moral issues which would not have been possible in an information-focused curriculum.

This study explores children’s use of expressive language in classroom drama, but it does not evaluate learning. Claims of how drama activities can encourage thinking and cognitive development were based on speculations. The mechanism of transfer was not tested.

Impact: The authors did not evaluate the impact, but noted children’s use of language in their samples of work.

Evidence: Weak

- Impact was not evaluated, but possible effects were suggested and speculated.
- There was no comparison group, so it is not possible to say if drama activities had any beneficial effect on language use compared to regular classroom activities.

DANCE

There is some evidence that dance has the potential in developing 3 aspects of creative thinking (abstractness, originality and fluency). This is not surprising as dance, especially where improvisation and composition are taught, allows children to create ideas and forms.

1. **Bridley, A. S. (2014)** The impact of a dance aerobics program on middle school girls' physical activity level, self-efficacy, and decisional balance. US, ProQuest Information & Learning. 75. (US)

Intervention: Dance aerobics on physical activity, self-efficacy and decisional balance

Age: Age 12-14

This was a cluster-randomised trial to assess the effects of a 2-week aerobics dance programme on the self-efficacy and decisional balance of 69 adolescent girls. Three classes from one school were randomly assigned to intervention (n=36) and three to control (n=33). The duration of the study was 8 weeks. The first two weeks was to collect baseline information about students' physical activity, the 3rd and 4th week was the intervention where treatment classes did aerobics with their parents/carers, while control classes continued with the usual physical education curriculum (mainly games and sports). Classes were carried out 5 days a week and each lesson lasted 50 minutes. Students' physical activity was collected in two follow-up phases (weeks 5 and 6 and then again in weeks 7 and 8).

Self-efficacy was measured using a 21 -tem questionnaire about students' confidence in physical activity. Level of physical activity was measured with a pedometer. Decisional balance measured students' views about pros and cons of physical activity using a 16-item questionnaire. Baseline equivalence was established suggesting that the groups were similar on the dependent measures.

Multi-level analyses indicated that the intervention did not have any effect on the students' level of physical activity. There were no significant differences between treatment groups across the phases in terms of level of physical activity. Regression equation suggested that the intervention group's physical activity increased relative to their baseline activity and that of the control group's. However, immediately after the intervention physical activity level of treatment students dropped dramatically, and 3 to 4 weeks after the intervention, their level of physical activity went down

significantly below that of the control (Fig 2, p. 62). Control students' physical activity remained more or less constant. This finding suggests that the heightened level of physical activity could be due to more intensive exercise students performed during the intervention and also partly due to the initial interest in something new. The novelty effects wear off 3 weeks after the intervention.

Treatment students' mean self-efficacy scores dropped between baseline and intervention. They increased substantially between intervention and first follow-up and continued to rise even 3 weeks after the intervention. For the control pupils, their self-efficacy maintained a steady rise but slowed down 3 weeks later. Overall, control students showed higher levels of self-efficacy compared to the treatment pupils.

Impact: Positive impact of physical activity during intervention, but negative effect over time and delayed effect on self-efficacy after intervention.

Evidence: Weak

- 6 clusters (classes) was significantly underpowered. To attain a power of 0.8 would require 24 classes.
- Number of pupils is also small (n=69).
- Sample was taken from one school, thus not generalisable.
- Not clear why a simple comparison of gain scores between control and intervention groups was not carried out.
- Only 11 pupils from each class were represented. It is not clear if there were any non-response and any dropouts. If there were, the samples would be self-selected.

2. Cheung, R. H. P. (2010) Designing movement activities to develop children's creativity in early childhood education. *Early Child Development and Care*, 180(3): 377-385. (Hong Kong)

Intervention: Creative movement on children's creativity

Age: Pre-school

[Full text of paper is not available]

This study examined the effectiveness of creative movement activity on developing children's creativity. Creativity was measured using the Torrance's test of creative thinking. Participants were 12 children from 3 classes in one school in Hong Kong. The study reported that the children's movements became more varied. Effects on children's creativity were not described in the abstract, although the study concluded that the teachers' limited skills, knowledge and experiences were an issue.

Impact: Impact on creativity was not evaluated

Evidence: No evidence of impact

- Very small sample (n=12).
- There was no comparison group.
- Not clear how children were selected.

3. Giguere, M. (2007) *The mind in motion: An examination of children's cognition within the creative process in dance.* Ann Arbor, Temple University. 3255119: 479. (US)

Intervention: Creative dance on cognition

Age: Primary (10-11)

This study looked at the creative process involved in creating dance creating dance movements. Participants included 16 5th grade children from 4 classes in one school. Children volunteered to participate and none were flagged as being from disadvantaged background. The intervention took place once a day for 2 weeks. Each session lasted between 40 and 45 minutes. Children were divided into groups with different activities. During the sessions they learnt to put into action the concepts and images related to the topic of the dance. Every session ended with children writing about their feelings and experiences in a journal.

Outcomes were assessed by analyzing video recordings of the dance sessions, children's reflective journal entries and interviews with individual participants and groups. Interviews involved children recalling and describing the process in creating the dances.

The study concluded that the creation of dance involved cognitive processes and these were affected by social, emotional, aesthetic and pedagogical influences.

Impact: Not evaluated

Evidence: No evidence of impact

- The study assessed children's cognitive process in creating dance. It does not evaluate the impact of dance on cognition.
- There was no comparison group and no pre-post comparisons, so not possible to assess impact.

4. Kim, J. (1998) *The effects of creative dance instruction on creative and critical thinking of seventh-grade female students in Seoul, Korea.* Ann Arbor, New York University. 9832748: 222. (South Korea)

Intervention: Dance activity on creative and critical thinking

Age: Secondary (12-13)

The aim of this study was to evaluate the impact of dance on creative and critical thinking using a pre- post-treatment control design. 15 sessions of

the intervention was conducted over 8 weeks. Participants were 78 seventh grade female students taken from two classes in one school. One class (n=39) was randomly assigned to receive creative dance instruction and the other class (n=39) were a taught traditional dance programme. The experimental group was taught creative dance by the researcher and the control class was taken by three dance instructors. Critical thinking was measured using the Figural Form of the Torrance Test of Creative Thinking (TTCT), while critical thinking was measured using the Raven's Standard Progressive Matrices (SPM).

The results showed that the experimental group made substantially bigger gains than control children on all measures of the test of creativity (originality, fluency, flexibility and elaboration), but only marginally bigger gains on test of critical thinking.

Impact: Mixed – positive effect on creativity, but no effect on critical thinking

Evidence: Weak

- Small sample (n=78).
- Classes rather than individuals were assigned to treatment, but analyses were on individual rather than class level.
- With only 2 classes, the study was seriously underpowered.
- Researcher was also the instructor of the experimental group – there is thus a conflict of interest.
- There was also the possibility of contamination as half of the class used Form A of the test and the other half Form B at pre-test. This was then switched over at post-test.
- The test of critical thinking had no parallel version, so the same test was used for both pre- and post-test. Since the interval between pre- and post-test is only months, there is a possibility of practice effect.
- The author also did not take into account the age and culture of participants. 7th grade girls in the study were shy but cooperative in sharing their negative feelings. The results might be different with 9th grade boys or mixed gender groups.

5. Lanfredi, C. S. (2013) *Formal dance training, cognitive ability, and academic performance of adolescent females*. Ann Arbor, Fordham University. 3565172: 112. (New York, US)

Intervention: Formal dance training on maths, reading and cognitive abilities

Age: Secondary (14-18)

This study examined the relationship between participation in formal dance training and students' cognitive abilities and how these abilities predicted achievements in reading and maths. The sample included 70 girls

aged 14 to 18 taken from public schools, dance studios and a visual and performing arts summer camp. Cognitive abilities were measured using the Woodcock-Johnson III tests of cognitive abilities. The Woodcock-Johnson III tests of achievement were used to assess maths and reading performance. This was a correlational study examining the relationship between the extent of students' exposure to dance training (assessed via a questionnaire) and their performance on the standardised tests.

Results showed that dance training was not correlated with visual-spatial thinking, auditory processing and short-term memory. Auditory processing and short-term memory predicted reading achievement, and visual-spatial ability and short-term memory predicted maths achievement. This study demonstrated that formal dance training did not contribute to differences in cognitive abilities when measured using standardised and validated tests.

Impact: No impact on cognitive abilities and academic achievement

Evidence: Weak

- This was a correlational study using only a sample of 70 girls from a range of dance training venues. No account of participants' background characteristics was taken into consideration, which could have explained differences in academic performances.
- Almost all the participants (86%) were White non-Hispanics. The results are therefore not generalizable to disadvantaged groups.
- It is also not clear how many were approached and how many declined to respond, which could suggest a self-selection group.

6. Lobo, Y. B., and A. Winsler (2006) The effects of a creative dance and movement program on the social competence of head start preschoolers. *Social Development*, 15(3): 501-519. (US)

Intervention: Creative dance on social competence of low-income children

Age: Pre-school (aged 3-5)

[Possibility of a pilot trial to include a larger sample using better measures of outcomes. E.g. standardised tests of social competence]

This was a study of the impact of an eight-week programme in creative dance movement on the social competence of 40 low-income pre-school children enrolled in the Head Start programme. Children whose parents consented to participation (n=43) were randomly assigned to experiment (n=20) or control condition (n=20). The intervention was carried out twice a week for 35 minutes each over eight weeks where participating children were taken out of their classrooms for the sessions. Experimental children were given opportunities to invent dance movements according to their

personal preferences. Dance concepts such as using parts of their bodies and making shapes were introduced during the sessions. Control children were taken into the same room as the experimental group and given an alternative intervention involving attention where they played with each other and with one of the researchers. There was considerable amount of interaction with the researcher. There was no music or dancing, but a lot of physical activity. Outcomes were measured using the Social Competence Behaviour Evaluation Scale completed by both teachers and parents who were blind to treatment conditions.

Because of the small sample, randomisation did not equalise the groups. There were more children with lower social skills and behavioural problems in the experimental group. Results from both teachers and parents reports showed that experimental children made bigger gains than control children between pre- and post- intervention. Although the mechanisms through which dancing may affect social and behavioural competence was not tested, classroom observations suggested that dancing increased children's confidence and they lose their inhibitions. Children learnt to express their emotions and share feelings. The researchers surmised that this may have helped develop their self-concept and self esteem.

Impact: Positive impact on social competence, externalising and internalising behaviour

Evidence: Weak

- Very small sample (n=40) based in one school.
- Researcher was also the dance instructor.
- It is not clear whether there was any age difference between groups. With very young children, even two months can make a difference in developmental growth. Is it possible that there were more much younger children in the experimental group which explains the lower pre-intervention scores.
- Teachers' and parents' reports varied. Teachers tended to rate children as having more behavioural problems.
- There is a possibility that teachers and parents may find out from the children which group they were in, but knowledge of group would not bias the results.

The suggestion for future research was to include measures of mediators, such as self-concept, self-esteem, self-regulation and peer relationships in order to determine the mechanism of effects. Reports of children's social competence and behaviour should be recorded by an independent evaluator, not involved in the programme.

7. Riley, A. (1984) *The interrelationships and effects of creative dance on the physical self-esteem, body image and problem solving of grade four children.* Ann Arbor, University of Toronto (Canada). NL34110: 0-1. (Canada)

Intervention: Creative dance on self-esteem, body image and problem-solving

Age: Primary (age 9)

The aim of this case study was to examine the effects of creative dance on physical self-esteem, body image and problem-solving ability of 30 nine-year old students from one class. The intervention was conducted in 12 sessions, each lasting 45 minutes over a six-week period. During these sessions, children were encouraged to use movement and imagination to express and communicate emotions and ideas. The lessons were structured to develop body awareness, awareness of space and shape using a range of props and percussion instruments. Pre- and post-intervention tests of body image (Body Image Scale; Body Build Test) and self-esteem (Culture-Free Self esteem Inventory) were administered. Interview data were also collected.

Results showed that children made significant gains in overall self-esteem, especially in academic self-esteem, with girls making bigger gains than boys. It is possible that boys overstated their initial self-esteem. Although the author's aim was to measure physical self-esteem, the instrument used measured academic, social and general self-esteem. There was no effect on children's body image. Improvements in body image and problem-solving reported in the study were based on interview data.

Impact: Mixed

- Positive impact reported on self-esteem.
- Positive impact on body image and problem-solving based on interview data, but tests of body image suggests no effects.

Evidence: Weak

- No comparison group, so it is not possible to say if the children would have made similar gains with their regular physical education programme.
- Results not generalizable because of the very small sample, based in one school and one class.
- Gains in problem-solving were not tested, and reported effects on body image were based on pupils' self-reports.

8. Roberts, T. M. (2010) *The experience of dance class: Exploring multiple intelligences instruction on student academic stress.* Ann Arbor, Capella University. 3418880: 144. (US)

Intervention: Dance curriculum on alleviating academic stress

Age: Secondary (age 15-18)

The aim of this case study was to demonstrate that the implementation of dance in the school curriculum (as part of a multiple intelligences activity) can help alleviate academic stress. Participants included 10 students aged 15-18 from areas with a focus on arts-related activities. Only students who had a deep knowledge and experience in dance were selected for participation. 60% of these students attended dance classes three or more times per week. Students' academic experiences were gathered from interviews, and the Lowenstein Digital Stress Thermometer (a biofeedback method of measuring stress) was used to measure the level of stress. A 60-minute dance class was conducted and following this students were interviewed about their academic experiences. Students' stress levels were taken before and after the class.

Interview data suggested that participants were particularly positive about dance. Many talked about how dance helped them manage their emotions, and provided an outlet for their stress. All participants registered a raised body temperature after the dance session. The interpretation is that the warmer the body temperature, the more relaxed the person is. The researcher interpreted this as a reduction in stress level.

Impact: Positive effects reported on stress reduction after dance

Evidence: Weak

- Small, self-selected sample (n=10).
- No comparison group.
- Outcome measurements suffered from validity issues. It is not surprising that the thermometer registered higher body temperature for all participants after physical activity (dance). I suspect the thermometer was not meant for taking temp following physical activity, but for situations that might normally cause stress or anxiety. I think there is a misunderstanding in the use of the thermometer.
- Students' responses about the benefits of dance is also not surprising as these were students who chose to take up dance – perhaps because they were already converts (believing in the positive benefits of dance).

9. Stratton-Gonzalez, S. (2008) *The impact of participation in the Creative Dance Clubs on the social, personal, and cognitive growth of fourth and fifth grade students at PS 722.* Ann Arbor, State University of New York Empire State College. 1456256: 122. (US)

Intervention: Creative dance on social, emotional and cognitive development

Age: Primary (age 9-11)

This case study examined the impact of Creative Dance Clubs on the social,

emotional and cognitive development of 40 4th and 5th grade children in an inclusive school setting. The school was an arts-focused school where drama, dance and visual arts were taught as part of the curriculum. Majority of participants were girls (65%) and just under half (45%) were identified as having special educational needs (SEN). Dance sessions took place during the lunch break for twice a week for the girls and once a week for the boys throughout the year. Each session was 40 minutes during which the children created and rehearsed dance movements. Pupils' cognitive skills, kinesthetic, social and personal skills were recorded using an observation checklist. Students' self-concept and social skills were also measured using a researcher-developed questionnaire.

Results on self-concept were mixed. Overall, girls' self-concept improved, but boys self-concept declined. In general girls were not happy with their weight, but more satisfied with their height and intelligence. Boys, on the other hand, were less likely to be happy with their height, and also their weight (but for a different reason). Boys wanted to be bigger, while girls wanted to be smaller. The difference in scores at the beginning and the end of the school year was small, although statistically significant. Scores on social skills showed a drop between the Fall and Spring term. One striking effect was children's spatial awareness.

Impact: Mixed

- Positive effect on some academic self-concept of girls, but boys' academic self-concept was not measured.
- Observational, survey and interview data suggested that children had gained confidence, developed better relationships with their peers. Children were observed to make improvements in spatial awareness.

Evidence: Weak

- Very small sample (n=40).
- There was no comparison group.
- Bulk of analyses was in-depth study of 4 special needs children.
- Children were already involved in dance activities prior to the study, so it is difficult to measure the before and after effects.
- The use of significant tests on a small non-random sample is also inappropriate.

10. von Rossberg-Gempton, I. E. (1998) *"Creative dance": Potentiality for enhancing psychomotor, cognitive, and social-affective functioning in seniors and young children.* Ann Arbor, Simon Fraser University. NQ24361: 347. (Canada)

Intervention: Creative dance on psycho-motor skills, cognitive and social-affective skills

Age: Primary (aged 7-10)

This study used a comparative matched control wait-list design to explore the effects of creative dance on the psycho-motor, cognitive and social-affective skills of children and senior citizens. Participants included 53 children and 15 senior citizens from various dance classes in a range of settings (school classroom, school gym and the pavilion). There was a high attrition among the seniors. Of the initial 24, 9 were excluded from the study for not turning up for the dance class or refusing to complete the tests. One died, one fell ill and one relocated. The intervention was for 12 weeks conducted twice a week for 30 minutes each time. The comparison children did physical exercises during the dance lessons.

Analyses of results for children groups showed that children in all 3 groups (children only dance, intergenerational dance and PE/control) improved in psychomotor skills (measured using Bruininks-Oseretsky Test for children). They all made significant gains between pre- and post-intervention, but comparison children made bigger gains than the two dance groups. On cognitive tests (using the Wechsler performance scales), all three groups also showed significant gains, but the dance groups made marginally bigger improvements. On self-concept (Cratty self-concept scale), again there were no differences between groups. However, the children only dance group showed a drop in self-concept between pre- and post-test. Overall, there were no differences between the 2 dance groups and the PE group on psychomotor and cognitive skills. The improvements could be the result of maturation.

Field observations and teacher reports suggested that creative dance enhanced social skills – children learnt to cooperate and communicate, following and leading. There was indication that dancing with elderly persons helped children to develop positive physical, social, and emotional attitudes that are manifested in the regular classroom.

Impact: No evidence of impact on cognitive, psychomotor skills and self-concept compared to alternative programme

Evidence: Weak

- Small sample (n=53).
- No randomisation.

11. Zander, L., et al. (2014) How school-based dancing classes change affective and collaborative networks of adolescents. *Psychology of Sport and Exercise*, 15(4): 418-428. (Germany)

Intervention: School-based dance classes on affective and collaborative outcomes

Age: Across age (age 10-15)

This was a quasi-experimental study investigating the effects of participation in dance classes on young people's reciprocal peer relationships. Schools were invited to take part and classes that agreed to participate formed the experimental group (n=271). Similar classes from the same schools that did not consent to participation became the control (n=217). These children followed regular non-academic related classes during the dance sessions. Students' peer relationships were assessed using the degree of centrality (proportion of number of relationships the individual actually have relative to the maximum number of relations they could possibly have in the classroom).

Multiple regression analyses were carried out. Results showed dance participation had no effect on students' affective and collaborative relationships with their classmates. However, participation in dance seemed to have a positive relationship on boys' collaborative (but not affective) relationships compared to those in the comparison group. The suggestion was that the dancing experience meant that boys were more willing to nominate their classmates, especially girls as partners.

Impact:

- No effect on students' affective and collaborative relationships.
- Positive effect on boys' collaborative relationships

Evidence: Weak

- Although sample was large, there was a high proportion of non-response (27%).
- Allocation was by class level – small number of classes reduced statistical power to detect true effects.
- Experimental children were from classes and schools that volunteered participation.
- Researchers did not carry out process evaluation to check for fidelity of implementation. Possibility of dance being taught during physical education classes as well.

12. DiSanto-Rose, M. (1986) *Effect of creative dance classes on the learning of spatial concepts and the ability to analyze spatial pathways in dance video by third and fourth grade students.* Ann Arbor, Temple University. 8627443: 251. (US)

Intervention: Creative dance on spatial awareness

Age: Primary (age 8-10)

This study evaluated the effect of Creative Dance on children's spatial awareness and ability to analyse spatial pathways. Specially designed

dance lessons were used to test this. Participants included 89 3rd and 4th grade pupils from one school. Dance classes were conducted twice a week for 5 weeks. Each session lasted 30 minutes. Control classes had hockey and square dancing during PE lessons. Understanding of spatial concepts was assessed using standardized test published by SRA, Primary Mental Abilities - Spatial Relations (PMA-SR). The ability to analyze spatial pathways in dance video was assessed by the Spatial Pathways in Dance Video (SP-DV) test specifically designed by the investigator to evaluate the effectiveness of the training. It was content specific.

The results showed no evidence of impact of participation creative dance classes on children's spatial ability. Both groups showed significant improvements, but experimental group did not improve as much as the control. There were also conflicting results between the pilot trial and the experiment. Boys performed significantly better than girls in the pilot, but no differences were detected in the experiment.

Impact: No effect on children's understanding of spatial concepts

Evidence: Weak

- Small sample (n=89).
- Allocation by classes (n=4; 2 for each grade).
- Control classes were also doing other dance activities (e.g. square dancing); possible contamination.

13. Keinanen, M., Hetland, L., and Winner, E. (2000) Teaching cognitive skill through dance: evidence for near but not far transfer. *Journal of Aesthetic Education*, 34(3-4): 295-306.

Intervention: Dance on reading and non-verbal reasoning

Age: Across age group

This was a meta-analysis of 7 studies on the impact of dance on cognition. Four examined effects on reading and three on non-verbal reasoning. Studies selected were all experimental in design. Small average effect was found for impact on reading. The overall evidence was rated weak because of the range of effect sizes and different measures used for assessing outcomes on such small sample sizes. The heterogeneity of the studies also made it difficult to have a valid and reliable meta-analysis. The studies involved different types of dance instruction, ranging from instrumental dance (making letter shapes with one's body), creative dance (problem-solving, divergent-thinking experiences) to traditional dance instruction

(technique class). The effects of each type of dance instruction need to be examined separately.

The three studies on non-verbal reasoning showed more positive effects. These were more homogeneous.

Impact: Small positive impact on reading, and slightly bigger effects on non-verbal reasoning.

Evidence: Weak

- Because of the heterogeneity of the studies, it was difficult to make a valid conclusion on the effects.
- The analyses were based on only 3 studies for non-verbal reasoning and 4 for reading. The small sample is not enough to make a conclusive statement about the effects of dance on academic and other cognitive outcomes.

14. Minton, S. (2000) *Assessment of high school students' creative thinking skills: a comparison of the effects of dance and non-dance classes.* Unpublished manuscript, University of Northern Colorado, Greeley, Co. (US)

Intervention: Different types of dance forms on creative thinking

Age: Average age 15

This study involved 286 adolescents from 6 schools who were either enrolled in dance classes forming the experimental group or non-dance (control group). The dance groups attended a range of dance classes with 6 dance teachers for 5 to 8 weeks in and out of school. The children were pre- and post-tested on the Torrance Test of Creative Thinking. Tests were scored by markers who were blind to group allocation. The results showed that dancers scored higher than non-dancers on with three of the 5 factors of the Torrance Test (elaboration, originality and abstractness of titles). The effects, however, varied across schools for different creativity factors. The author explained that this could be due to differences in teachers and school cultures. Although there is a potential for selection bias with pupils who are more creative opting to do dance, the fact that the dance groups had lower pre-test scores suggests that this may not be the case.

This study indicates that dance can help to develop creative thinking skills in students (especially in originality and abstractness), but it does not test whether such creative thinking skills can be transferred to learning academic subjects.

Impact: Positive impact on 3 of the 5 factors of creative thinking (originality, abstractness and elaboration).

Evidence: Weak

- There were only 6 schools and pupils were not randomly allocated. As the results had shown there were wide variations in effects across schools for different creative factors. This could be differences in teachers and schools. Large random allocation of pupils would ensure that any teacher or school effects are cancelled out.
- Students were involved in a range of dance forms: it is therefore not possible to say if one dance form is more effective than another. The analyses did not take this into account.
- The study showed a correlation between dance and creative thinking, but could not demonstrate transferability
- Future studies could tease out whether it was movement/improvisation or choreography that had the effect on creativity.

15. Rose, D. (1999) *The impact of Whirlwind's Basic Reading Through Dance program on first grade students' basic reading skills: Study II.* Unpublished evaluation study. 3-D Group, Berkeley, California. (US)

Intervention: Basic Reading through Dance programme on reading

Age: 1st grade (6-7)

This study examined the impact of the Whirlwind dance programme on the reading ability of children in the first grade. It was first implemented in 3 schools in Chicago (n=174). The programme consisted of 20 sessions over 3 months conducted by dance specialists. Children were taught to make shapes using their bodies to represent letters and letter combinations. Another 9 schools not offered the programme acted as control (n=198). All the schools in the study had a high proportion of African-American children from poor families. Children were assessed on their ability to recognise letter sounds and phoneme segmentation using the Read America's Phono-Graphix Test. Both groups showed significant improvements in reading, but the Basic Reading Through Dance group made bigger gains between pre- and post-test compared to the control group on all measures of the test. This was a well-designed study showing that teaching children to represent letters with their bodies can help in basic reading skills. It demonstrates that improvisation movement in dance can be used to show how sounds can combine into words. Children learn the shapes of letters as well as the sounds and were able to blend them to make meaningful words.

Impact: Positive impact on reading (letter sound recognition and phoneme segmentation)

Evidence: Medium to weak

- This was a well-designed study. However, the children were not randomly allocated giving rise to the question of possible differences between children and the schools that may explain the results.

- The dance group also scored lower on the pre-test, so the bigger gains made may be the result of regression to the means.
- The activities are closely related to the test in that children were taught to form letters and sounds with their bodies.

[The study could be replicated using a larger number of schools and random allocation to experimental conditions]

MULTI-ARTS

1. **Brown, E. D., et al. (2010)** Arts enrichment and school readiness for children at risk. *Early Childhood Research Quarterly*, 25(1): 112-124. (US)

Promising

Intervention: Integrated multi-arts programme (music, dance and visual arts)

Age: Pre-school

This paper reported two studies on the effects of the Kaleidoscope Pre-school Arts Enrichment Programme on pre-school children academic achievement.

The first study was a quasi-experimental study comparing children who were exposed to the programme for 2 years with those who were exposed for only 1 year. Results suggested positive effects on the developmental and achievement growth of those on the programme for 2 years. The focus of this study was to see if arts integration impacted on children of different ethnicity and levels of development. Participants were 194 children (92 attended 2 years; 102 attended 1 year), with a large majority of African American. Outcome measures were developmental level, assessed using the Brigance Preschool Screen-II tests; academic achievement assessed using teacher/researcher developed assessments on language development, literacy, maths, science and social & cultural learning. The assessment also includes a checklist of items relating to the class' specific daily schedule (e.g. music, creative movement and visual arts). Apparently the items differed with classes.

Multivariate analysis of covariance (MANCOVA) showed significant difference between one and two years of Kaleidoscope attendance. After controlling for age differences, children on 2 years of Kaleidoscope made significantly bigger improvements on all measures (language, maths, science and social cultural learning) compared to children on one-year of the programme (ES for early learning = 1.5; ES music = 1.2; ES creative movement = 0.9; ES visual arts = 0.8). Further analyses also showed that there was no significant relationship between children's developmental level, their initial achievement and ethnicity and children's achievement growth.

The second study compared Kaleidoscope children with children in a nearby pre-school on an alternative programme (These formed the control group). The focus of this second study was to see if integrated arts programme had an overall effect on the receptive vocabulary of pre-school children (measured using the Peabody Picture Vocabulary Test III – PPVT-

III). In this study 102 control children were compared with 63 Kaleidoscope children. Analyses of variance (ANCOVA) showed that both groups of children made improvements in receptive vocabulary within a year, but Kaleidoscope children outperformed control children (ES = 1.7).

Impact: Positive impact of Kaleidoscope integrated arts programme on pre-school children's receptive vocabulary, and measures of early learning, creative movement, visual arts and music.

Attendance for 2 years resulted in bigger improvements compared to one year of exposure.

Evidence: Medium to weak (promising); results are promising but there are issues with research design.

- Convenience sample with no proper randomisation. Comparing one-year with 2-year students means comparing different cohorts. Any differences may be due to differences in cohorts.
- In the 2nd study comparing schools with and without the arts programme may be comparing two different types of children. Parents who chose to send their children to Kaleidoscope school may differ from those who send their children to the non-arts integrated school.
- What is promising is the result on receptive vocabulary. However, it has to be noted that only 63 of an initial 92 (or 69%) pupils in the Kaleidoscope school had data analysed.
- Teachers were not blind regarding pre-post-test data collection. This could bias their ratings.
- It is not clear which component was the more effective ingredient: visual arts, music or creative movement.

2. Arthington, C. A. (2002) *Celebrating the arts: A bridge to the emotional brain.* Ann Arbor, The Union Institute. 3034507: 132. (US)

Intervention: Integrating combined arts programme on reading and creativity

Age: 5 to 12

The study explored the effects of a year long school-wide integrated arts programme on the reading performance of children in one school using a pre-post experimental design. Children were from kindergarten to 6th grade. Teachers were trained to integrate arts into the reading curriculum. The reading curriculum included using Language Arts materials for teaching cultures. Arts related assemblies were held in the school and students attended artistic performances outside school. In addition the school also ran an after-school club for 5th and 6th grade pupils. A music teacher was also hired to teach folk songs and music from other countries. Reading performance was based on pupils' report card grades. A total of 80 pupils' report card data were used in the analyses. These were randomly selected

proportionately from each grade. Pupils who left the school and those who newly joined the school during the year were excluded.

The study reported improvements in reading scores at every grade except for first to second and 5th to 6th grades. The author explained that this was because of the more difficult text used in the second year and a higher marking criteria used by the teachers. The fall in grade between the 5th and 6th grade was attributed to the departure of high achieving students leaving only the less able pupils. This suggests that the school-wide arts integrated programme might not be suitable for low ability pupils.

Evaluation of the after-school Art Club (offered to pupils in the 5th and 6th grades) showed that Art Club pupils (n=44) outperformed non-Art Club pupils in reading grades. They also reported enjoying the creative process and gained confidence. The after school club consisted of seven weeks of one-hour sessions for the 6th graders and eight weeks for 5th graders.

Impact: Mixed

Evidence: Weak

- Analysis of school-wide activity did not have a comparison group, so it is not clear if similar pupils would have made the same progress. Also implementation of the arts programme may vary between teachers. The researcher argued against the use of standardised tests and relied on teacher assessments of reading grades, which may not be consistent across teachers as demonstrated by the lack of progress between the first and second grade.
- Participation in Arts Club was voluntary. Comparing volunteers with non-volunteers who maybe inherently different compromises the validity and reliability of the results.
- The small sample makes the results unstable.

3. Clark, S. J. (2007) The relationship between fine arts participation and the emotional intelligence of fifth-grade elementary students. US, ProQuest Information & Learning. 67: 2877-2877. (US)

(Potential)

Intervention: Integration of fine arts participation (drama, dance, music and visual art)

Age: 5th grade (age 10-11)

This was a causal-comparative study to evaluate the effects of integrating fine arts in the curriculum under the programme called Arts Works for Kids Program (AWFK) on the emotional intelligence of 5th grade pupils from 4 schools. Each lesson is about 60 min per week in music, visual art, dance or

theatre. Music lessons involve using songs to learn names of counties, steps in maths, or using music beat to facilitate reading fluency. Drama lessons involve writing and performing characters from popular classic literature, or dramatizing a poem. Visual art lessons involve using art to express feelings or emotions, e.g. in mask-making. In dance lessons, children use movements to demonstrate the digestive system or the solar system in science.

Participants were 645 5th grade pupils from 12 AWFK pilot schools which specialise in one of the four art disciplines, and three non-art specialist schools. Only data from 506 children were available for analyses. Outcome measure was emotional intelligence assessed using the MSCEIT-YV (Mayer-Salovey-Caluso Emotional – Youth Version) intelligence test. Arts participation was measured by determining the number of hours children attended each of the art component at school as well as outside school (this was estimated from parents' survey).

Multivariate analyses of covariance (MANCOVA) showed that AWFK pupils scored significantly higher than control pupils on 6 of the 7 measures of emotional intelligence (Effect sizes ranged from 0.08 to 0.3). Only on 5 of the measures were effect sizes big enough to be interesting: understanding emotions (ES = 0.3), managing emotions (ES = 0.3), the second aggregate score (ES = 0.3), facilitating thought (ES = 0.24) and overall emotional intelligence (ES = 0.2). A breakdown analysis by art forms showed that dance and music were associated with the highest emotional intelligence scores.

Impact: Positive effect on emotional intelligence. This is particularly so for dance and to some extent music

Evidence: Weak

- The causal-comparative design does not demonstrate that participation in arts causes improvements in emotional intelligence, but it does show an association between arts participation and higher emotional intelligence scores.
- There was also a high percentage of missing data (22%).
- Art focused schools may differ from non-art focused schools in some respects. These confounding variables could not be accounted for in a non-random allocation design.

4. **Boyes, L. C., and Reid, I. (2005)** What are the benefits for pupils participating in arts activities? The view from the research literature. *Research in Education*, 73: 1-14. (??)

Intervention: Arts participation on self-esteem and self-concept and indirect effects on cognitive learning

Age: Cross age

A review of literature looked at the effects of arts participation on the affective outcomes of pupils and how these may translate to performance in cognitive learning. One study (Wylie 1979) showed inconclusive associations between self-esteem (using a range of psychometric measures) with creative ability (measured using Torrance, Guildford tests and self-report). Another study (Woodrow 1981) compared two methods of arts instruction (the unified and conventional arts) showed no significant differences between the two groups, although Woodrow claimed that the unified method produced students with better attitude towards each other and higher self-concept/self-esteem. This study did not have a counterfactual, so we do not know whether arts education in general had any impact. McKeon (1982) using the Cooper-Smith self-esteem inventory in a pre- and post-test experiment also found no significant impact of an integrated arts intervention, although teachers reported observed improvements in the behavior of intervention pupils.

The review also described some small-scale studies that reported positive effects of arts participation on academic performance. E.g. Glisman (1967) showed that pupils on an arts programme made significantly greater improvement in maths achievement than non-participating pupils. Another study cited (Norman 1986) reported significant effects of participation in an integrated Learning Through the Arts (LTA) on standardized academic achievement test scores. The findings of this review have to be taken with a bit of skepticism as we do not have details about the number of participants involved, how participants were selected, whether there was random allocation of subjects and the scale of attrition, for example. Harland et al.'s (1995) study reported that a time-tabled arts curriculum showed effects on pupils' self-esteem and confidence as well as other cognitive skills. A subsequent study by Harland et al. (2000) on the effectiveness of arts education in England and Wales compared pupils' prior and later academic achievement scores. The study claimed that arts participation boosted general academic performance and also resulted in greater personal development. It has to be mentioned that Harland et al.'s study were based on surveys and interviews. There were no comparison groups so the claims of effects cannot be upheld.

Impact: Overall no evidence of causal links between arts participation and academic outcomes. Where effects were reported they were largely from studies relying on anecdotal reflections of those asked about their

experience, rather than substantiated by rigorous data with pre- and post-test measures and properly randomised allocations of treatment groups.

Evidence: Evidence of impact is still unclear.

5. **Hetland, L., and Winner, E. (2001)** The arts and academic achievement: what the evidence shows. *Reviewing Education and the Arts Project; executive summary*, 102(5): 3-6.

Intervention: REAP (Reviewing Education and the Arts Project)

Age: Cross age

Review of studies:

In their analysis of studies spanning 50 years, they found that one of the reasons why schools with a strong focus on the arts tended to report higher academic achievement among their pupils was because these same schools also had other innovative programmes that promote learning. It may also be the case that an integrated arts curriculum make learning more interesting for pupils and teachers. However, more research is needed to test these hypotheses.

Impact: Positive

Evidence: No evidence of impact as studies are largely correlational

6. **Konrad, R. R. (1999)** *Empathy, art, and the social studies: The effect of an empathy based, arts enriched, United States history curriculum on middle school students*. Ann Arbor, University of California, Los Angeles. 9939061:197. (US)

Intervention: Multiple arts integration

Age: Secondary (7th and 8th grade; age 12-14)

This was an action research study to test the effects of teaching empathy through the use of art, music, poetry and role playing on middle school pupils' academic achievement, general empathy, citizenship and civic-mindedness. The strategies were introduced in social studies lessons. Participants were taken from 3 schools and included 141 pupils (experimental n= 100 and control n= 41). The experimental group included both grades 7 and 8 children, whereas the control only had grade 8 children. It is not clear if the children were randomised to treatment conditions. Pre and post-assessment of outcome measures were collected using 5 scaled instruments and four descriptive analyses based on teacher interviews and observations. These were all based on self-reports completed by the teachers and pupils about themselves and their observations. Control pupils did not complete the test on academic knowledge, so it is not possible to tell if the intervention had any impact on academic achievement. The study reported 'significant results in student achievement, teacher rated aggression, teacher rated prosocial behavior,

and cognitive empathy'. Teachers also reported that by modifying their lesson students became less aggressive and more empathetic.

Impact: Positive impact on achievement and prosocial behavior and cognitive empathy reported.

Evidence: Weak

- Students were not randomly selected nor allocated.
- Assessment of outcome measures were based on teachers and pupils' self-report which may not be reliable.
- Teachers were not blind to intervention, so may have an expectation of success. This could influence the way they interact with their pupils. Therefore, we cannot determine whether it is the new strategy of integrating arts or changes in teacher behaviour that caused the changes in pupils' outcomes.
- There is also the novelty effect of doing something different.
- Test of academic achievement using standardised measurements was not employed to give a more objective assessment of impact.

7. Garcia, C. M. (2010) *Comparing state mandated test scores for students in programs with and without fine arts in the curriculum*. Ann Arbor, Walden University. 3418795: 134. (US)

Intervention: Integrated fine arts on reading and maths (combination)

Age: 3rd to 8th grade (age 8-14)

The aim of this study was to assess the impact of a fine arts programme on the reading and maths achievement of a group of children (aged 8-14) in a small rural community in the US. Evidence of effect was measured by comparing the reading and maths TAKS (Texas Assessment of Knowledge and Skills) scores of children who received arts instruction in the three years with those who did not receive arts instruction prior to the implementation. The performance of children who received different levels of arts (1-year, 2-year and 3-year) was also compared. The sample consisted of 150 children per level (25 from each class), giving a total of over 600. Over the 3 years, fine arts course included lessons on music, drama and art.

Results:

- Overall, ANOVA showed no significant differences in reading achievement of those who participated in fine arts programme and those who did not. The only significant result found was those who were in the programme for two years.
- Significant difference in reading achievement only for Hispanics children and low SES children who had arts for 2 years.

- There was also no effect on the maths performance of arts pupils (no statistical significant difference between groups), although sub-group analysis by ethnicity suggested significant effects for Hispanics children who had arts instruction for 2 or more years. No effects on maths performance of low SES children.
- Arts participation did not have any impact on both the reading and maths performance of White children.

Impact: No impact overall

Evidence: Weak

- Groups were unequal to begin with. They were assigned to classes by grade level.
- No baseline equivalence was established. No pre-test to ensure participants were equal.
- Comparing the performance of children taking arts with another group of children from a different cohort (the year prior to implementation) is problematic.
- Using post-test only design with no random allocation of subjects seriously undermine the validity of the results.
- Using significance test to estimate effects was inappropriate with a convenience sample.
- High mobility of children in and out of the school.
- Record of SES status of children was not reliable due to incomplete or unreturned forms.

8. James, C. Y. (2011) Does arts infused instruction make a difference? An exploratory study of the effects of an arts infused instructional approach on engagement and achievement of third, fourth, and fifth grade students in mathematics. US, ProQuest Information & Learning. 72: 1872-1872 (US)

Intervention: Infusing arts with core academic subjects

Age: 3rd, 4th and 5th grade (age 8-11)

This aim of the study was to test if infusing arts with maths instruction can enhance pupils' engagement and maths achievement. The study involved 132 children aged 8 to 11 (3rd to 5th grade) in a school identified as being at risk (corrective action status). There were two classes in each grade and one class was randomly picked to be in the treatment and the other in the control group. Experimental groups were taught using the arts infused approach, while the control groups were taught using the traditional classroom approach. Experimental teachers were given a one-day training on using the arts infused instruction. Arts infused lessons involved both fine and performing arts strategies. These included drawing, acting, movement and making art projects and games.

The study reported that experimental groups made huge gains between pre- and post-test and concluded that using arts infused instruction was effective in enhancing engagement and achievement in maths. However, calculation of the gain scores between the two groups suggests that the control children made even greater gains than did the experimental children (ES = -0.4). This suggests that the programme had negative effects on achievement. Survey on pupil engagement (based on a 6-item instrument) showed that children taught using the arts infused method had high levels of engagement. Evidence of engagement from teachers were based on their reports like, *'I think the kids really enjoyed the lessons'* and *'One of students who rarely turned in homework started to turn in his maths homework'*.

Impact: Positive effects reported (but negative impact based on comparison of pre-post-test gains scores).

Evidence: Weak

- The sample was small involving only 6 classes (2 for each grade), one teacher from each class for each grade was randomly selected to use the arts infused programme. Because of the small sample, it is not possible to rule out teacher effects (if any).
- There is a possibility of contamination as pupils were also exposed to a whole raft of other strategies and after-school programme aimed at improving academic standards.
- Threat to external validity.

9. Kinney, D. W., and Forsythe, J. L. (2005) The Effects of the Arts IMPACT Curriculum Upon Student Performance on the Ohio Fourth-Grade Proficiency Test. *Bulletin of the Council for Research in Music Education*, (164): 35-48. (US)

Intervention: Integrated arts programme on academic achievement (Combined)

Age: 4th grade (age 9/10)

This study investigated the effects of an integrated arts curriculum (Arts IMPACT) on 4th grade pupils' academic performance in reading, writing, maths, science and citizenship. Two schools implementing the Arts IMPACT programme formed the treatment group, and another two schools similar in demographics formed the control. Control schools followed a conventional school curriculum in arts instruction taught by itinerant teachers, whereas Arts IMPACT schools have full-time arts instructors. Both control schools had 90 minutes of arts instruction per week, while the two Arts IMPACT schools received 120 and 180 minutes of instruction per week – significantly more than control schools.

Results showed that Arts IMPACT schools scored significantly higher on the Fourth Grade Proficiency Test in maths, science and citizenship than control schools, but not for reading and writing. Low income Arts schools performed significantly better than low income conventional schools in all subjects (especially for writing) except in reading. The study concluded that integrated arts education taught by professionals had positive effects on academic outcomes, especially for low income pupils.

Impact: Positive impact reported

Evidence: Weak

- Small sample (4 cases) – threat to external validity.
- Non-random selection nor allocation.
- No pre-test comparisons to ensure baseline equivalence, so impossible to say if integrated arts instruction improved performance.
- Using significant test for small non-random sample is also not an appropriate analysis.

10. Matthews, J. L. (2001) *Impact of fine arts integration on third, fourth, and fifth graders' reading achievement in an urban magnet school.* Ann Arbor, Oklahoma State University. 3023940: 95. (US)

Intervention: Integrated arts on reading

Age: Primary (3rd to 5th grade; age 8-12)

This quasi-experimental study examined the impact of integrating arts (music, drama, dance and visual arts) into the curriculum on the reading performance of pupils in the 3rd to 5th grades in an elementary school. The intervention involved integrating music (playing musical instruments), dance and art in the literacy lessons for 45 min every week. Classes may incorporate the various art forms on different day of the week. Every experimental class had an arts specialist teacher working with the regular class teacher.

Participants were taken from intact classes whose teachers volunteered for participation. 110 pupils from a Fine Arts school formed the experimental group and 142 from a traditional school became the control. Children were from low-income families and all were African American. Reading performance was assessed using the state standardised tests, the Iowa Test of Basic Skills (ITBS) and the Oklahoma Criterion-Referenced Test.

Results showed no significant effects on the ITBS reading performance of grade 3 and grade 5 pupils, but a negative effect on grade 4 pupils.

- For 3rd graders: Post-test only comparisons showed that although fine arts pupils achieved slightly higher scores than pupils taught using the

traditional method (ES = 0.09), the differences were not statistically significant. [It has to be mentioned that given the non-random sample, the use of statistical significance is irrelevant

- For the 4th graders: traditional school pupils outperformed those in the fine arts school. There was a negative impact on achievement (ES = - 0.06).
- For the 5th graders: there were no significant differences in the reading scores of fine arts pupils and traditional pupils, although fine arts pupils achieved slightly higher scores (ES = 0.3). On the criterion-referenced test (only available for the 5th graders), results showed that fine arts pupils performed marginally better than control pupils (58% vs 53% passed the test).
- Analyses of gains between fall and spring showed that pupils in the fine arts schools recorded improvements in scores. However, it is not clear if this was the result of the intervention or other confounding factors as there was no comparison with the control group.

Pre-post- test was conducted only with the experimental schools, so it was not possible to compare gain scores.

Survey data showed that children in the traditional schools also had some exposure to arts (music, dance, drama and visual arts). Teacher responses from the survey suggest that children had better retention, were more expressive and were better able to make connections between curriculum subjects. Teachers also believed that there is a strong relationship between music and reading.

Impact: Mixed (Negative effects on 4th grade; no differences for 3rd and 5th grades)

Evidence: Weak

- Schools were different to begin with: one a fine arts school and the other a traditional school. It is difficult to determine if the differences can be attributed to the integrated arts curriculum of the type of school.
- Pupils were not randomised to treatment.
- No pre-post test gain scores comparisons were made, so it is not possible to determine which group has made bigger progress.
- Limited generalizability since study was conducted in one school.
- Possibility of conflict of interest as the researcher was the administrator in the experimental school.
- Teacher volunteered for participation, there is a teacher expectancy in terms of positive effects.

11. Thomas, R., and Arnold, A. (2011) The A+ schools: A new look at curriculum integration. *Visual Arts Research*, 37(72): 96-104. (US)

Intervention: Integrating arts in the curriculum

Age: Cross age

The aim of this study was to examine the effects of integrating arts in the curriculum. The A+ Schools Program provides arts classes to pupils every week (music, dance, visual art and drama) in addition to integrating arts with curriculum subjects.

Outcome measures were reading and maths performance assessed using the North Carolina End-of-Grade Tests (EOG), a state standardised assessment. Teachers' views on their experiences with integrating arts in the classroom were also collected via a survey. The exact number of teachers and students in the study is not known. The study reported that the sample was "representative of the larger population of A+ schools in average enrolment, number of students classified as economically deprived" and "averaged 58 fewer minority students enrolled than the larger population".

Pupils' performance from the 40 A+ schools was compared with the state average. A+ schools performed marginally better than the state average in reading (83.91% passed vs 83.6%), but not for maths (62.12% vs 66.4%). Half of the A+ schools performed below the state average in reading proficiency and 67.5% of A+ schools performed below state average in maths. Although the study reported gains in reading and maths over the 3 years of implementation, this cannot be taken to be positive effects of the programme as no comparison was made with non-arts schools.

Although results on state exams did not show convincing effects of the programme on pupils' academic performance, teachers believed that integrating arts in the classroom had positive effects on performance. Although effects on the affective outcomes of pupils were not assessed, teachers and administrators reported programme effects on pupils' interest and attitudes towards school and creative expression.

Impact: No effect on academic performance

Evidence: Weak

- No comparisons of test scores between pupils in A+ schools and non-arts schools. Instead comparison was made with proportion of pupils who passed state assessments.
- No baseline equivalence of pupils was established which could account for differences between pupils.
- There was also no disaggregated analyses by grade level and subgroup analyses by ethnicity, gender or indicators of disadvantaged. It may be the

case the arts curriculum may be more effective for boys/girls, or certain ethnic group.

- The snapshot analysis cannot determine causation.

12. Nelson, C. A. (2002) The Arts and Education Reform: Lessons from a Four-Year Evaluation of the A+ Schools Program, 1995-1999. Executive Summary. In R. Deasy (Ed.), *Critical Links: Learning in the Arts and Student Achievement and Social Development*, Washington, DC: AEP. (US)

Intervention: Arts education as a school reform

Age: Whole school

This study evaluates a 4-year pilot study of A+ Schools Program in 25 schools in North Carolina. The aim of A+ school programme is to integrate arts into the school curriculum as part of a whole school reform. The emphasis was on hands-on learning taking on an integrated, thematic approach based on Howard Gardner's theory of multiple intelligences. It was designed to provide arts instruction in all 4 art forms (art, drama, music and dance) at least once a week. There are partnerships with cultural agencies, and teaching artists are employed. Much of the arts instruction was by certified arts teachers. The study was based on case studies of 10 schools. A range of methods was used to collect data: classroom observations, interviews and focus groups as well as surveys of parents, students and partners.

The report detailed the planning, development of activities and processes involved in such a school reform. It was presented more as an advocacy document than a research report, thus limiting its contribution to research literature.

However, the report paints a positive contribution of the project on school reform and art education in general.

[Full-text of the report was not available – so cannot comment on the quality of the evidence]

The study was unable to establish a causal link between arts integration and students' achievements in test scores.

Other evaluations of A+ schools:

- Corbett, D., McKenney, M., Noblit, G., & Wilson, B. (2001). The arts, school identity, and comprehensive education reform: A final report from the evaluation of the A+ Schools Program. Winston-Salem, NC: Kenan Institute

for the Arts.

- Marron, V. (2003). The A+ Schools Program: Establishing and integrating the arts as four languages of learning. *Journal for Learning through Music*, 4(Summer), 91-97.
- Nelson, C. A. (2001). The arts and education reform: Lessons from a four-year evaluation of the A+ schools program, 1995-1999. Executive Summary. North Executive Summary of A + Schools. WinstonSalem, NC: Thomas S. Kenan Institute for the Arts.

Impact: No evaluation of effects apart from the suggestion that it brought positive contribution to school reform.

Evidence: No evaluation of outcomes

13. Venzen, C. (2011) *Effects of an integrated arts curriculum on fifth grade students' mathematics test scores.* Ann Arbor, Capella University. 3487283: 118. (US)

Intervention: Integrated arts on maths

Age: 5th grade (age 10-11)

The study aimed to evaluate the effects of an integrated arts programme on the maths performance of 37 5th grade pupils in one school. Achievement was assessed on the Criterion-Referenced Competency Test (CRTC) and the district maths benchmark exam scores, as well as teachers' perceptions of pupils' performance. Other school outcomes such as attendance and discipline referrals were also assessed. Paired t-test showed that the children made significant gains between pre and post-tests on both CRTC and the benchmark exam. However, because there was no comparison group it is impossible to say if the children would have made similar gains without the intervention. There were fewer absences and fewer discipline referrals at the end of the year compared to the beginning of the year.

Impact: Positive impact reported on maths achievement, attendance and discipline referrals

Evidence: Weak

- Small sample (n=37), who volunteered to be included in the study; possibility of volunteer bias.
- Although pre-post-test comparisons were used, there was no comparison group, so not possible to attribute any changes to the intervention.
- Sample taken from one school – threat to external validity, limiting generalizability.
- Teacher survey based on subjective observations, may be influenced by knowledge of participation and also an expectation that there will be

positive effects.

14. Ffolkes-Bryant, B. (2010) Investigating the effect on student attitudes, motivation and self-esteem in performing arts elementary schools incorporating arts integration. US, ProQuest Information & Learning. 71: 132-132. (US)

Intervention: Integrating arts in the curriculum

Age: Primary (grade 4 and 5; age 9-11)

Ffolkes-Bryant conducted a study looking into the effects of integrating performing arts into the curriculum of primary schools in New York.

Although the title suggests performing arts, the schools involved had a range of arts activities, from music to visual arts and dance. This study investigated the effect of integrating arts in the curriculum on pupils' knowledge about art, their attitudes towards arts and emotions. Participants were taken from 4 schools that represented the model of arts integration. The schools involved had a high proportion of disadvantaged pupils. Outcome measures were assessed using researcher-developed instruments – hence the validity and reliability of these measures had not been established. A sample of grade 4 and 5 pupils were surveyed (n=370). It is not clear how these pupils were selected. These pupils would have at least 4 years of exposure to arts integration.

The kind of arts activities varied across schools. Only one school was involved in 7 different arts programmes. One school had only dance in its curriculum. Interestingly pupils from the school which indicated that it had all 7 of the arts programmes in its curriculum showed the least knowledge about arts.

Impact: Positive correlation between participation in arts and self-esteem but not attitude.

Evidence: Weak

- There was no measure of effectiveness as such; a survey comparing pupils' knowledge in the 4 arts integration schools cannot determine effect.
- Correlation between participation in arts and knowledge and self-esteem cannot demonstrate causal relationship.
- Such design cannot control for confounding variables that could explain the relationship.
- There was no comparison group.
- Self-esteem questionnaire was researcher-developed. E.g. "Has the arts experience made you feel differently about yourself as a student, artist, member of the community?"

15. Kranz, R. (2003) Arts across the Curriculum. *Creative Classroom*, 17(5): 40-44.
(country?)

Intervention: Integrating arts in the curriculum

Age: Across age groups

A review of the potential benefits of integrating arts across the curriculum reported positive effects on pupils' personal, social and cognitive skills, such as improvements in standardized tests. Arts are also particularly beneficial for pupils with physical and learning disabilities.

[Full text not available)

Impact:???

Evidence: ???

16. Martin, A. J., et al. (2013) The role of arts participation in students' academic and nonacademic outcomes: A longitudinal study of school, home, and community factors. *Journal of Educational Psychology*, 105(3): 709-727.
(Australia)

Intervention: Combined arts (music, art, dance and drama) Home, school and community arts participation on academic and non-academic outcomes

Age: Across age (primary and secondary)

This was a longitudinal study looking into the links between arts participation in different contexts (in-school, at home and in the community) on the academic and non-academic outcomes of primary and secondary school pupils. Participants included 643 pupils from grades 5 to 11 (age 10-16) across 15 schools in Australia. They were surveyed in the first year and again a year later when they were in grades 6-12.

Measurements of arts participation was an aggregated measure of arts-related participation (including in-school arts tuition, arts engagement, home arts engagement, parent-child interaction and outside school arts tuition).

Items were taken from a range of sources, e.g. PISA about frequency of arts participation. Academic outcomes were based on measures of academic self-concept and motivation using Motivation and Engagement Scale, General Self-Esteem Scale of the Self-Description Questionnaire II. There was no information about how prior attainment was measured.

First year outcome data were used as predictors in Step 1.

Sociodemographic data and prior achievement were entered as predictors in Step 2, and arts participation in Step 3. Attrition was reported as under 5%.

The study found that home-support and parent-child arts interaction and in-school arts participation are positively associated with school outcomes. Participation in out-of-school arts tuition, on the other hand, was negatively associated with academic motivation. Although the effects were reported to be statistically significant, the effect sizes were small.

Impact: Inconclusive, the interaction effects are not clear.

Evidence: Weak

- Although the sample looks large, but given that there were 7 grades across 15 schools, there would be 6 pupils for each grade in each school. This suggests that not all grades were represented in all schools.
- There was no pre- post-test comparison to test if arts participation impacted on outcomes. Rather the outcome factors in the first year were used as predictors for outcomes in the second year.
- Why were changes in academic and non-academic outcomes between first and second year not compared? Using the difference in scores as outcome variables.
- The report was also very badly described and structured making it very difficult to follow the argument.
- Structural equation modelling can only show associations, not cause, as studies of association cannot include all possible confounding variables.

17. Pepler, K.A., Powell, C.W., Thompson, N., and Catterall, J. (2014) Positive Impact of Arts Integration on Student Academic Achievement in English Language Arts. *Educational Forum*, 78(4): 364-377. (US)

Intervention: Multi-art integration on academic performance (combined)

Age: Primary (from kindergarten to grade 5; ages 5 to 11)

Another longitudinal study looked at integrating arts in the school curriculum using a model called Learning and Achieving Through the Arts (LATA). The study reported significant gains in English language made by children in the LATA schools, compared with matched comparison schools with standalone arts programme. In this study, three schools which used the LATA model formed the treatment group. These were compared with another three schools with matched characteristics which used standalone arts programme. LATA teachers received training in arts and on how to integrate arts in the curriculum. The focus of LATA was on the development of English language skills through the use of arts (visual and performing arts). Learning took place in the ICA centre. Pupils across all grade levels and teachers travelled to ICA twice a week for the training. An example of art integration was the use of dramatization to recreate events or concepts from other subject areas. Students also learnt to critique and discuss each other's art pieces using appropriate vocabulary. The control schools also

ran an arts programme but not integrated in the curriculum. Lessons were conducted in the school, but teachers were not given arts training nor professional development. Arts activities were also optional for teachers.

Analysis of results on the standardized test of English (California State Test of English Language Arts) for 2nd to 5th grade pupils compared the percentage of pupils who passed the CST_ELA from baseline over the 3 years. Results showed that over the 3 years an increasing percentage of treatment pupils were more likely to pass the ELA exam than control (an 11% gain in number of pupils passing the exam vs -1% for control). For ELL pupils, the difference was even greater. ELL pupils in treatment schools showed an average increase of 15% compared to -1% in control group.

Impact: Positive impacts reported (a bigger increase in the percentage of pupils more likely to pass the standardized tests compared to control).

Evidence: Medium to Weak

- The sample appeared large (over 3,000) taken from 6 schools (3 control and 3 experimental).
- Allocation to treatment was not randomised, suggesting that there could be differences between schools. Perhaps schools that are on the LATA programme were progressive schools which may have other enrichment or interventions going on. These were not recorded.
- Only those who performed at or above proficiency levels were compared. It is not clear if the intervention would benefit those who failed the test at baseline. It is possible that the weakest pupils may be the ones who made the biggest progress. The analyses did not measure this.
- More importantly, comparisons were made with different cohorts of pupils over the 3 years. E.g. grade 2 pupils in the first year were compared with grade 2 pupils in the second year. As pupil intakes varied from year to year, such comparisons do not show gains in pupils' performance. This could be likely the result of changes in the quality of pupils at each intake.
- Although the study cannot establish causal link between integrated arts instruction and academic outcomes, there is some evidence that this may be the case.

18. Smithrim, K., and Uptis, R. (2005) Learning Through the Arts: Lessons of Engagement. *Canadian Journal of Education*, 28(1/2): 109-127. (Canada)

Intervention: Learning Through Arts – a school-wide multi-art integration programme

Age: 6th grade (10-12)

Experimental study

This is a study of the Learning Through Arts (LTTA) approach. It was conducted in Canada and involved 6000 students. Effects on students'

academic achievement and attitudes towards art and school were estimated at the end of a 3-year implementation. Sample was taken from schools across 6 sites in Canada. A random sample of 650 pupils from each grade (grade 1 to 6) was selected for inclusion in the study.

Implementation of the LTTA programme was staggered by grade. The final sample was 4,063 students from 55 LTTA schools. At each of the site, 35 control schools were also selected (n=2,602). Some of these schools offered alternative programme not related to the arts, e.g. integration of technology across the curriculum, while others had no special initiatives. This study gave the impression that the sample analysed was over 4000, whereas only the results for 6th grade (initial 4th grade) were presented in this paper. The sample was thus around 431 (LTTA schools) and about 300 in control schools.

At the end of the 3rd year, results of grade 6 children (initial grade 4 children) were analysed. Assessments of academic ability were based on the standardized national tests (Canadian Achievement Tests). Of the 5 tests of maths and language, only test on computation and estimation showed significant effects in favour of the LTTA children (ES = 0.28). On all other measures, LTTA children performed marginally better than control students (effect sizes ranged from 0.05 for reading comprehension to 0.15 for geometry and applications). It appears that integrating arts in the curriculum is more effective in raising mathematical skills than literacy (reading comprehension, vocabulary and writing).

Students' attitudes towards school and learning were assessed via a researcher-developed survey instrument. Interestingly there was no correlation between participation in school arts and outside arts activities. In general children who enjoyed school arts were not involved in arts activities outside school, and those who were involved in arts activities outside schools did not enjoy arts in school. Arts here refer to drama, dance and visual arts. Only children who were engaged in music outside school indicated that they also enjoyed music in school. Interviews with pupils, parents and teachers suggested that positive impact on pupils' engagement, motivation and learning.

Impact: Positive impact on grade 6 maths achievement, especially Computation and Estimation (but not on language); no analysis and data were available for the other year groups

Evidence: Medium to weak (on 6th grade only)

- Attrition was 32% (between year 1 and 3).
- Most important factor influencing academic performance was the child's

ability. Pupils who did well on language tests also did well on maths tests.

- Prior performance of children in grade 4 (1st year of implementation) accounted for a quarter (24.3%) of the variance (after controlling for income and mother's education), while participation in arts accounted for only 1.2% of the variance.
- Not clear what aspects of arts children were involved in, although the study mentioned that the schools were approached by the Royal Conservatory of Music, but the study also mentioned that LTTA involved a lot of movement and physical activities.
- There were no disaggregated analyses by art forms (music/dance/drama/art), grade levels or number of years of participation. No explanation was given as to why only initial grade 4 children's results were analysed.
- There was also no separate comparison with the two types of control schools.

19. Poe, R. M. (2000) Celebrate the joy: Pleasurable engagement in learning through the infusing of the arts into a sixth-grade classroom. Ann Arbor, The Fielding Institute. 9960201: 118. (US)

Intervention: Combined arts, music, drama and dance -Integrating arts in learning with impact on attitudes (enjoyment)

Age: Secondary pupil 6th grade (age 11-12)

Correlational study

This study compared the effects of learning via traditional textbook approach and a creative art-infused approach on pupils' attitudes (measured as enjoyment and engagement in learning) towards learning. Participants were 36 pupils from one 6th grade class. Infused lessons were taken from 30 traditional textbook-based and 30 art-infused teaching materials from across the curriculum. Another 3 from each of the sources were used for assessments. The lessons were structured so that pupils received creative and traditional lessons on alternate days. Pupils then rated their attitudes towards each lesson. Analysis of results showed a significant difference between pupils' attitudes towards the creative lessons and the traditional lessons. Generally, pupils rated art-infused lessons as more enjoyable than the traditional textbook approach. The traditional approach was also seen as more boring. Pupils also rated art-infused maths, social science and science lessons significantly higher on attitude and engagement than the traditional method. Interestingly, in pupils' reflective accounts, novelty of experience was cited 51 times as a major factor influencing their attitude. Academic achievement was most likely to be cited as an influencing for attitude towards traditional lesson

than for creative lessons. Peer influence and humour were also important factors influencing pupils' attitudes towards lessons.

Impact: Positive influence on attitudes towards learning (enjoyment and engagement)

Evidence: Weak

- There was no control or comparison group.
- There was no pre- and post-test comparisons to see if there were changes in attitudes
- Measurements of attitudes were not standardised nor validated, but based on pictorial representations on a 5-point likert scale from extremely boring to extremely joyful.
- Researcher was also teacher implementing the lessons, there is therefore possibility of teacher expectancy, and a conflict of interest
- Collection of data was by the researcher (therefore not blinded), this may influence pupils' responses.
- Possibility of Hawthorne effect. Need to look at effects over time and re-visit site
- There is also a problem with diffusion as the same teacher taught both the traditional and creative lessons.
- There was a wide variation in the number of pupils per lesson – ranging from 14 to 31.

20. Robinson, A.H. (2013) Arts Integration and the Success of Disadvantaged Students: A Research Evaluation. *Arts Education Policy Review*, 114(4): 191-204.

Intervention: arts integration on academic success

Age: Cross age from pre-K to 12th grade

This is a review of 44 studies on different forms of arts integration and their effects on the academic performance of disadvantaged students (defined by SES, EAL and disabilities). Only 19 of the studies had sample size of over 100. This includes those with multiple classes and multi-sites, and 24 of them assessed some form of academic or learning outcomes. The others were largely about affective or socio-emotional and behavioural outcomes.

Results: The review found that only drama integration had the strongest evidence of positive effects on the academic/cognitive outcomes (e.g. reading and maths; expressive/receptive language and critical thinking) as well as social skills, of disadvantaged children. No studies in this category reported negative effects. Two studies (Mages 2008; Campbell 2008) with a strong causal design and one with a moderately strong design (de la Cruz 1995) demonstrated positive effects. Both were described as well

implemented. Mages' studied participants in 12 sites, while Campbell's study had just under 900 participants. de la Cruz's was rated moderate perhaps because of the small sample (n=35).

Dance integration may have potential benefits on consonant sound and vowel recognition and phoneme segmentation, but the evidence was not strong only one study with a strong design was found. (McMahon, Rose & Parks 1003)

There was some evidence that visual art integration may have positive effects on reading, math and writing achievement and on empathetic behaviours, but the evidence was not strong because although no studies reported negative effects, only one moderately strong study was found.

There was no evidence that music integration had any effects on disadvantaged children. This was largely because the 4 studies were all weak: one was based on a single-subject, one was a descriptive narrative and the two strong studies did not provide data for calculation of effect sizes (so the effects cannot be ascertained).

Multi-arts integration was reported as potentially beneficial on disadvantaged children's reading and maths attainment, critical thinking and other measurements of well-being such as self-efficacy, motivation and engagement. The evidence was not strong because only 2 of the 18 studies with a strong causal design and one moderately strong study reported positive effects.

Impact: Strong positive impact of drama integration and potential impact of dance and visual-art integration on cognitive/academic and non-cognitive outcomes of disadvantaged children.

Evidence: Weak

- The evidence is moderate largely due to the small number of studies with strong causal design. Only 19 of the 44 studies used some kind of a causal design. Of these only 6 reported an effect size for each outcome. Of the 15 experimental/quasi-experimental studies only 6 used random sampling and of these only 3 had a control group.
- Many of the studies rated as having strong causal model would be rated weak according to our criteria. They were small scale, had no random allocation or had no control groups.
- There is a possibility of conflict of interest as the researcher also writes and develops programmes in arts integration.

These studies could be replicated with better research design and implementation involving large sample (over 100 in each intervention arm), random assignment to treatment groups (to minimize potential effects from confounding variables).

21. Rossini, M. D. (2005) *An investigation of the psychosocial and behavior changes experienced by children participating in the Gallery 37 Connections art program.* Ann Arbor, Loyola University Chicago. 3180961: 272. (US)

Intervention: Gallery 37 an after-school fine arts programme (drama and musical instruments) on non-cognitive outcomes

Age: 4th to 8th grade (age 10 to 15)

This study examined the effects of participation in an after-school fine arts programme for children in an inclusive education setting across 5 schools. Different types of fine arts activities were offered in different schools. Most offered drama/radio drama with a combination of theatre and story writing or mask-making. Other schools offered musical instruments and recorder orchestra or percussion and drums. A pre- post-intervention survey was carried out on 47 participants to estimate the effects on pupils' psychosocial behavior (e.g. self-esteem, self-reliance, school attitudes, and interpersonal relations). These were measured using an adapted version of the Behavior Assessment System for Children Self-Report instrument. Gallery 37 was a 12-week job-training programme to train pupils in visual, literacy, culinary and performing arts. The programme was conducted once a fortnight in the school delivered by professional artists who acted as mentors. Children across grade levels (4th to 8th grades) were selected for participation. Of the 88 participants, consent was sought from only 65, and of these only 47 completed both pre- and post surveys. Most of the participants were from grades 6 and 7; one from grade 4 and 5 from the 8th grade. 28 children were classified as having special needs (these included children with a range of disabilities) and the other 19 were regular children.

Anecdotal accounts from interviews with parents and teachers suggest that the SEN pupils benefited from the programme. There were lots of interactions among the pupils. Parents noticed changes in their children's engagement and enjoyment levels. They liked doing things with their hands.

Analysis of survey data showed no significant increases in reported psychosocial behavior constructs. However, African-American children and those identified with special education needs reported significantly higher levels of self-esteem in the post-survey.

The effects also varied across schools and between the different forms of fine arts participation. Those who participated in music programmes (including learning to play a musical instrument) showed higher levels of self-esteem than those in the drama programmes. Different types of arts programmes were offered in different schools, and the levels of implementation might be different.

Impact: The study suggested positive effects of the arts programme on the self-esteem of African-American and special education children. Participation in music was more effective in raising self-esteem than drama.

Evidence: Weak

- Very small sample.
- High levels of attrition (47%).
- Participants were 'carefully' selected for the programme.
- No random allocation to treatment.
- No control/comparison group.
- Measurements of effects were based on post-intervention levels of self-esteem. There was no comparison of gain scores.

22. Yorke-Viney, S. A. (2007) *An examination of the effectiveness of arts integration in education on student achievement, creativity, and self perception.* Ann Arbor, Marywood University. 3275700:193. (US)

Intervention: Arts integration on academic and non-cognitive outcomes

Age: 5th grade (age 10-11)

This is a quasi-experimental study to test the effects of arts integration on the academic achievement (reading and maths), self-perception and the creativity of a sample of 158 grade 5 children. Participants were taken from 2 schools; one with a strong focus on the arts and humanities and one with no arts integration in the education setting as a control. Outcome measures were assessed using standardized instruments (Torrance Test of Creative Thinking for creativity; Pennsylvania State System of Assessment on maths and reading) and a widely used Self Description Questionnaire for academic self-perception. Only children whose parents gave consent took the Torrance test of creativity and the self-perception tests. It is not clear what components of arts were taught in the school.

- Analyses revealed that children in low art focus school (LAS) performed better on PSSA maths than children in high art focus school (HAS)
- High SES pupils in LAS did better than similar children in HAS
- Low SES pupils in HAS schools did significantly better than similar children in LAS (indicating beneficial effects on low SES children). However, there were only 4 SES children in LAS school.

- Children in LAS school with special needs also outperformed similar children in HAS. Generally, children in HAS school did better in reading than children in LAS schools.
 - Low SES children performed better in reading in HAS school than those attending LAS.
 - Overall LAS children also performed better than HAS children on creativity test.
 - No difference in effects on SEN children.
 - HAS children scored higher on their perception of reading ability, while LAS children had higher perception of their maths ability than HAS children.
 - LAS children also did marginally better on perception of school compared to HAS children, although the difference was not significant.
- The results suggest that any differences between children are largely due to differences between schools and hence the kind of children they take in. E.g. LAS schools tend to focus on intensive maths, while HAS school focused on the arts and humanities. This is not indication of the effects of the programme – and should not be confused with programme effects.

Impact: No evidence of impact

Evidence: Weak

- Participation was voluntary and only 61% invited chose to take part (experimental n=104; control n=54). Groups were unbalanced, e.g. there were only 4 low SES children in the control group.
- Convenience sample.
- The two schools may differ in intake. Schools with a high focus in arts and humanities may take in children from higher income families where arts and culture are valued. There are significant differences between children in the two types of schools.
- Although there is a higher percentage of pupils from the high arts focus schools on free/reduced lunch than in the low arts focus schools, children are already self-selected in participation.
- There was no true counterfactual.
- Better to have random assignment with pre and post-test comparisons.

23. Van Nuys, E. R. (1988) *The influence of artistic training on selected cognitive abilities: "Learning to Read Through the Arts Program" of the Guggenheim Museum.* Ann Arbor, Rutgers The State University of New Jersey - New Brunswick. 8827368:288. (US)

Intervention: Guggenheim program – multi-art integration project

Age: 3rd and 4th grade (age 8-10)

Mixed method - Quasi-experiment and case study

This is a quasi-experiment to test the effects of the Guggenheim program on

122 third and 4th grade pupils' artistic (imagery ability and art making) and cognitive abilities. Using the Guggenheim approach to integrating art in the curriculum, art lessons were conducted twice a week, each session lasting an hour. The duration of the intervention was 20 weeks. Visual art activities also include drama, music, dance and literature. A structured lesson plan was prepared for each lesson. Guggenheim directors visited schools to support the artists. Lesson objectives included integrating arts, promoting language acquisition, writing and expression of emotions and problem-solving activities. Teachers chose the subjects and topics in integrate art.

Two classes from each grade were assigned to either 20-week of intervention or control with no art instruction for the first 10 weeks. 50 experimental pupils; 72 control (9 pupils' data were not available due to absences).

Cognitive and artistic abilities were assessed using 3 instruments: the Developing Cognitive abilities Test (DCAT), the Narrative Comprehension Imagery Assessment (NCIA) and the Rouse Scale of Art Products. Assessments were carried out after 10 weeks, then the control pupils were introduced to the art programme. Some children in the experimental group continued for another 10 weeks. Pupils' cognitive and artistic abilities were assessed again. Assessment of basic cognitive ability showed no effects of exposure to the Guggenheim programme. One Y4 experimental class made significant gains over control at the end of the 20-week intervention (ES=0.6), while the other Y4 experimental class made less gains than the control (ES= -0.65). There were no differences in the gains made by control and experimental Y3 classes.

Measurements of comprehension imagery (NCIA) showed experimental classes outperformed control classes at the end of 10 weeks. However, differences narrowed at the end of 20 weeks when the control groups were also exposed to the intervention. Two of the control classes discontinued after the 10-week intervention. There was negative impact for one of the experimental classes. This suggests that the impact was not sustained. Children's art productions were judged on the Rouse Scale. Results were similar to those of NCIA test. All groups made progress between pre- and post-tests, but only some experimental groups made bigger gains than others.

Impact: Mixed.

- Overall no effects on cognitive abilities, no sustained effect on imagery ability.

- Positive effects on art ability.

Evidence: Weak

- Small sample (only 8 classes) most of which had only 15 pupils.
- No random assignment; groups were different to begin with.
- Children were predominantly White middle class – so the findings may not be generalized to disadvantaged children.
- The classes selected were the more academically able pupils
- Measurements of art productions were based on teacher judgements. Teachers were not blind to intervention, so this may influence judgements.
- There was no differentiation between the type of arts used nor the lessons/subjects they were implemented.
- The use of significant test for a small non-random sample was inappropriate.

24. Winner, E. and Hetland, L. (2000) The arts in education: evaluating the evidence for a causal link. *Journal of Aesthetic Education*, 34(3/4): 3-10. (US)

Intervention: Combination of arts forms (Effects of arts on learning in non-art subjects)

Age: Cross age

This was a meta-analysis of reviews covering a range of art forms in 188 studies. Winner and Hetland reported no reliable causal links between arts and verbal/maths scores and creative thinking, and between learning to play music and reading. There was also no evidence of causal effects of visual arts and reading and between dance and reading. They cautioned against the inclusion of arts based on the non-arts effects. Arts, they argued should be valued for their own right. No evidence of effect of arts integrated approach on improvements in academic subject (both traditional and arts integrated approach led to similar improvements), so arts integrated approach is no more effective than traditional approach.

However, they reported medium causal link between listening to music and spatial-temporal reasoning, large causal link between playing music and spatial reasoning, and medium causal link between classroom drama and verbal skills, recall of stories and oral understanding, oral language and writing.

Impact:

- No causal link between integrated arts and academic outcomes (maths and verbal reasoning and creative reasoning).
- Medium causal link between listening to music and spatial reasoning.
- Large causal link between playing music and spatial reasoning.
- Medium causal link between classroom drama and verbal skills, oral

understanding, oral language and writing.

Evidence: Medium

- Well-conducted meta-analyses of 188 studies

25. Catterall, J. S., Dumais, S.A., and Hampden-Thompson, G. (2012) *The arts and achievement in at-risk youth: findings from longitudinal studies*. Research Report #55. National Endowment for the arts: Washington. (US)

Intervention: Arts participation on academic and social achievements

Age: High school to college

This report examined the academic and social outcomes of engagement in arts of teenagers and young people from low SES backgrounds to see if arts engagements are correlated with these outcomes. Using three longitudinal databases (National Educational Longitudinal Study; the Early Childhood Longitudinal Study and the Educational Longitudinal Study) the authors tracked the children and young people over time. Arts engagement included courses in music, dance, theatre and visual arts, out-of-school arts activities as well as participation in arts activities outside school. Students' arts engagements were ranked based on the frequency of participation and leadership in arts associations.

Socially and economically disadvantaged students with high levels of arts engagements were more likely to show positive outcomes in academic areas and also in civic behavioural measures. They were more likely to aspire to college, to attend a competitive college, obtain high grades and test scores than their peers with low levels of arts engagement. They were more likely to graduate and get a degree, belong to a club/society, engage in school or local politics and take part in civic or community volunteer work.

Impact: Positive relationship between arts participation and academic and wider outcomes

Evidence: Weak

- The correlational study cannot show causal effects. It can only be indicative.
- The study design does not control for confounding variables which may explain differences in the students. Young people who are deeply engaged in the arts may be the aspirational ones who are motivated, generally interested in things around them and are persevering. These variables could be influences of home, school, neighbourhood, ethnicity and other psychosocial factors.
- There is no differentiation between the different arts activities, so it not

clear which art forms have the most impact.

26. Omniewski, R. (1999) *The effects of an arts infusion approach on the mathematics achievement of a second-grade student.* Unpublished doctoral dissertation, The University of Texas, Austin. (US)

Intervention: Combined arts (visual arts, dance and drama)

Age: Primary (age 7-9)

49 pupils were taken from three classes in one primary school. Classes were randomly assigned to experimental group AI (using a combined art-infused approach to maths); experimental group IM (using maths an innovative manipulative approach) and the control group TT (using traditional textbook approach. All the 3 classes were taught by the same teacher. The intervention lasted 6 weeks and conducted every day for 45 min each. Maths performance was measured using the Textbook Unit Math Test (TUMT) and the Number Patterns Test (NPT), the latter was developed by the researcher.

Results showed that all groups made significant gains on the TUMY between pre- and post-test. However, the arts infused group made the most gains between post-test 1 and post-test 2 (6 weeks after the intervention). On the NPT, the control group made the biggest gains between pre- and post-test, and between post-test 1 and post-test 2. This suggests that the traditional textbook approach was most effective in teaching number pattern. However, the differences were not significant.

Impact: Positive effect on TUMT, but negative effect on NPT

Evidence: Weak

- Very small sample (n=49) further divided into three conditions.
- Participants taken from one school, this limits the generalizability of the study.
- The groups were not balanced to begin with: the AI group had the lowest scores on the TUMT pre-test while the IM approach had the highest scores. The gains made between groups could be regression to the means. Given the very small number, these differences can be due to a number of factors.
- All the 3 classes were taught by the same teacher who was not blind to group allocation, there is therefore a possibility of a cross-contamination where the teacher may inadvertently introduce elements of the experiment in the other groups.

27. Manning, E. F. (2003) *The effects of instruction utilizing the arts on the academic achievement of fourth-grade students.* Ann Arbor, Louisiana Tech University. 3084540:106. (US)

Intervention: Integrating arts in the curriculum on academic achievements in language arts, maths, science and social studies

Age: 4th grade (9-10)

This study used an ex post facto design comparing 37 schools where teachers had received training in integrating arts in Louisiana Institute for Education in the Arts (LAIEA) with another 37 comparison schools where teachers were not trained in LAIEA. Outcomes were measured using the Louisiana Educational Assessment Program for the 21st century (LEAP21). Some trained teachers disseminated training to other members of staff during staff development, staff meeting or informally. There were a total of around 3,667 pupils in LAIEA and 3,668 non LAIEA pupils. Results showed that LAIEA pupils scored significantly higher in LEAP 21 tests in maths, science and language arts but not social studies. The effect of classroom drama was of particular interest in the study as the aim of the LAIEA was to train teachers to infuse arts into existing classroom.

Impact: Positive effect on maths, science and language arts, but no significant differences between groups in social studies.

Evidence: Medium

- Large scale involving over 7,000 pupils in 74 schools.
- There was no randomisation, so schools with high proportion of LAIEA trained teachers may be different to non-LAIEA schools in terms of teachers and pupil intakes.
- It is also not clear how and to what extent arts were integrated and what form of arts was most commonly used.

This study could be replicated using a large randomised controlled design, standardized test instruments and with other grades. The effects of visual arts, music and drama could be isolated to test their relative effectiveness.

28. Muehlbauer, C. F. (2000) *The effects of an arts-infused, multiple intelligences program on mathematical achievement.* Ann Arbor, Duquesne University. 9993766: 137. (US)

Intervention: Different Ways of Knowing (impact of visual and performing arts on academic outcomes)

Age: 3rd and 4th grade (8-10)

This study used a matched comparison design to determine the effects of Different Ways of Knowing (DWoK) on pupils' maths achievement assessed using the Mathematics Bridge Assessments for grade 3 and the New Standards Reference Maths Exam for grade 4. DWoK is an arts-infused multi-intelligence programme developed to integrate visual and performing arts in the curriculum to improve academic achievement of

pupils from disadvantaged backgrounds. In this study four DWoK schools were matched with 4 non-programme schools and pupils' performance in maths tests were compared.

Results showed no significant effects of DWoK on grade 3 pupils' achievement in maths (n=387). There was also no significant effects on grade 4 pupils' achievement (n=444).

Impact: No effect of DWoK (arts-infused curriculum on grade 3 and 4 performance in maths

Evidence: Medium weak

- Schools were not randomly assigned, but matched with non-programme schools. There may be inherent differences between DWoK schools and non-DWoK schools in terms of teacher quality and pupil intakes.
- There was no pre- post test comparisons that would take into account baseline differences between groups.

29. Catterall, J.S., Chapleau, R., and Iwanage, J. (1999) *Involvement in the arts and human development: General involvement and intensive involvement in music and theater arts. The Imagination Project at UCLA.* Los Angeles: Graduate School of Education & Information Studies. (US)

(Chicago Arts Partnerships in Education project)

The aim of the Chicago Arts Partnership in Education (CAPE) was to revive arts in schools by bringing local artists and arts agencies into partnership with teachers. Artists and teachers work together to plan the integration of arts into the curriculum.

Intervention: Music and performing arts

Age: 8th to 10th grade (13-16)

This was a longitudinal study looking at the academic and non-cognitive outcomes of children and adolescents who participated in arts activities (music and drama) using data from the National Educational Longitudinal Survey (NELS).

- The study found that children who were engaged in arts activities across disciplines showed positive developments between 8th and 10th grade and also between 10th and 12th grade. This was true also for children from low SES backgrounds (low parent income and education).
- Playing musical instruments at high levels in middle and high was positively correlated with maths proficiency at 12th grade.
- Participation in drama and musicals were positively correlated with reading, self-concept, motivation, empathy and tolerance of others.

Analyses were undertaken for low SES children only.

Impact: Positive impact of playing musical instruments on low SES children's maths achievement. Low SES children with high involvement in music (orchestra/band) do better than average students in maths. The gap widens over 4 years when children are in the 12th grade.

Positive impact of participation in theatre arts (drama and musicals) on reading proficiency and self-concept, empathy and tolerance

Evidence: Cannot establish causality

- Medium to weak.
- This was a large-scale study comparing low SES children and others using national longitudinal data tracking students over 4 years.
- The study can only show association, but not causality as it cannot control for other confounding variables. Those who participated in music and drama may differ from those who did not, or who participated in other forms of art.
- However, there is potential in establishing the causal effects of music and drama involvement using large-scale RCTS to control for alternative explanations for the positive associations.

30. DeMoss, K., and Morris, T. (2002) *How arts integration supports student learning: students shed light on the connections*. Chicago: Chicago Arts Partnerships in Education (CAPE).

Intervention: Integration of arts in the curriculum in the CAPE schools on students' writing skills

Age: Cross age

The aim of this study was to understand students' cognitive processes when engaged in arts-integrated instruction. Using CAPE as an example, DeMoss and Morris explored students' learning in an arts-integrated environment. Ten teachers from 8 of the original 19 CAPE schools volunteered to take part in the study. They prepared 2 units of lessons, one using the integrated arts and the other using the traditional textbook approach. Each teacher identified 3 students representing a mix of those who thrive in traditional classroom approach to those who found it challenging (n=30). Students were asked to write their responses to a series of questions about the topics they studied, and their pre- and post-writing work was then rated.

Results showed no statistical differences between arts and non-arts units in the growth in analytic interpretations. The researchers, however, noted qualitative differences. In non-arts units students' analyses tended to be factual whereas in arts units students' interpretation went beyond the

factual linking the subject matter with society and their lives. Through interviews with students, students answers to open-ended questions and observations, the researchers found that students of all academic levels reported increased motivation and ability to assess their own learning.

The authors concluded that there were 3 key features contributing to the learning processes.

- The first was improvement in the learning environment. Interviews with students indicated that they enjoyed the arts integrated lessons; it was fun and there was deeper understanding as opposed to just remembering facts
- The 2nd element was engagement with content. Arts was used as a mechanism for students to be engaged in their learning.
- Extension of learning beyond the classroom

Impact: No impact on quality of writing, but qualitative differences were noted in analytical interpretations.

Evidence: Weak

- Small sample. Only 10 teachers from 8 of the original 19 schools volunteered.
- The number of pupils sample (n=30) was small (3 from each teacher).
- There was no true counterfactual. Instead arts integrated units were compared with non-arts units. There was no control for differences between pupils.
- Results might be different if students were randomly assigned to receive integrated arts or traditional approach.
- There were threats to internal and external validity.
- It is not possible to determine if arts integrated instruction led to positive outcomes.
- The schools chose included elementary, middle and high schools. There was no separate analyses by age group.

31. Baum, S.M., and Owen, S.V. (1997) *Using art processes to enhance academic self-regulation*. Paper presented at ArtsConnection National Symposium on learning and the arts: New strategies for promoting student success, New York, February 22, 1997.

Intervention: Integration of arts in the classroom on pupils' self-regulation (defined as paying attention, persevering, problem-solving, self-initiating, asking questions, taking risks, using feedback, co-operating).

Age: 4th, 5th and 6th grade (age 9-12)

This was an observational study to examine the effects of integrating arts in the curriculum on pupils' self-regulation. It looked at whether the effects differed between children who participated in an arts development

programme (run by ArtsConnection) and taught by teachers involved in ArtsConnection staff development and those who were not involved in any arts development programme. Comparisons were also made with academically at-risk children who were involved in arts development programme and participated in programme that integrated arts in the classroom. Control children were those not involved in any arts development programme and not taught in classes that integrated arts. There was no information about the number of children in each group. The children were taught the same academic content using the traditional format with no arts integration and an arts integrated format. They were then observed for their use of self-regulation skills.

Lesson observations indicated that artistically talented children exhibited significantly more self-regulation behaviours in arts integrated lessons, but they did not learn more than in traditional non-arts focused lessons. In fact, control group did significantly better than the arts-integrated group. Reading and maths test scores of the 3 groups were compared over 3 years.

Reading scores of both the control and the talent group showed steady performance over the years, but the talent at-risk group made the biggest improvement. The amount of training in arts integration received by the teachers predicted pupils' performance, suggesting that the skills of teachers in integrating arts may have a beneficial effect on at-risk pupils.

Maths performance, however, was not affected by whether children had training in the arts or not. The 3 groups made similar progress in maths scores. This is not surprising as arts instruction was only integrated in language-based curriculum, but not Maths.

Impact:

- Positive effect on self-regulation, but not on learning.
- Positive effect of arts integration on reading for at-risk group only.
- No effect on maths performance.

Evidence: Weak

- It is not clear how many children there were in each group.
- Groups were not randomised to conditions, so any differences in results could be due to initial differences between groups: children who participated in the talent development programme may be inherently different to those who were not involved in any arts programme (control group).
- The type of arts programme.

- Taken by at-risk and the artistically talented children in may be different. This was not explored.
- There was also no breakdown analyses by age group to test if integrated arts was more beneficial for younger or older children.
- It is also not clear how or what arts forms were integrated in the lessons.

32. Burton, J.M., Horowitz, R., and Abeles, H. (2000) Learning in and through the arts: the question of transfer. *Studies in Art Education*, 42(3): 228-257.

Intervention: Exposure to the arts on creativity and academic self-concept

Age: 4th to 8th graders (age 9-14)

This study involved 2,046 students from a range of schools (n=18) with varying levels of arts provision. Some integrated arts in their curriculum taught by regular teachers, some taught arts as a separate subject by specialists arts teachers, while others had little emphasis on the arts. Outcomes were measured using the Torrance figural creativity test and a self-concept test. Other non-cognitive skills like risk-taking, imagination and expression were also measured using teacher rating. Pupils were also asked about their arts experiences inside and outside school.

Results showed that pupils with high levels of arts exposure scored higher on the test of creativity, on teacher rated test of non-cognitive skills and on a number of measures of self-concept than pupils with less arts experience. There is also a belief among head teachers and teachers that using arts in the class helped teachers to be more innovative.

Impact: Positive relationship between arts participation and creativity and self-concept

Evidence: Medium to Weak

- The study design can only demonstrate correlation between arts and cognitive outcomes; it does not show causal relationship.
- It is possible that children who have more exposure to arts (either inside or outside school) are different to those who have less exposure to arts. The study design cannot show the direction of causation, i.e. whether it was arts exposure that led to greater creativity and self-concept or whether children were more creative were more likely to be involved in the arts.
- It is also possible that teacher differences between schools may explain differences in children outcomes. E.g. teachers in arts rich schools tended to be more innovative than those where there is less emphasis on the arts.
- Teacher reports on non-cognitive outcomes of children may be subject to a number of other influences, and are therefore not reliable measures.

33. Catterall, J. (1998) *Involvement in the arts and success in secondary school.*

Americans for the Arts Monographs, 1 (9), Washington, D.C. (US)

Intervention: Involvement in the arts on academic outcomes

Age: Middle school and high school (age 10-16)

This was a longitudinal study using data from the National Educational Longitudinal Study (NELS) following 25,000 pupils from the 8th grade to the 10th grade. Students' arts involvement was taken to be the number of arts courses taken in and out of school and visits to museums outside school. Students in the highest quartile of arts involvement and those in the lowest quartile were compared on a range of academic measures. These included grades in English, test scores for history/geography and composite scores on standardized tests. Sub-analysis of 6,500 of the lowest SES students was also carried out.

Arts participation was found to be positively correlated with better grades and higher standardized test scores, even among the low SES group. Those with high involvement in arts were also less likely to drop out of school and were more involved in community service. It shows that participation in arts is not a function of SES.

Impact: Positive correlation between arts participation and academic outcomes as well as other social outcomes.

Evidence: Medium to Weak

- The correlational study is unable to show the direction of effect: does arts involvement cause pupils to do better academically, or are more academically able pupils more likely to be involved in arts.
- It is possible that those who chose to do art are inherently different to those who did not. They may be the artistic and creative ones, or those who come from families where academic achievement is valued. The study design does not allow this possibility to be tested.
- The study also did not distinguish between the types of arts involvement (e.g. was it music, dance, drama or visual art) and whether it was in-school or out of school; were they private lessons paid for by the children's parents or whether they were part of school activities. The different effects of these experiences were not explored.
- For practical implication, the study needs to unpack the nature of these involvements.

[The positive correlation provides a basis for pilot trials to test the effects of various types of arts involvement.]

34. Catterall, J. and Waldorf, L. (1999) Chicago Arts Partnerships in Education (CAPE): Evaluation summary. In Friske, E. (1999) *Champions of change: The*

impact of the arts on learning. The Arts Partnership and The President's Committee on the Arts and the Humanities. Washington, D.C.: Arts Education Partnership. (US)

Intervention: Arts involvement on standardized test scores

Age: Grades 3 to 11 (age 8 to 17)

This study evaluated the effects of CAPE on standardized test scores of pupils from grades 3 to 11. CAPE (Chicago Arts Partnership in Education) is a programme where artists and teachers work together in partnership to design a curriculum that integrates arts in the instruction of academic subjects. The number of lessons where integration happened ranged from one unit to 5 units, each unit lasting 4 to 6 weeks. In most cases visual arts (painting, drawing, ceramics and sculpture) were integrated into reading or social studies lessons. Pupils' test scores in reading and maths were then compared with other public schools in Chicago not involved in CAPE. Teachers reported spending more time integrating arts in academic subjects than just teaching arts skills. Artists spent half their time teaching arts and half integrating arts in lessons.

There were 2 evaluations: one by the North Central Regional Laboratory (NCREL) and the other by the Imagination Project (IP). NCREL's evaluation came from their 1997-1998 survey. Students were generally positive about the programme. Most high school and elementary school pupils, and only 50% of middle school pupils, said they enjoyed the lessons. When compared to non-CAPE schools, CAPE pupils outscored non CAPE pupils on all measures of academic motivation (self-efficacy, attitudes towards school), but not academic engagement. The differences were not statistically significant. There was some evidence that CAPE pupils also performed better than non-CAPE pupils on the Iowa Test of Basic Skills and the Illinois IGAP test.

The IP evaluation was based on the 1998-1999 survey. Students' achievement in CAPE schools were compared with those in non-CAPE schools. However, comparisons were not consistent throughout. In some cases comparisons were made with all Chicago public schools, in others comparisons were made with matched schools, and some comparisons were made only with high poverty schools. It is not clear why this was the case.

Overall, CAPE schools made bigger improvements in test scores than matched schools in 25 of the 40 comparisons for pupils from kindergarten to grade 8. In reading grades 9-11 CAPE pupils did better than non-CAPE

pupils in 7 out of the 12 tests. For maths, CAPE pupils from K-8 outperformed non-CAPE pupils in 16 out of 40 tests, and 8 out of 12 tests for grades 9-11 pupils. Programme effects were most evident for 6th grade reading and maths. No statistical differences were found for 8th grade, and although high school CAPE students performed better than non-CAPE pupils, the difference was not significant.

Low SES arts integrated schools also outperformed better than comparison schools but the difference was statistically significant only for elementary pupils, but not for high school pupils.

Impact: Mixed impact

- Arts integrated pupils outperformed comparison schools only in some tests (not all tests). Strong evidence of programme effects is seen in elementary school (in particular grade 6), but not in high school.
- Such studies cannot demonstrate cause and effect, so the findings can only be suggestive and not conclusive.

Evidence: Medium

- The findings are difficult to interpret because it appears that the authors are keen to highlight only the positive results.
- The schools are not randomised to receive arts or no arts. Comparison of schools with integrated arts and other schools means that differences in results may be a reflection of differences between types of schools and teacher quality, and not necessarily the result of arts activities.
- It is not clear if the comparison schools and all other schools used for comparisons are also involved in arts integration.
- There is also a possibility of Hawthorne effect as lessons are different to the regular ones that children are used to – hence pupils reported enjoying lessons. Increased in motivation and reports of self-efficacy and enjoyment may only be a temporary effect. Whether these effects can be sustained after the novelty effect wears off needs to be tested.
- Future research should compare CAPE students with students using an alternative innovative programme that does not involve arts.
- The relative effects of different type of arts activities are also unknown.

35. Harland, J., Kinder, K., Lord, P., Alison, S., Schagen, I., Haynes, J. with Cusorth, L. White, R. and, Paola, R. (2000) *Arts education in secondary schools: Effects and effectiveness*. The Mere, Upton Park, Slough, Berkshire: National Foundation for Educational Research (NFER). (UK)

Intervention: Involvement in the arts on general academic performance

Age: Year 11 (age 15-16)

The evidence in this study on the effectiveness of arts education was

collected using 3 methods:

- It analysed data of over 27,000 students from 152 secondary schools in the UK to examine the relationship between their performance on national exam (GCSE) and the amount and type of arts activities the students were engaged in;
- It conducted interviews with teachers and school staff, classroom observations and interviews with 2 cohorts of students in 5 secondary schools (79 students in each cohort) who were known to have done well in arts courses;
- A questionnaire survey was administered to over 2,200 Year 11 pupils in 22 schools establish the relationship between prior attainment and GCSE (national exam at age 16) and students' participation in arts.

Results:

Interview results showed that pupils reported positive effects of the arts, particularly transfer of learning skills to other areas. Other positive effects included enjoyment, relief of tension, development of creativity and critical thinking skills, self-confidence, expressive skills and personal and social development.

Different types of art forms seemed to invoke different advantages. E.g. dance students reported better body awareness. Visual arts were associated with expressive skills, drama was related to empathy and social skills, while music enhanced listening skills. And gains in learning varied with types of art forms.

Arts should not be treated as a unified discipline. Each art form should be looked at separately.

Large scale analysis of national exam data found no evidence that participation in the arts boost performance in national exams (e.g. English and maths) when prior attainment and social background were taken into account. In other words, students' academic performance is more likely to be influenced by their social background and prior attainment.

This result contradicts Catterall's findings which showed that when analysed separately, those who participated in the arts did better than those who did not and similar results were found among low SES pupils. However, it has to be noted that Catterall compared schools with high arts provision with those with non-arts provision. This suggests that any difference could be the result of differences between schools. In the US

academically strong students are encouraged to study the arts, while in the UK, it is likely to be the reverse.

Impact:

- No relationship between arts participation and performance in national exam at age 16.
- Positive effects on learning skills, creativity and critical thinking and other non-cognitive skills (self-confidence, expressive skills and personal and social development).

Evidence: Medium

- There is incongruence between what students and school staff reported and what the national exam results suggest.
- This suggests that evidence based on self-reports may not be reliable.
- Perhaps developments in personal and social skills and other non-cognitive skills do not necessarily translate to exam performance. If the aim is to improve children's well-being, then participation in arts is a good thing in itself, but one should not expect it to transfer to academic performance.

36. Winner, E., and Cooper, M. (2000) Mute those claims: no evidence (yet) for a causal link between arts and academic achievement. *Journal of Aesthetic Education*, 34(3-4): 11-75.

Intervention: Impact of arts study on academic achievement

Age: Across age groups

This was a meta-analysis of studies (correlational and experimental) on academic outcomes (maths and verbal skills)

The results from correlational studies suggest statistically significant relationships between arts study and composite maths and verbal scores (average ES = 0.05); between arts and verbal skills (average ES = 0.19). Correlational studies on maths and verbal skills outcomes also showed statistically significant positive relationships with an average ES of 0.17.

However, results from meta-analyses of experimental studies on maths and verbal skills showed mixed results. Mean ES for impact on verbal skills was 0.07 and 0.06 for maths, but statistical significance could not be established conclusively.

Impact: Positive

- Positive correlation between multi-arts experience and a synthesised set of outcome measures.
- Positive mean effects on verbal and maths skills, but results failed to reach statistical significance on some tests.
- Inconclusive causal impact on maths and verbal skills from meta-analyses

of experimental studies.

Evidence: Medium to weak

- This was a meta-analysis of 31 studies using different research design and measures of outcomes.
- This study demonstrates how apparent relationships between arts and academic outcomes can disappear when they are subjected to more stringent experimental design.
- The limitation of meta-analysis is the standardisation of outcomes from a wide range of studies.
- There is little information about the individual studies. E.g. the meta-analysis of the correlational studies of 3 million studies provided no information about the quality of arts education, art forms. For the experimental studies we had little knowledge about the kind of arts, the duration of the intervention, and whether effects differed with different art forms and different age groups.
[Few studies looked at the transfer of skills, e.g. transference of improved motivation, attitude and learning skills to learning in general. Need to think of new ways of measuring non-cognitive outcomes apart from self-report and surveys.]

37. Vaughn, K., and Winner, E. (2000) SAT scores of students who study the arts: What we can and cannot conclude about the association. *The Journal of Aesthetic Education*, 34(3-4): 77-89.

Intervention: Relationship between arts study and maths and verbal SATs test

Age: Across age groups

This was a correlational study to establish the relationship between arts participation (in particular the amount of art classes taken over the years) and performance in SATs (maths and verbal skills). Students volunteered for the survey and answered questions about their arts experience (number of years of arts classes).

Results showed that:

- Students who take arts classes have higher maths, verbal and composite scores.
- There was a positive correlation between the number of years of arts classes and the SAT scores.
- Relationship was strongest for those who had 4 or more years of arts classes.
- Effect sizes were consistently smaller for maths than for verbal scores
- Significant positive relationships were also reported for all types of arts on both maths and verbal scores.

- But strongest relationship was reported between acting and verbal SAT scores.
- Acting and music (theory, history and appreciation) had the strongest relationship with maths.

Impact: Positive

- Positive correlation between arts and maths and verbal SAT scores.
- Bigger effect on verbal than maths scores.
- Acting classes had stronger effect on verbal skills.
- Music had stronger relationship with maths.

Evidence: Medium to weak

- A limitation with correlation studies of this kind is that they tend to lump all arts forms and classes as though they were similar. The quality of instruction, where the instruction takes place were not considered.
- Such correlation studies does not allow for causal claims because in some schools in the US high performing pupils are encouraged to take up arts classes.
- The differential effects on children of different age groups are not explored, so it is not clear which type of arts activities are more beneficial for which age group of children.

[One of the characteristics of high performing schools is the provision of arts classes. Independent and affluent suburban schools in the states have retained their arts programmes which the lower performing schools were not able to do]

38. Luftig, R. L. (2000) An investigation of an arts infusion program on creative thinking, academic achievement, affective functioning, and arts appreciation of children at three grade levels. *Studies in Art Education*, 41(3): 208-227. (US)

Intervention: Integrated arts programme on academic achievement and self-esteem, locus of control and creativity

Age: Grades 2 to 5 (age 7 to 11)

SPECTRA + (Schools, Parents, Educators, Children, Teachers, Rediscover the Arts+) is a multi-disciplinary , integrated school-wide arts in education approach. It is Ohio-based and has 5 components:

Arts instruction: Visual art, music, dance, drama, media arts, and creative writing are taught weekly by certified arts specialists (when available) as part of the basic school curriculum. The arts are placed on the same level as other subjects taught in schools.

Artists in residence

Professional development

Evaluation (includes formal and informal evaluation for accountability, performance-based assessments)

This study evaluated the effects of an integrated arts programme (SPECTRA+) on a range of outcomes (creative thinking, academic achievement, locus of control and appreciation of arts) of children in grades 2, 4 and 5. A total of 615 children from 4 schools participated in the programme. The programme involves arts instruction in school (one hour per week), integrating arts in other curriculum, professional artists working with teachers in the school for 2 weeks to 9 months. Two SPECTRA schools were matched with two non-SPECTRA schools. One of the non-SPECTRA schools was designated a modified control condition where they received innovations in curriculum materials and approaches, leisure time activities, parental involvement and playground equipment. The second non-SPECTRA school formed the clean control group where instructions carried on as per normal. Outcome measures were assessed using standardized instruments (Culture-Free self-Esteem Inventory, Bialer-Cromwell Locus of Control Scale, Torrance Tests of Creative Thinking). Arts appreciation was measured using questions adapted from two state assessment instruments. The Iowa Tests of Basic Skills and the Stanford Achievement Tests measured the academic outcomes. Different school districts used different test of academic ability.

Results were mixed- differed between school districts and grade levels.

Creativity

Results showed that SPECTRA pupils performed significantly better (made biggest gain scores between pre- and post-test) than the other two control groups on overall test of creativity. However, the modified control group did better than SPECTRA pupils on the sub-test on elaboration.

Academic achievement

Results were mixed. In District A, no differences were found in reading performance between groups, but in District B, SPECTRA pupils in all grades outperformed full control pupils in total reading, reading comprehension and reading vocabulary. However, District B did not have a modified control group, so the improvement may be the result of a Hawthorne effect.

For overall maths achievement (available only for 5th grade), the full control groups in District A showed the biggest improvement between pre- and

post-tests. SPECTRA boys showed slight improvements, but SPECTRA girls' performance showed the biggest decline of all groups in total maths and maths concepts. There was no difference between groups in tests of maths application. SPECTRA pupils did better than the other two groups in maths comprehension. In District B, no differences were found between SPECTRA and full control pupils in all measures of maths achievement. However, in maths comprehension unlike in District A, SPECTRA girls performed better than the boys. SPECTRA boys declined in maths achievement.

Self-esteem and locus of control

No differences were found among groups in total self-esteem and academic self-esteem, but groups differed in general self-esteem. This varied depending on the grade level. Compared to the other 2 control groups, 2nd grade SPECTRA pupils did worse in total self-esteem. In terms of social self-esteem, SPECTRA girls did worse than girls in the other two control groups, but SPECTRA boys outperformed boys in the other 2 groups.

No differences among groups were also found for locus of control. Not surprisingly, SPECTRA pupils outperformed children in the other two control groups on arts appreciation.

The duration of the experiment was one-year, and the author argued that the results might have a delay time effect.

Impact: Mixed effects/inconclusive

- Depending on what aspects of the subject was measured (whether it was maths comprehension, maths application or maths concepts).
- Negative effects on maths achievement for SPECTRA girls, but not SPECTRA boys.
- Results differed between school districts.

Evidence: Medium to weak

- Lack of random allocation of cases.
- Different assessments were used in different school districts which could result in different outcomes.
- Because conditions were nested within schools, there was a possibility of diffusion.

CREATIVE WRITING

Not many intervention studies exploring the effects of creative writing on pupils' outcomes have been found in the search. Most were for undergraduates, or about the techniques of creative writing. Others were about creative writing as an outcome (e.g. Medd 2002; Nieding 1992). Still many were exposition about the value of creative writing – with no evaluation of its effects on pupils (e.g. Irvine 2003)

1. **Bettencourt, C. L. (2009)** *Promoting social change through writing: A quantitative study of research-based best practices in eighth-grade mathematics.* Ann Arbor, Walden University. 3379789: 109. (US)

Intervention: Use of creative writing to enhance maths achievement

Age: Secondary (age 13-14)

The aim of this study was to examine the effectiveness of creative writing as a teaching strategy to enhance maths achievement among 8th grade students. Two 8th grade classes in one middle school took part in the study. One class was assigned by the toss of a coin to receive 18 weeks of instruction involving writing strategies in maths lessons (n=19) and the other continued with traditional instruction with no writing taught (n=22). Outcome measure was maths achievement on the mock Criterion Referenced Competency Test (CRCT). Results showed that the experimental group made bigger gains than the control group although the difference was not statistically significant.

Impact: No effect on maths achievement

Evidence: Weak

- Small sample (n=41), involving only 2 classes (no. of cases = 2), very low statistical power to detect effects.
- Researcher (also the developer of the programme) taught both control and experimental classes posing a threat to validity.
- It was also not clear if the control children had additional maths support outside class. These were not controlled for.

Despite finding no effects the researcher concluded that the overall data showed that the intervention had positive benefits on students and educators, and that self-reflected learning was beneficial to students. The researcher then made recommendations for introducing writing activities into maths lessons stating that traditional methods of teaching maths had been shown by previous research to be ineffective.

2. **Kliewer, W., et al. (2011)** A school-based expressive writing intervention for at-risk urban adolescents' aggressive behavior and emotional ability. *Journal of Clinical Child and Adolescent Psychology*, 40(5): 693-705. (US)

Intervention: Expressive writing on socio-emotional and behavioural outcomes

Age: Secondary (age 12-13)

[Full text not available]

This is an RCT to test the effectiveness of expressive writing on the socio-emotional and behavioural outcomes of 258 students aged 12 to 13 years old (response rate of 75%). Majority of these were from disadvantaged families. Students were randomised to receive standard expressive writing, enhanced expressive writing or traditional writing (which involved writing about a non-emotional subject). The two experimental groups wrote about their feelings and thoughts about violence they experienced; enhanced group could write about poetry, skits or songs. These exercises were carried out twice a week for 20 minutes for 8 sessions. Students were assessed 1 month before the intervention and 2 months and 6 months after the intervention. Outcomes were measured using teacher-rated instruments on students' emotion and behaviour, as well as students' self-rating of aggression. Pupils on standard expressive writing improved on teacher-rated aggression and emotional ability 2 months after the intervention relative to controls ($d = -0.48$). Similar effects were not observed in the enhanced group. Six months later, control children seemed to demonstrate less aggressive and emotional behaviour than the two experimental groups. Standard expressive writing appears to be more effective than enhanced writing in reducing problem behaviour, and was particularly effective for those exposed to higher levels of community violence.

Impact:

- Positive short-term effect of standard expressive writing.
- No effect of enhanced writing on behavior.
- Negative long term effect of both expressive and enhanced writing.
- Students' self-reports on behaviour showed no differences between groups.

Evidence: Weak

- Assessments of outcomes based on student and teacher reports may not be reliable, hence the mixed results.
- Teachers were not blind to group allocation. This may biased their ratings.
- Post-test was taken when children were in the 8th grade. This means that different teachers were involved in the pre- and post-test ratings. The lack of effects or even negative effects could be a consequence of different ratings by different teachers.
- Classroom and class teachers also varied between 7th and 8th grades – all these could have affected teacher ratings.

3. Rowicki, M. A. (2001) *A study of the relationship between reflective writing and critical thinking in seventh grade integrated science students.* Ann Arbor, Auburn University. 3016110: 266. (US)

Intervention: Reflective writing on critical thinking

Age: Secondary (age 12-13)

This study examined the effects of an 18-week reflective journal writing intervention on 69 seventh grade students (63% response rate). Of these 12 were selected, representing different levels of critical thinking. Writing activities took place during science lessons over 18 weeks. Throughout the period of the study, it was observed that students' level of reflection in their writing improved. Students' critical thinking skills also improved as evidenced in their ability to apply the 5 skills in problem-solving. However, there was no direct relationship between students' critical thinking skills (using Test of Integrated Process Skills) and their level of reflective writing.

Impact: No impact on critical thinking skills

Evidence: Weak

- Small sample (only 12 out of 69 selected for study).
- Response rate to participation was 63%, suggesting participants were self-selected
- There was no control group, so although students showed improvements in reflective writing and critical thinking, it is impossible to tell if these improvements were due to natural developmental process or reflective writing.
- The regular science lessons also involved asking higher order thinking questions – the effect of this cannot be separated from the effect of reflective writing. Again having a control group may help to identify the influencing factor.

4. Ayers, W. E. (1993) *A study of the effectiveness of expressive writing as a learning enhancement in middle school science.* Ann Arbor, Temple University. 9408754: 177. (US)

Intervention: Expressive writing on science learning

Age: 8th grade (age 13-14)

This was a quasi-experimental study using matched groups to explore the effectiveness of using creative writing in learning science content and in retention of information. All pupils were taught by the same teacher and received same instructional materials and lessons except that the experimental children incorporated expressive writing in the course, while control children followed the usual instructional lessons without the expressive writing component. Assessment of impact was by comparing the pre- and post-test results of the two groups. A delayed post-test was

administered to test retention of learned information. Number of participants was 39.

Results showed no significant differences between groups although the researcher suggested that pupils in the treatment group showed greater retention of information. In fact data suggest that control children made bigger gains than experimental group. In terms of retention, the data showed that both groups registered a loss in retention of information, but the non-expressive writing group made bigger loss immediately after the intervention than the expressive writing group. Analysis of data 6 weeks after the intervention showed that control group retained more information than experimental group. Even after controlling for reading and maths pre-test, no significant results were found.

*The lessons described as science would be more appropriately described as geography (or Earth Science) where pupils studied geology.

Impact: Negative impact on science achievement and long term retention of information, even after controlling for pre- test scores for reading and maths.

Evidence: Weak

- Non random assignment to treatment conditions. This means that differences in results could be the result of group differences rather than the intervention. The small group (n=39).
- Small group being based in one school limits generalisation.
- Assessment tests were developed by the researcher and instructor. This threatens validity of assessing impact.

5. Deegan, A. (2010) *Creative confidence: Self-efficacy and creative writing in an out-of-school time program and beyond.* Ann Arbor, California State University, Long Beach. 3448618: 252. (US)

Intervention: Creative writing on self-efficacy in creative writing

Age: Adolescent girls (13-15)

Using a Listening Guide methodology, the author examined how participation in an out-of-school creative writing programme help develop self-efficacy in creative writing, academic confidence and aspiration among 18 adolescent girls. The method involves using interview transcripts girls and analyses of participant's writing. Participants were girls who had previously participated in the WriteGirl programme in schools when they were 13-15. They were tracked to participate in the study several years after they have left school. Some were now 18-25 years.

WriteGirl is a mentoring system where girls were assigned to mentors who were professional women writers. The girls work with their mentors on a range of creative writing skills, journalism, fiction and non-fiction writing, poetry, songwriting and screenwriting. These girls were traced from various contacts and their responses to online interviews via social media and email interviews were analysed. Of the 120 who were tracked 50 responded and agreed to join Facebook. 20 were selected representing different amount of participation in WriteGirl (ranging from 1-5 years). All the participants were now accomplished writers having participated in a writing programme and some have their work published in award-winning books. The researcher also used the I poem to analyse the voices of the participants.

Participants wrote and talked about how creative writing was an outlet or diversion from the achievement-focused environment. Others used it to express themselves through writing as a way to overcome their shyness.

Impact: Not evaluated

Evidence: Weak

- There is no evidence in this study to suggest that the creative writing programme enhanced self-confidence. Pupils were confident in their writing, but the study design could not show whether there was a change in confidence or not.
- Most of the participants were keen writers to begin with which was why they enrolled in the after-school WriteGirl programme working with professional writers.
- A large majority of them were white middle class girls. This study is therefore limited in generalising to other population.

6. Irvine, M. (2003) *Freedom of expression in creative writing: Scope and limits for secondary school students.* Ann Arbor, Simon Fraser University (Canada).

MR03440:164. (US)

Intervention: Exploration of the school as a place where freedom of expression can be cultivate to guide their creative writing process

Age: Secondary

This thesis explored how secondary students employed freedom of expression in their creative writing assignments, and how free speech and self-censorship influences their writing. It further examined the way in which the school can be a place where pupils are encouraged to express controversial, unpopular or untested ideas.

Impact: Not evaluated

Evidence: No evaluation

- This study is an exploration of how the school can be the setting where freedom of expression can be cultivated to support creative writing.

7. Simle, M. A. P. (1993) *The effects of guided and unguided creative writing activities on spelling achievement in fifth-grade.* Ann Arbor, University of Minnesota. 9317736: 216. (US)

Intervention: effects of creative writing on spelling achievement

Age: 5th grade (age 10-11)

[Full text not available]

This was one of the few studies that examined the effects of creative writing on children's academic achievement. Three groups of children were compared. The control children followed a weekly spelling lesson focusing on spelling only. Treatment group 1 were involved in creative writing activities and included 3 to 8 words from the spelling series in their creative writing. Treatment group 2 were engaged only in creative writing with no spelling words. Outcomes were assessed using 3 tests (Spelling series test, Comprehensive Test of Basic Skills and Cognitive test of mental ability).

The results showed that the control group and treatment group 1 who had been exposed to the spelling textbook and spelling list outperformed those in treatment group 2 who did not use the spelling words or textbook in the weekly session. However, standardized tests of unfamiliar words showed no significant differences between groups.

Impact:

- Positive impact on spelling based on words used in the practice sessions.
- No impact on standardized tests of unfamiliar words.

Evidence: Weak

- Test was specific to the intervention using words children practised in the weekly session. On tests of unfamiliar words, no differences were found.
- There is no information about the number of participants and how they were selected and assigned to treatment conditions. No information about non-response or drop out. So it is not possible to evaluate the strength of evidence, but based on the kind of tests used it is clear that teaching to the test does not indicate effect of the intervention.

POETRY

- Few empirical studies were found about the use of poetry for school-aged children.

- Most empirical work about poetry in schools were conducted pre 1980. These were largely about the teaching and assessment of poetry (e.g Gallo 1968; Benson 1971; Snider 1973; Bridge 1966).
- There is the conjecture that the shift in emphasis to maths, science and literacy after 1960s has led to the abandonment of teaching poetry in school. Few empirical research has been conducted since 1980
- Most studies about poetry were about the beneficial effects of poetry in general or for older pupils and undergraduates or about the methods of teaching poetry (e.g. Paulsen 1996; Jackson 1980; Manderfield 2004; Pacheco 2011; Gallagher 2000) or a thesis about the author's or pupils' experience with poetry (e.g. Robinson 2006; Schneier 1995; Marsh 2010). There were also dissertations about teachers' experience in teaching poetry or suggested techniques in poetry appreciation (e.g. Dusenbery 2011; Sierra Monroig 2004; Barber 2014; Budhecha 2000; Fretwell 1996).
- Since the No Child Left Behind Act, the teaching of poetry has been put on the back burner and the focus was on core subjects like reading, writing, maths and science. Despite this, it is interesting that few teachers have tried to incorporate poetry in the curriculum as part of a strategy in the teaching of literacy. Friedman (2012) was one of the few teachers who used the opportunity to introduce poetry in the classroom to encourage literacy.

1. **Ball, E.R. (1979)** *An investigation into the effects of a specifically designed introductory poetry unit on the cognitive gains and affective responses of ninth grade students.* Ann Arbor, The University of North Carolina at Greensboro. 7922395:180. (US)

Intervention: Use of poetry for cognitive development

Age: 9th grade (age 14-15)

This was a pre-post-design study to establish the effect of using a specifically designed poetry unit on cognitive development of 9th grade children. Cognitive skills were measured using objective tests instruments. A corollary was to determine whether reluctant teachers could use the strategy equally successfully.

Six classes were randomly selected and assigned to treatment, and 2 classes to control (no treatment). The treatment classes were divided into 3 groups of 2 classes, each group taught by a different instructor (some by a poet, some by the investigator and some by investigator and teacher together). All the 3 groups used similar materials for teaching developmental sequence of poetry. However, teaching styles and teacher effectiveness may vary between groups.

Results showed that although there was no significant growth in cognition among the treatment groups, they made bigger cognitive gains when compared to the control group. The results also varied between instructors with the poet classes showing biggest improvements. This is not surprising considering that the test questions were specific to poetry which may have been emphasized by the poet in the lessons.

Impact: Positive effects reported on cognitive development

Evidence: Weak

- It is not clear how many pupils there were, but the 8 intact classes in one school is not a big enough sample.
- There is also the question of generalisation as the study was undertaken in one school.
- It is also not clear how long the intervention was and how many lessons there were.
- Although the abstract described the allocation of classes to treatment groups as random, this was not the case. E.g. one teacher was allowed to be in the non-treatment group because they had no intention of teaching poetry.
- More importantly the test of cognition can be considered invalid as the test items were specific to the intervention. Test questions pertained to knowledge about poetry, which may be emphasised and better illustrated by the poet. Examples of test items:

A humorous, five-line poem which usually has a rhyme scheme of ABBA is called a (A) haiku (B) limerick (C) stanza (D) narrative (E) couplet.

A poem which tells a story is called a (A) haiku (B) limerick (C) stanza (D) narrative (E) couplet.

A nature poem which contains seventeen syllables arranged in three lines of 5-7-5 is called a (A) haiku (B) limerick (C) stanza (D) narrative (E) couplet.

Two lines of poetry is called a (A) haiku (B) limerick (C) stanza (D) narrative (E) couplet.

2. Pacheco, D. L. (2011) *Writing out loud: The intellectual and epistemological work of developing a community of poets in an urban elementary classroom.* Ann Arbor, University of California, Los Angeles. 3493405: 345. (US)

Intervention: Use of poetry to develop thinking and expression

Age: 5th grade (age 10-11)

This was an ethnographic study which looked at the use of poetry writing

to develop complex forms of thinking and expression. The author examined the discourse and social interaction and the pedagogical practices within the classroom. Students were selected from one class and put into pairs consisting of one with strong language skills and one with weak language skills. The 16 pupils also received 22 individual writing workshops (for 15-40 minutes each) from the researcher who was also a poet. Students explored their writing to experiment ways of using it to express their feelings through poetic language. Students were taught the use of metaphors and skills in poetry writing.

Impact: Not evaluated

Evidence: No evidence of impact

- 3. Piper, S. N. (2009)** *Poetry centers for the purpose of lowering inhibitions of English language learners in the constructivist English language arts classroom.* Ann Arbor, Auburn University. 3386169:334-n/a. (US)

Intervention: Poetry on lowering inhibitions of ELL

Age: Graded 8-9 (age 13-15)

This was a small case study to investigate how poetry can help lower inhibitions of ELL pupils also known as EAL (English as Additional Language) learners in the UK. The aim was to use poetry activities to lower inhibitions to encourage ELL to better access the English language for learning other curriculum subjects. The intervention was conducted in a poetry centre housed in a school on Saturday mornings for 2 hours each week. Children were introduced to various aspects of poetry using aesthetic experience of texts in a group setting. Children engaged in reading, writing, listening and interacting with other students and dramatic presentation. Activities were audio and video recorded, and field notes collected from observant participation. Participants were ten ELL pupils (of different degrees of fluency) at the center who agreed to participate in the study out of 47 in the class.

Lesson observations suggested that pupils were enthusiastic and show keenness to learn. They were engaged in all the activities. There was little evidence of inhibition or resistance. This is not surprising as pupils volunteered participation.

Impact: No evaluation (Results were based on researcher's observations and interpretations), but author suggested the activities lowered inhibition.

Evidence: Weak

- Very small sample (n=10) who were self-selected. Similar results may not be obtained with non-volunteers.

- Study participants were based in one centre, this limits the generalisation to wider population.
- The results were detailed evaluation of the process in the classroom based on the researchers' observations of what went on in the lessons and interpretations of individual pupils' behaviour.

4. Redmond, M. C. (1997) *Like a waterfall in a miracle's hand: Children writing with art, music and poetry*. Ann Arbor, University of Virginia. 9724691:236. (US)

Intervention: Poetry writing on children's cognitive development

Age: Primary (cross age)

This was a longitudinal case study of 5 children to examine how the use of poetry writing can affect their cognitive development. Children were volunteers who attended a cross-age lunch time poetry writing club.

The study showed that visual and literary stimuli could help promote children's use of poetry devices such as closed attributive simile and analogous metaphor in their writing.

Results showed that children were able to write freely using poetic devices in their writing. They also developed automatic writing, i.e. writing to music without pre-writing or pausing. The author interpreted this as linguistic and cognitive development, and concluded that children developed deep literacy in the process. Children spoke about how poetry changed their lives, helped them in their spelling and made them calmer

Impact: No evaluation, but author suggested that the method of using visual and literacy stimuli promoted the use of poetic devices. Purported improvements in writing were interpreted as linguistic and cognitive development.

Evidence: Weak

- Case study based on 5 children from a class of 40 children is not a representative of the population.
- Children volunteered for the lunch time writing club.
- No comparator.
- Limited generalizability of the study results.
- There was no proper evaluation as such.
- Reports of cognitive and linguistic development were based on the researcher's interpretation of children's writing.
- Other non-cognitive effects were based on children's self-report. This is often not very unreliable, although there may be some truth in it.

5. **Sierra Monroig, C. F. (2004)** *The teaching of poetry to ESL students through the use of creative dramatics*. Ann Arbor, University of Puerto Rico, Mayaguez (Puerto Rico). 1418266: 140. (Puerto Rico)

Intervention: Use to creative dramatics to appreciate poetry to gain English proficiency

Age: 9th grade (age 13-14)

The aim of this study was to develop creative dramatic activities to facilitate the enjoyment of poetry and thus help to improve English proficiency. These activities included choral reading, pantomime, readers' theatre, role-play, improvisation and scripted drama. Participants were 9th grade ESL students. It is not clear how the pupils were selected and how many there were.

Impact: Not Evaluated, but the suggestion was that creative dramatics enable pupils to express themselves through the use of poetry. The use of language and freedom of expression is believed to help raise proficiency in English although this was not tested.

Evidence: Weak

- The effects of English proficiency were not assessed.
- It is not clear how many pupils were involved and how they were selected for the study.
- The study was more a manual on examples of using creative dramatic activities to promote enjoyment of poetry in order to develop English proficiency.

6. **Snider, S. J. (1975)** Cognitive and affective learning outcomes resulting from the use of behavioural objectives in teaching poetry. *Journal of Educational Research*, 68(9): 333-338.

Intervention: Teaching poetry using behavioural objectives on affective and cognitive learning outcomes

Age: 9th grade (age 14-15)

This study used a pre- post-test study design with random allocation of 4 intact classes to treatment and control (2 treatment and 2 control) to evaluate the effects of teaching poetry on cognitive and affective understanding. The study also aimed to find out whether poetry can be taught effectively using behavioural objectives. At the beginning of every lesson pupils were told explicitly the learning objectives and the success criteria. Pupils also received feedback about their learning (whether they have achieved the learning objectives).

Analysis of variance showed significant effects on all the cognitive and affective outcomes measured. However, there were no comparisons of gain scores between treatment and control groups.

Impact: Positive impact on cognitive and affective outcomes

Evidence: Weak

- Four intact classes randomised to 2 treatment and 2 control classes present a small sample, not large enough to control for extraneous factors.
- It is not clear how many pupils were involved and if there was any missing data or dropouts. There was no account of sample size.
- The same teacher taught all the 4 classes. There is a possibility of teacher using the same strategy inadvertently in the control classes. It was not clear if the lessons were observed to ensure fidelity to treatment.
- There was no comparison of gain scores between treatment groups. Test of significance is not appropriate with a small sample.
- In any case, this study was more a test of the effectiveness of the use of feedback and explicit use of success criteria, rather than the use of poetry.
- It is not clear if it was the feedback or the use of poetry that caused the improvements in outcomes.

7. Walker, P. A. (2008) *The impact of a series of poetry workshops on the cognitive development of middle school students*. Ann Arbor, University of California, Los Angeles. 3302777: 217. (US)

Intervention: Impact of poetry workshops on cognitive development

Age: 8th grade (age 13-14)

This was a quasi-experimental study of an 8-week poetry workshops aimed at developing the cognitive development of 56 eighth grade pupils in one school (28 treatment and 28 control). During the workshops children wrote a journal entry using prompts, similes and metaphors and practice poetry writing. The format included reading and discussing poetry, writing individual and collaborative poems, revising, and publishing.

Analyses of results on writing fluency (on the California High School Exit Exam) showed that all pupils wrote fewer words between pre- and post-test. Although control pupils showed bigger decline, the difference was not significant. Comparisons for the lowest 50% of each group showed that treatment group made significant gains whereas the control group registered a big decline. On one measure of vocabulary, there was no difference between groups. Although treatment group showed bigger gains on a 2nd measure of vocabulary the differences were not significant. There was also no significant difference in improvements in vocabulary use between groups.

Positive impact was reported for appreciation of multiple perspectives. They wrote longer journal entries and showed greater appreciation of multiple perspectives in their journal entries, but significantly fewer metaphors. This was based on pre- and post-intervention comparisons of the writings of only the treatment group.

[Details of the workshop activities are in the thesis]

Impact: Mixed

- No impact on standardised tests of writing fluency and both measures of vocabulary.
- It was particularly beneficial for the weakest pupils.
- Positive impact reported for appreciation of multiple perspectives based on researcher's subjective rating, and certain measures of vocabulary.

Evidence: Weak

- The study was conducted in a high-performing arts academy. Results may not generalised to other population.
- Groups were not randomly allocated. Treatment pupils were recruited from one English language arts class, while control pupils were from all the other language classes where poetry was not taught. Students who do English language arts may be different to those who did not.
- 56 pupils were recruited from a total of 188. It is also not clear how the control pupils were recruited. Control group included only those who took the pre- and post-test, suggesting that those who did not take the test were dropped from the analysis, so it is not possible to estimate the attrition rate.
- There was no control group comparison in the use of metaphors and appreciation of multiple perspectives.

8. Bianchi, L. L. (1999) *Finding a voice: Poetry and performance with first graders.*

Ann Arbor, University of New Hampshire. 9926010:304. (US)

Intervention: The reading, writing and performance of poetry on children's affective behaviour and learning.

Age: First grade (age 6-7)

This was a small-scale exploratory case study of 3 first grade children to show how children expand their repertoires of ways with words as speakers, readers and writers through the reading, writing and performance of poetry. The aim of the study was not to evaluate the impact of poetry but rather to explore the processes involved in learning when engaged in poetry, chronicling the learning experiences of the 3 children.

Impact: Not evaluated

Evidence: No evidence of impact

9. Carter-Pounds, A. A. (1996) *Teaching reading through poetry using a sports format: An evaluation.* Ann Arbor, University of Virginia. 9708587:109. (US)

Intervention: Teaching poetry to developing affective & non-cognitive outcomes (fluency, expression, self-confidence)

Age: 5th and 6th grade (age 10-12)

This study evaluated the teaching of poetry and its impact on 16 5th and 6th grade students in one school. The project known as Poetry Athletics was a 6-week after-school program where the students were coached to read and dramatize poems. The purpose was to help pupils overcome shyness and build self-confidence. Like sports students practiced reading and writing poetry.

Fluency assessed using researcher-developed instrument and timed repeated readings as well as case study of 6 children observing their interactions surreptitiously. Self-confidence was measured using teacher-developed self-confidence chart. Themes from children's journal entries were identified and classified.

Children showed improvements in 3 out of 5 areas of fluency, increased speed in reading and overall increase in expressive moves in their reading (of the 9 criteria only facial expression did not show improvement). In the 12 measures of confidence, gains were made in 8 of them. They maintained the same scores for 2 and lower scores for 2 others

[For those interested in this programme, the thesis described in detail how these activities were carried out].

Impact: Positive overall impact on quality of reading (fluency, speed and expression)

Evidence: Weak

- Very small sample (ranged between 10-16). Case studies for only 6 children.
- Limited generalisation because the study was located in one school.
- Children volunteered to join the after-school club. So results may not be the same for less willing participants.
- There was no comparison group, so any improvements could be due to factors such as maturation, novelty effect or teacher effect. These confounding factors were not controlled, so it is difficult to say if the changes in reading behaviour were the result of the intervention.

- Assessments were based on teacher or researcher-developed instruments, which may be intervention specific.

10. Crozer, K. J. (2014) *American Poetry & A Paradigm of Play: Transforming Literature with Young Children*. Ann Arbor, The Claremont Graduate University. 3617776:255. (US)

Intervention: Using poetry to engage children in literature in an after-school programme

Age: 10-12

This dissertation described how the author used play to engage primary school children in literature through a poetry curriculum in an after-school programme. 28 of the 803 children taught through the programme were interviewed. Pupils reported enjoying literature more than before.

Impact: Positive effect on enjoyment of literature

Evidence: Weak

- Outcome was not assessed. It was simply based on children's report of enjoying the lessons more than before.
- Similar lessons may not have the same effect because much depends on teacher's personality and pupil-teacher relationship. A less willing teacher may not be as effective. These factors were not controlled.
- The selection of small sample may be biased. There was no random allocation and no control group.
- A large randomised sample with proper comparison group engaged in alternative exciting programme (e.g. computer-assisted learning) may be able to control for the novelty effect and teacher effects.

11. Fiore, M. E. (2012) *Time for a Culturally Relevant Pedagogy: Spoken Word Poetry in Urban Schools*. Ann Arbor, Drew University. 3535941: 169. (US)

Intervention: Introducing poetry as part of a hip hop culture to provide platform for young people to express themselves

Age: Secondary

This study does not evaluate the effects of spoken word poetry, but expounds the virtues of the inclusion of poetry in contemporary classrooms. The author likened the Black Arts movement and early hip hop as witness poetry which served to document the plight of the times: poverty, violence, substandard housing and health care and struggling schools. Witness poetry, as spoken word, provides a platform for students in the midst of such deprived conditions to question and negotiate them and bring about dramatic social change.

Impact: Not evaluated

Evidence: No evidence of impact

12. Friedman, J. (2012) *A stepping stone of language: Teaching poetry in the fourth grade classroom*. Ann Arbor, University of California, Davis. 1512390:77. (US)

Intervention: Teaching poetry to enhance acquisition of new vocabulary, reading and writing

Age: 4th grade (age 9-10)

This study argued that the teaching of poetry has a place in literacy, and poetry has many benefits. It inspires children to be better readers and writers, access new vocabulary and write with deeper emotions.

Participants were 28 4th grade pupils in one school, most of whom from low SES background. Pupils were exposed to a variety of classic poems to stimulate interest in reading and writing. Children were introduced to similes and new vocabulary. Over a 6-week period the researcher assessed pupils' response to reading and writing poetry using observation, interviews, analysis of pupils' written work and pre- post survey.

More pupils reported enjoying poetry at the end of the 6 weeks but more pupils found reading poetry hard after the intervention than before. Pupils reported in interviews that they enjoyed reading, had more confidence in writing and are better about reading out loud. They also said they loved writing poetry.

Impact: Positive effect on children's reading and writing, enjoyment of poetry and confidence.

Evidence: Weak (no proper evaluation)

- Small sample (n=28) in one class.
- There was no comparison group.
- Assessments were based on pupils' self-report.
- Interviews were conducted by the researcher who was also the teacher. This could influence pupils' response.

13. Jocson, K. M. (2004) *Writing as right/rite: Promoting literacy, social and academic development through poetry in the lives of urban youth*. Ann Arbor, University of California, Berkeley. 3146895:331. (US)

Intervention: Use of poetry to promote literacy, social academic outcomes

Age: 9th to 12th grade (age 14-18) at participation

This was an ethnographic study of a 6-week intervention called Poetry for the People (P4P), an intervention involving teacher-student-poet working in an expert-novice apprenticeship partnership. In-depth case studies were conducted with seven former P4P students who agreed to take part in the study from an initial 37. Their learning processes and literacy practices

were analysed through participation observations, interviews and their poetry outputs were collected and analysed. The pupils were already keen poets having written poetry.

The study demonstrated that the apprenticeship relationship had a positive influence on the students. The programme helped students in producing poetry that was critical and embedded in multiple meanings. This effect extended beyond school, shaping their identities. These literacy practices involved spoken words and slam competitions.

Impact: No evaluation although positive influence of poetry on young people's social and academic identities was suggested.

Evidence: Weak

- The impact was not evaluated but interpreted by the researcher from pupils' work, although this was substantiated with interviews and focus groups.
- Much of the evidence depends on the researcher's interpretation.
- Pupils were already interested in poetry to voluntarily join P4P in school, some were already producing quite high quality poetry in school.
- Therefore the results may not be generalised to a wider and perhaps more reluctant population.
- The instructional strategy works with children working with poets.

14. Koukis, S. (2010) *At the Intersection of Poetry and a High School English Class: 9th Graders' Participation in Poetry Reading Writing Workshop and the Relation to Social and Academic Identities' Development.* Ann Arbor, The Ohio State University. 3438162:292. (US)

Intervention: Using poetry to improve social and academic identities

Age: 9th grade (age 14-15)

This was a case study of a 10-week Poetry Reading Workshop on 9th grade students' social and academic identities. There were 19 students in the workshop but 6 were selected for in-depth study.

The study found that the students had a better knowledge of poetry after the workshop. They were more engaged and enjoyed it more when they had the choice of poetry. There was resentment when they were made to read poetry selected by the researcher. There were positive changes at the end of the workshop. Pupils were reading, writing and sharing their work whereas when they first started they were angry and uninterested..

However, these improvements did not affect the young people's social and academic identities which were still closely related to their overall grades, attendance and behaviour.

Impact: No impact on social and academic identities

Evidence: Weak

- No actual evaluation was carried out.
- Evidence of impact was deduced from what transpired during interviews with the individuals.

15. Wilensky, L. M. (2013) *The Proof is in the Poetry: Generating student voice in a collaborative writing group approach to teaching and learning in ninth grade English*. Ann Arbor, University of California, San Diego. 1547816:191. (US)

Intervention: Use of poetry and feedback to develop young people's writing

Age: 9th grade (age 14-15)

This study examined the use of poetry in a programme called Proof is in the Poetry, a collaborative group approach to encourage young people to engage in writing and to write with an authentic voice. The 8-week programme was developed by the researcher. Pupils were trained to give feedback to help increase engagement and attention to revision to encourage them to write in an authentic voice. Relevant texts were used as a model to help pupils find their own voices.

Participants were from 3 English classes with 31 pupils in each. Students were assessed on how peer and text feedback improve their voice in writing and whether the use of feedback improve their performance in writing. At the end of each writing group, pupils wrote a reflective piece which was then analysed to assess progress in writing. Pupils also chose a poem (given as a writing assignment) to read to an audience. This poem was written with only the support of their writing groups.

Evaluation was largely about pupils' attitudes and perceptions of the programme, what they liked about the programme and how it had helped them in their writing process.

Impact: Not evaluated

Evidence:

- No objective evaluation of writing outcomes carried out.
- Evaluation was largely about pupils' attitudes and perceptions of the programme, what they liked about the programme and how it had helped them in their writing process.

MUSIC EDUCATION

The Effect of a Music Therapy Social Skills Training Program on Improving Social Competence in Children and Adolescents with Social Skills Deficits, 48, eax 440-462, Journal of Music Therapy (2011).

(did not find but found Gooding, 2010 where this paper is based on.)

The Effect of a Music Therapy Intergenerational Program on Children and Older Adults' Intergenerational Interactions, Cross-Age Attitudes, and Older Adults' Psychosocial Well-Being, 48, eax 487-508, Journal of Music Therapy (2011).

(this was an intergenerational music therapy programme that took place in a retirement living facility – it was not relevant to mainstream schooling)

Albright, R. E. (2012) *The Impact of music on student achievement in the third and fifth grade math curriculum.* 3492175 Ed.D., Northcentral University, Ann Arbor. (US)

Type of intervention: Integrated music in school curriculum

Age of children: elementary school in the US (refers to grades 3 to 5)

Brief description of the study:

Students listened to a CD of baroque and classical music which was played as students were receiving instructions in mathematical concepts in the mathematics classroom. Baroque music was used to help the students relax during class instruction, and classical music was used to increase short and long-term memory. The researcher included math in the music curriculum by teaching students to (a) add, subtract, and multiply musical notes, (b) find the missing addend using musical notes, (c) combine music history and surveys to graph data, (d) combine the process of composition in music and the concept of probability, (e) understand musical notes and how they relate to fractions, (f) use time signatures to teach fractions, (g) reinforce math vocabulary, and (h) listening to baroque and classical music. The music was played for 50 minutes five days a week. The treatment was given for 16 weeks.

Aim of the study:

The study aimed to answer the following research question: What effect, if any, does baroque and classical music have on student achievement in mathematics when integrated into the third and fifth grade math curriculum?

Method:

Research design: Pretest-posttest control group design

Sample:

- Size of sample: 51 third grade students and 51 fifth grade students
The students were randomly assigned and placed in an experimental and control group.
- Attrition? No information provided
Students in the study were randomly heterogeneously grouped by the administration. Participants were gifted students, inclusion students, and

regular education students – *this is not very clear, what ‘regular education students’ means for example.it’s a heterogeneous mixed ability group*)
BGS: (I guess the children must be allocated by classes into treatment groups, so there could be a class or teacher effect) – DK : I am not sure, it seems that they were randomly heterogeneously grouped by the administration.

Outcome measures:

Achievement in maths: if listening to baroque and classical music in the maths class, along with math integration into the music curriculum, increases student achievement in maths. Data analysis was based on student performance, race, and socio-economic status (free/reduced lunch)

State standardised test: Benchmark quarterly assessment was used to measure student progress in math. The assessment is based on state standards that are required for each grade level to meet or exceed requirements on the state mandated test. The first assessment of the year was used as the pretest. At the end of 16 weeks, students received a benchmark assessment in math as a posttest.

Impact: Negative impact on maths attainment.

Both control and experimental groups showed statistically significant differences in posttest compared to pretest. The control groups outperformed the experimental groups in maths achievement. This was also observed for the outcome of race and socio-economic status.

Evidence: Weak evidence.

The author’s assertion that the findings of the study show ‘how listening to baroque and classical music along with integrating math into the music curriculum for third and fifth grade students have a statistically significant effect on student achievement in the mathematics curriculum’ is not supported by the data. Both control and experimental groups performed better in the maths test, so the improvement cannot be attributed to the intervention.

There was an attempt to ‘make all groups equal with respect to one or more control variables’ using ANCOVA but these variables are not mentioned.

The sample size was small and only based on one school. Other programmes that might have affected the results are not mentioned. Threat to external validity.

The math integration element was not properly explained and did not form part of the research questions.

The type of baroque and classical music that was used is not mentioned. There could have been differences in the type of music used and the extent of using the music in the classroom as no training to teachers was offered.

1. **An, S. (2013)** *The effects of music-mathematics integrated curriculum and instruction on elementary students' mathematics achievement and dispositions*. 73, ProQuest Information & Learning, (US)

Type of intervention: Integrated music instruction in school curriculum

Age of children: 3rd grade students (elementary school in the US)

Aim of the study:

To examine the effects of a sequence of classroom activities integrating mathematics content with music elements.

Brief description of the intervention:

One 45-minute music-integrated mathematics lesson was introduced to the third grade student participants each week. Each music-mathematics integrated activity was focused on one or more major mathematics content areas.

A series of music-mathematics integrated activities were developed by An (the author) and Capraro (2011). Music composition and playing activities were the two primary music activities that the teacher participant incorporated into her mathematics lessons. In the music-mathematics - integrated lessons, students had opportunities to use graphic notation (e.g., music color cards) and a variety of musical instruments such as handbells, drums, music sticks, and keyboards as manipulatives to learn mathematics. The content of the intervention is presented in detail in the thesis.

Method:

Research design

A quasi-experiment time series design with multiple pretests, mid-tests and posttests was utilized to investigate the effects of music-mathematics interdisciplinary lessons on students' mathematics achievement and dispositions.

Sample

56 third grade students from an elementary school in Southern California. One class of students (N=28) was assigned as the music group and they were involved in a series of **14** mathematics-music integrated activities associated

with regular mathematics lessons throughout a nine week interval. Another class of students ($n=28$) was assigned as the non-music group and received only regular mathematics lessons (random allocation of the two groups to treatment or control group).

A pretest administered to investigate any pretest difference found no difference in ability between the groups.

The two teachers had equivalent teaching abilities with third grade mathematics.

Outcome measures

Pre and posttests measuring mathematics content achievement, students' mathematics dispositions (administered to both groups) and mathematics process ability tests to assess improvement in mathematics abilities were administered to the music group throughout the intervention.

Mathematics Disposition Test adapted from the *Fennema-Sherman Mathematics Attitude Scales* (Fennema & Sherman, 1976).

Mathematics Achievement Test designed by the author and adapted from the *California Standard Test* (Standardized Testing and Reporting [STAR], 2011). The test was reviewed by school teachers and mathematics education professors.

Mathematics Process Ability Test

Wu and An (2006 & 2007) developed the model–strategy-application (MSA) assessment as a method of determining students' mathematics process ability levels on three areas. This test was derived from the core strands of proficiency from NRC (2001) and RAND (2003), as well as the guiding principles of the California Mathematics Framework (2006). The mathematics process assessment includes three components: model, strategy, and application.

Impact: Positive impact

- The posttests revealed that the music group students had statistically significant higher scores in mathematics disposition than non-music group students.
- The music group had a significantly higher score on mathematics achievement than the non-music group students.
- The music group's overall mathematics ability levels were statistically significantly improved from pretest to posttest; improvement was also identified from the mid-test I, to mid-test II and to mid-test III during the intervention period.

Evidence: weak

- Small sample size. Also quasi-experimental design meant that participants were not randomly allocated to the treatment and control group. The groups

had similar ability scores in pretest. The music group might have had higher dispositions towards mathematics before the intervention.

- Volunteer teachers and students selected from a limited number of schools (lack of generalizability to other elementary school students with different backgrounds).
- The teacher taking the class was not blind to treatment, so there is an expectation of success. This could have motivated both pupils and teachers to do well. The positive effect may have been an indirect result of participation in the intervention.
- Control and treatment classes were taken by different teachers. This could have accounted for the differences in performance.

However, interesting intervention and robust measurement methods.

The study shows promise but at the moment, as no control schools are available for comparison, we cannot confidently attribute the improved results to the intervention.

- 2. Anderson, S. A., & Fuller, G. B. (2010)** Effect of music on reading comprehension of junior high school students. *School Psychology Quarterly*, 25(3), 178-187. doi: 10.1037/a0021213 (US)

Type of intervention: Effect of lyrical music on reading comprehension

Age: secondary (12-13)

Brief description of the study:

The study was an investigation of the effect of lyrical music on reading comprehension by adolescents.

The reading comprehension subtest of the Gates-MacGinitie Reading Tests, 4th edition (MacGinitie, MacGinitie, Maria, & Dryer, 2000) was administered to 334 7th- and 8th-grade students. Students were selected from five public junior high schools in southwestern Arizona (gender and race were fairly equivalent in representation and all students were proficient in speaking, reading and writing English). Testing was conducted under two conditions: a non-music environment, and with accompanying music comprising Billboard Magazine's (2006) top hit singles. Following the music portion of the test, students completed a survey to assess any preference for or against listening to music while studying. Results of an analysis of variance showed performance declined significantly when listening to music. A point biserial correlation illustrated a pronounced detrimental effect on comprehension for students exhibiting a stronger preference for listening to music while studying.

Outcome: reading comprehension (students' ability to acquire and process new information).

The study has pre and post-test comparisons but there is no comparison group.

Impact: Negative impact.

Across all four experimental conditions, the music environment score was significantly lower than the non-music environment score.

Evidence: weak

The study used only one experimental condition and pupils of different ages or in other settings using different types of music might respond differently. It is not evident how the students were selected to participate, if for example, they volunteered to participate or what were the selection criteria.

3. **Bloor, A. J. (2009)** The rhythm's gonna get ya'—background music in primary classrooms and its effect on behaviour and attainment. *Emotional & Behavioural Difficulties*, 14(4), 261-274. (UK)

Type of intervention: Background music in classroom

Age: Primary age pupils – year 5

Brief description of the study:

The original hypothesis for this research was that a number of children are distracted by music being played in test situations and, further, that a minority of these children are themselves 'musicians'.

The study aimed to investigate if the music had a measurable effect on the behaviour and attainment of the children during tests. The results were then cross-referenced with the children's self-evaluation of their own musicality to ascertain if those children who experienced disruption of attainment and behaviour were themselves musicians.

A total of 47 year 5 pupils took part in the study – from three classes in different primary schools in a west London school.

The testing included four tests: two mathematics tests and two reading tests; two with music and two without.

Outcomes:

Reading and mathematics attainment.

Measures:

Two non-statutory (practice) SATs from 1997 were used. Observation of pupils' behavior and interviews with some of the pupils.

Impact: mixed but inconclusive

Music was suggested to be broadly beneficial to the reading test, but had a conversely adverse effect on the mathematics test. Inconclusive impact on behavior - there seemed to be a link between pupils' behavior and their attainment in the test but only tentative speculation is made.

Evidence: weak

- The author draws tentative conclusions mainly because of the small sample (47 out of the potential maximum of 90 pupils).
- Possible parental motivations may have affected children's previous musical experiences – possible selection bias as parents with certain experiences and attitudes would have given consent for their children to participate.
- The study does not mention what type of music was played to the children.

4. Bressler, R. A. (2003) *Music and cognitive abilities: A look at the Mozart Effect*. 3112138 Psy.D., The Chicago School of Professional Psychology, Ann Arbor. ProQuest Dissertations & Theses Global database. (US)

Type of intervention: music

Age of children: 5 years old

Brief description of the study:

The study aimed to investigate the influence of the Mozart effect on memory in 24 5-year old children. The children were recruited from day-care centers in urban and suburban municipalities in New Jersey.

A random sampling method was used to determine which condition each child would participate in this study. Thirteen children were assigned to a listening condition and 11 children were selected to a silent condition. Both groups were handed a popular coloring book and asked to choose and color any of the designs in the book. The Mozart musical selection was played for those in the listening condition while they were coloring; those children in control condition colored in silence for a 10 minute period. The children were administered selected subtests from *The Children's Memory Scale* when this time elapsed.

The study used a post-test-only control group design. The hypothesis that those children who listened to Mozart (K.448) would perform significantly better than those from the silent condition in any of the three memory domains (i.e. auditory-verbal; visual-nonverbal; attention and concentration) along with along with a measure that assessed learning was not supported.

Impact: Negative impact

The hypothesis that those children who listened to the Mozart piece would perform significantly better than those from the silent condition on each of the three memory domains tested as well as on a measure that assesses

incremental recall of verbal and visual information when this material is repeatedly presented, was not supported in this study.

Evidence: Weak.

- Small sample.
- A posttest-only control group design was utilized. There was an attempt to ensure that the two groups were similar in terms of demographic variables (ethnicity and socioeconomic level) but we cannot rule out the possibility of children differing in terms of their memory abilities as these were not tested at the start of the study.
- Attrition affected both groups in that the results from three subjects, two from the silent condition and one child from the Mozart condition, could not be obtained. This would have a big effect in the small sample.

5. Bryant, K. G. (2013) *Effect of music-integrated instruction on first graders' reading fluency.* 73, ProQuest Information & Learning. (US)

Type of intervention: Music-integrated instruction

Age: First grade students from two public elementary schools in Georgia.

Brief description of the study and aim of the study:

The study examined music-integrated (MI) instruction, framed by automatic information processing theory and elements of prosody.

Method:

A quasi-experimental, pre- and posttest design was utilized to ascertain the effect of MI instruction on reading fluency among first grade students (30 minutes per day in each class for 8 weeks). Musical strategies were added to the instructional processes (teacher-student modeling, imitation and reinforcement). The teachers in the treatment group/school received particular training on arts integration and music integration in the curriculum.

In 2009, the treatment school of the proposed study was designated a laboratory school site for the Music-in-Education National Consortium. This resulted in the delivery of additional on-site music-integrated teacher training. In addition, an MIENC action research project was initiated at the treatment school in 2009. Impressive preliminary results informed instructional design regarding further implementation of MI in the teaching of reading at the treatment school, particularly among first grade teachers.

Sample:

Convenience sample from two elementary schools in Georgia (one treatment and one control, 55 pupils in treatment / 60 pupils in control school, 3 classes per school). It is reported that the schools had similar demographics.

Outcome measures:

Independent samples *t*-tests were employed to compare students' Dynamic Indicators of Basic Literacy Skills (DIBELS) test scores. Analysis revealed to what degree MI instruction in reading had effect upon two DIBELS indicators - nonsense word fluency (NWF) and phoneme segmentation fluency (PSF) scores.

Impact: mixed (contradictory results regarding the effect of MI instruction on the outcome variables - This research indicated that there is no significant effect of MI reading instruction on DIBELS NWF scores. It also indicated that there is a significant effect of MI reading instruction on DIBELS PSF scores).

Evidence: weak

Convenience sampling – we cannot rule out the influence of confounding variables.

(The researcher was unable to control assignment of particular students to classes at either treatment or control site. It is reported that the classes assigned to participate at either site were randomly selected by each school's principal.)

Baseline equivalence was not established. The treatment and control groups could have been different in the first place. There could have been pre-existing differences in socio-economic status and variance in student motivation and maturity levels was not accounted for.

The treatment class was in a school where music/arts culture had been already established (differences in treatment and control settings). Any outcomes could have been the result of the whole school atmosphere and culture rather than the result of the intervention. In addition, subjects in the treatment group had previous exposure to arts-integrated instruction at the kindergarten level (i.e. music, drama, visual art, movement/dance); *possible selection bias threatening its internal validity.*

Variances would also exist in the instructional style and delivery between treatment and control group teachers – the outcomes could have been affected by the different teachers' delivery rather than by the intervention. There is also the possibility of teacher expectancy.

6. Butzlaff, R. (2000) Can music be used to teach reading? [Article]. *Journal of Aesthetic Education*, 34(3/4), 167-178

Type of intervention: Meta-analysis

Age: Cross age

Brief description of the study:

Bultzlaff conducted a meta-analysis using studies that met three criteria: a standardized measure of reading ability was used as the dependent variable; a test of reading followed music instruction; statistical information was sufficient to allow for the calculation of an effect size.

24 correlational studies conducted between 1959 and 1997 (those studies that did not randomly assign children to conditions and that had no pretest of reading ability)

The analysis of the 24 correlational studies demonstrates that there is a strong and reliable association between the study of music and performance on standardized reading/verbal tests. However, in these studies, it is not possible to explain what underlies this association. For example, it is possible that students who are already strong in reading choose to study music; it is possible that students who are interested in music are also interested in reading because they come from families which value both music and reading.

6 experimental studies conducted between 1969 and 1994 (those studies that randomly assigned children to music vs. control conditions, and that assessed reading ability before and after exposure to music).

The experimental studies yielded no reliable effect. There is also considerable variation in the effect sizes, indicating that the overall finding is not stable.

Two of the six studies had a high effect size ($r=.64$, Douglas and Willats, 1994; $r=.57$ in Fetzer, 1994). There are various limitations to these studies that are discussed, such as possible experimenter expectancy effects (Douglas and Willats, 1994; Fetzer, 1994), high attrition especially in the control group and extra attention given to the treatment group (Fetzer, 1994).

The study by Roskam (1979) had a negative effect size, based upon the scores for music and reading comprehension. Two other scores were also reported, one for spelling and another for word recognition. These effect sizes were positive ($r = .34$ and $r = .37$, respectively). Bultzlaff argues that it would be best to include only the effect size from reading comprehension as spelling and word recognition are not equivalent to reading comprehension. In addition, in this study the music group demonstrated more 'severe learning difficulties' than the control group, so baseline equivalence was not ensured between the two groups.

Impact: Experimental studies yielded no reliable effect. Considerable variation in the effect sizes, indicating overall finding is not reliable.

Evidence: Weak because of high attrition especially in control group and extra attention given to treatment in one study. Also experimenter expectancy effects in another. Third study showed negative effect on reading comprehension but positive effects on word recognition and spelling.

7. Cabanac, A., Perlovsky, L., Bonniot-Cabanac, M.-C., & Cabanac, M. (2013)
Music and academic performance. *Behavioural Brain Research*, 256, 257-260.
(Canada)

Type of intervention: music participation

Age of children: secondary school, 1 secondary school in Canada, Quebec.

The sample consisted of students from a secondary school of the province of Québec Canada. The students belonged to the International Baccalaureat program for which they were selected on their first year of secondary school based on their high grades in previous years. They formed a homogenous group in terms of their grades. There is no information regarding their prior achievement and how baseline equivalence in ability was established.

The mean grades for the academic year 2011–2012 were recorded for three different school years, corresponding to the third year (n = 196 students), the fourth (n=184 students) and the fifth (which is the senior class of the secondary school; n = 180 students). Students were of both sexes, aged 14–15, 15–16, and 16–17 years old (for the corresponding school year).

The aim of the study was to investigate whether those students that chose music as an option in years 3, 4 and 5 of the International Baccalaureat program (after the first two compulsory in studying music years) achieved better in other subjects (sport, science, mathematics, French, English, history, chemistry, physics, Spanish, ethics).

Impact: Students taking musical courses achieve better performance in all other subjects. Each year, the mean grades of the students that had chosen a music course in their curriculum were higher than those of the students that had not chosen music as an optional course. It is reported that this tendency was true regardless of the topic of the course.

Evidence: weak

- No comparison group. Small sample size drawn only from one school – threat to external validity.
- The results show a link between music and cognition. They do not indicate causality: whether the students have better grades because they practice music from time to time or whether they chose music because they are better at school. The influence of confounding variables cannot be ruled out.

8. **Carlson, J. K., Hoffman, J., & Gray, D. (2004)** A Musical Interlude: Using Music and Relaxation to Improve Reading Performance. [Article]. *Intervention in School & Clinic*, 39(4), 246-250.

[Full text or abstract are not available]

9. **Charles, J. L., Jr. (2014)** *Evaluating the effects of tenth grade students' music ensemble participation in relationship to the graduation exit examinations mathematics and reading scores.* 75, ProQuest Information & Learning. (US)

Type of intervention: music instruction

Age of children: 10th grade (secondary school – second year of high school in the US)

Brief description of the study:

The purpose of the study was to determine whether or not there were significant differences in participants' academic achievement relative to English and mathematics (as measured by Graduate Exit Exam) between participants who received instrumental music instruction in school and participants who did not receive instrumental music instruction in school (2010-11 school year). This study is a non-experimental correlational design.

Sample:

Participants identified as music students were students who participated in their school's instrumental music program during the 2010-2011 school year. Participants identified as non-music students were students who did not participated in their school's instrumental music program during the 2010-2011 school year.

Three school districts located in southeast Louisiana participated in this study. School district 1 presented a total of 89 participants (13 participating in an instrumental music ensemble and 76 not participating) who were administered the GEE during the 2010-11 school year. School district 2 presented a total of 225 participants (16 music participants, 209 non-music). School district 3 presented a total of 317 participants (31 music participants, 286 non-music).

The mean scores of participants receiving instrumental music instruction were compared with the mean scores of participants who did not receive instrumental music instruction.

The author mentions that 'a simple random sampling was applied' but it is not evident what this mean and what this random sampling refers to. It seems that the participants were put forth by each school district.

Impact: No impact

No significant differences between mean scores of instrumental music participants and non-instrumental music participants.

Evidence: weak

- Small sample, especially of music participants.
- A variety of possible confounding variables – baseline equivalence was not established, the quality of music instruction could be different according to teacher, school and district. The allotted time for instrumental music instruction could vary between schools and districts.

10. Chase, R. V. (2012) *Impact of Music Instruction on Social-Emotional Competence.*

3515245 Psy.D., The Chicago School of Professional Psychology, Ann Arbor. (US)

Type of intervention: instrumental music instruction through participation in a band program.

Age of children: 7th and 8th grade – middle school in the US. (secondary)

It was expected that seventh and eighth grade students who receive instrumental music instruction will have higher levels of social-emotional competence than students who are not receiving formalized music instruction.

Sample and data:

Data for 34 7th and 8th grade students from a public middle school located outside a major Midwestern city in the US was collected through a self-report measure (SEARS A – Social-emotional assets and resilience scale-adolescent form). Students surveyed consisted of seven 7th and 8th graders participating in the band program at the middle school and twenty-seven 7th and 8th graders who were not participating in the band program.

Impact: No impact

No relationship was found between band involvement and levels of social emotional competence, as indicated on the Social-Emotional Assets and Resilience Scale-Adolescent Form (SEARS-A).

Evidence: weak

- Small sample size, participants were from one school – threat to external validity. The study makes certain assumptions, for example, that the participants are representative of the overall student population at the middle school or that this particular middle school is representative of other middle schools across the nation or – these are assumptions rather than attempt to provide any evidence.
- Other possible confounding variables: the study did not account for the band students' length of time and involvement in music. In addition, it did not

assess for the non-band students' involvement in other art programs, such as visual art, drama, or dance.

- Therefore, results do not reveal whether or not there are any differences in the levels of social-emotional competence between students who have just joined the band program that year and students who have been playing an instrument for several years.

11. Cochran, K. H. (2009) *The effects of singing and chanting on the reading achievement and attitudes of first graders.* 69, ProQuest Information & Learning. (US)

Type of intervention: singing and chanting integrated with reading in the classroom

Age of children: 1st grade students (US)

Aim: effect of singing and chanting on the reading achievement and attitudes of 1st grade students.

Sample: 23 first grade students. Five first grade classes in the school served collectively as the control group (total of about 100 students).

Research design: mixed methods design - case study of the reading instruction and quantitative data gathered from 1. assessment of students' attitudes toward reading and (ERAS – Elementary Reading Attitude Survey) 2. Reading achievement.

The instruction focused largely on the use of song lyrics and chants instead of basal text.

The STAR Reading Test (Standardised Test of Reading) was administered regularly to the first graders in this school in conjunction with the Accelerated Reading Program, and scores from administrations of the first grade STAR Test from two consecutive school years provided data for comparison of the first grade students' reading achievement.

Impact: positive

The qualitative findings suggest that singing and chanting of text during the Guided Reading Block produced high levels of arousal and, consequently, of engagement among the children, which, combined with the teacher's encouragement and instruction, reciprocally brought about high levels of self-efficacy for reading.

As measured by ERAS, *the attitudes of students* in the experimental class toward reading increased dramatically from the beginning of the year to the end of the year, although there was a decline in attitudes in the middle of the school year.

These children steadily achieved significantly more in their reading skills as measured by the STAR Reading program than all of the other five first grade classes.

Evidence: weak but looks promising as an intervention to teach reading.

- Different teachers taught the different classes, so teacher characteristics and personal attributes could be confounding variables influencing the positive outcome of the intervention.
- Pupils were not randomly selected to participate in the intervention or the classes that acted as the control group (no baseline equivalence established).
- Data from one school present a threat to the study's external validity.

12. Cole, J. M. (2000) *The effects of music type, movement opportunity, and affect induction on the cognitive task performance and mood ratings of African American school children.* 9981746 Ph.D., Howard University, Ann Arbor. (US)

Type of intervention: music-linked movement integrated into learning context

Age of children: 9 & 11 (primary)

Aim: To examine whether music-linked movement incorporated into the learning context enhances cognitive task functioning for African American children. The study attempted to replicate and improve upon findings in the McLean-Cole (1998) experiment. The study sought to re-establish the enhancing effects of high movement opportunity and syncopated music on task performance, and to question whether a learning context with low movement opportunity and non-syncopated music would lend itself to be more facilitating than a learning context with no music or movement altogether. Three learning contexts: high movement/syncopated, low movement/non-syncopated and no music/no movement.

In addition, the study sought to further examine the affective domain by exploring the influence of induced positive affect on elementary school children's cognitive task performance. (for half of the subjects, a positive mood induction was given following each learning context condition, and for the other half, a neutral mood induction was given following each learning context condition.)

Sample: 136 African American elementary school students (64 fourth graders and 72 sixth graders) from two schools in Southern California. Students who participated were from low-income background (participation in free lunch program). Students seem to have been randomly selected but no baseline equivalence was established in terms of ability.

Measurement: A 20-item questionnaire was devised and administered to the students to

specifically assess comprehension and recall of the story content presented during the three learning contexts (two types of cognitive processing: encoding and inference).

A mood questionnaire was adapted from the Profile of Mood States (POMS, 1992).

Finally, there were mood induction conditions (positive, neutral).

Impact: Positive impact in enhancing performance in cognitive task when opportunities for movement and syncopated music were employed in the learning context for fourth grade children. However, a different pattern was found for the enhancement of cognitive task performance for sixth grade children. The data also revealed the facilitating effects of positive affect on cognitive task performance across grade levels.

Evidence: weak

- Results only apply to African American students.
- Baseline equivalence in academic achievement was not established.
- In addition, students could have differed in ability in the three conditions anyway.

The experimenters facilitating the learning contexts were blind to the mood induction assignments and did not administer the mood induction (helped avoid experimenter bias).

13. Costa-Giomi, E. (1999) The effects of three years of piano instruction on children's cognitive development. [Article]. *Journal of Research in Music Education*, 47(3), 198-212. doi: 10.2307/3345779 (Canada)

Type of intervention: piano instruction

Age of children: fourth to sixth grade children

Aim: to investigate the relationship between music and cognitive abilities.

Sample: 63 children receiving piano lessons from fourth to sixth grade (experimental group) and 54 children not receiving piano lessons (control group).

Research design: Baseline equivalence was established at the beginning of the study (There were no differences in cognitive abilities, musical abilities, motor proficiency, self-esteem, academic achievement, or interest in studying piano between the two groups of children at the beginning of the study).

Measurement: Five standardised tests (DCAT, CAT2, Musical Aptitude Profile, the Bruininks-Oseretsky Test of Motor Proficiency, and the Coopersmith Self-Esteem Inventories).

Impact: Positive but temporary

This temporary improvement in cognitive abilities was significant but small. The results of the study show that the treatment improved children's general cognitive abilities and spatial abilities significantly but that these improvements were only temporary. (After 2 years of piano instruction, children in the experimental group obtained significantly higher total scores in the cognitive abilities test than did the children in the control group. The spatial scores of the experimental group were also significantly higher than were those of the control group after 1 and 2 years of individual piano lessons. However, no differences in cognitive abilities were found between the groups after 3 years of instruction).

Possible explanation for this conflicting finding: After 3 years of treatment, 22% of the variance in cognitive improvements of the children receiving piano instruction was explained by their attendance at the lessons and time spent practicing piano. This suggests that children who persisted and participated more actively in the process of learning the piano benefitted to a greater extent than did those less likely to attend the lessons and practice.

Finally, individual piano instruction did not affect the development of children's quantitative and verbal cognitive abilities.

Evidence: moderate - Carefully controlled study.

- Baseline equivalence was established.
- But there was high attrition: A total of 78 children (35 in the control group and 43 in the experimental group) completed all cognitive abilities tests. 11 participants dropped out of the treatment. Further tests showed that there were no differences between the dropout and control groups or between the dropout and experimental groups for any of the DCAT scores. This indicates that the differences between the experimental and control groups are likely due to the treatment. The sample from the school (n = 20) attended by 10 children who dropped out of the piano lessons was not included in the analyses because the preservation of the randomness of the remaining sample was questionable.

14. Costa-Giomi, E. (2004) Effects of three years of piano instruction on children's academic achievement, school performance and self-esteem. *Psychology of Music*, 32(2), 139-152. (Canada)

Type of intervention: piano instruction

Age of children: 9 years old (fourth grade)

Aim: investigate the effects of piano instruction on children's academic achievement, school performance and self-esteem.

Sample: 117 fourth-grade children attending public schools in Montreal (67 children in experimental group; 50 children in control group – children randomly assigned to the two groups).

Research design: Children in the experimental group (n = 63) received individual piano lessons weekly for three years and were given an acoustic piano at no cost to their families. Children in the control group (n = 54) did not participate in formal music instruction. The children had never participated in formal music instruction, did not have a piano at home, and their annual family income was below \$40,000 Can. Baseline equivalence established - To control for differences in academic achievement, self-esteem, musical abilities, motor proficiency, and cognitive abilities between the control and experimental groups, all children were administered a series of tests prior to the treatment. The results of t tests indicated no differences in tests' scores between the experimental and control groups at the beginning of the study.

Impact: *positive impact for self-esteem and school music marks but no impact for academic achievement in math and language as measured by standardized tests and school report cards.*

Evidence: moderate - Carefully controlled study.

However, high attrition (36 dropped out overall): A total of 81 children (35 control, 46 experimental) completed all language subtests of the academic achievement test and 80 children (35 control, 45 experimental) completed all math subtests of the academic achievement test and self-esteem measures. The author tried to preserve the randomness of the sample by excluding pupils from a whole school from the analysis (where 10 pupils dropped out). The author also mentions that there was no indication that those with less academic prowess were the ones who dropped out of the lessons.

In addition, children selected to participate in the study had lower family incomes than the typical piano student and the proportion of single parents and unemployed parents in the sample was much higher than in a nationwide sample of American piano students surveyed by Duke et al. (1997).

Apparently, the contribution of piano instruction to the development of self-esteem is not restricted to the privileged children described in Duke et al.'s study but can also reach those who are less privileged if provided with adequate resources.

- 15. Costa-Giomi, E. (2012)** Music instruction and children's intellectual development: The educational context of music participation. In R. A. R.

MacDonald, G. Kreutz & L. Mitchell (Eds.), *Music, health, and wellbeing*. (pp. 339-355). New York, NY, US: Oxford University Press.

[Book chapter not found in library or the web]

16. Courey, S. s. e., Balogh, E., Siker, J., & Paik, J. (2012) Academic music: music instruction to engage third-grade students in learning basic fraction concepts. [Article]. *Educational Studies in Mathematics*, 81(2), 251-278. doi: 10.1007/s10649-012-9395-9 (US)

Type of intervention: integrated music in school curriculum

Age of the children: 3rd grade children (US)

Aim: The study examined the effects of an academic music intervention on conceptual understanding of music notation, fraction symbols, fraction size, and equivalency of third graders from a multicultural, mixed socio-economic public school setting.

Sample: The participants were 67 third-grade students (ages 8.5–10) from one elementary school in Northern California. The experimental group (N=37) took part in the experimental mathematics instructional program, academic music. The comparison group (N=30) continued regular mathematics instruction with their classroom teachers.

Research design: quasi-experimental comparison group pretest/posttest design. Students were assigned by class to their general education mathematics program or to receive academic music instruction two times/week, 45 min/session, for 6 weeks.

The academic music instruction was delivered by a music teacher and a university researcher. Academic music students used their conceptual understanding of music and fraction concepts to inform their solutions to fraction computation problems. For the instructional intervention, components of the Kodaly system of music education was employed.

It is noted that the two groups had no significant differences in gender composition, ethnicity, age, language or disability status (as shown by chi-square tests). In addition, independent samples t tests comparing the mean scores of the experimental and control group on the CELDT Overall Standard Scores, the CST Language Standard Scores, and the CST Math Standard Scores revealed no significant differences between the groups on academic achievement and English language proficiency prior to the start of the study.

Impact: positive for students' music and fractions conceptions and fraction computation.

Linear regression and t tests revealed statistically significant differences between experimental and comparison students' music and fraction concepts, and fraction computation at posttest with large effect sizes (e.g. ES 1.15 on the fraction concepts posttest). Students who came to instruction with less fraction knowledge responded well to instruction and produced posttest scores similar to their higher achieving peers.

Evidence: weak but shows promise for the use of music to teach fraction concepts in the elementary curriculum. However, there are certain limitations:

- Two experimental and two control groups from the same school with small sample size (67 participants) – threat to external validity.
- No randomisation, assigned by classroom to conditions by the school principal (the two groups were checked for some baseline equivalence).
- Half of the students were ELLs (English language learners), so the results can only be generalised to similar populations. – specific sample characteristics.
- The authors also argue that they cannot be certain that the classroom teachers would obtain similar results if they did not have some music training (so music training of teachers might be required for the effectiveness of the intervention).

However, treatment fidelity was checked (Crucial instructional points from each part of the lesson were identified and described on a fidelity checklist).

17. Cox, H. A., & Stephens, L. J. (2006) The effect of music participation on mathematical achievement and overall academic achievement of high school students. [Article]. *International Journal of Mathematical Education in Science & Technology*, 37(7), 757-763. doi: 10.1080/002077390500137811 (US)

Type of intervention: effect of music participation

Age of Children: high school students (exact age is not known)

A study was conducted on high school students, comparing those with some music credits to those with none. No statistically significant difference was found in their mean math grade point averages (GPA) or their mean cumulative GPAs. Students were then separated into two groups based on the number of music credits. Students who had earned at least two music credits per grade level were placed into Group A. This category included ninth graders with two or more music credits, tenth graders with four or more music credits, eleventh graders with six or more music credits, and twelfth graders with eight or more music credits. The remaining students were placed into Group B. Group A students performed better than group B students. However, the differences were not statistically significant. Scatter plots indicated a slight upward trend in GPAs as the number of music credits increased. Lower GPAs were nonexistent as the music credits increased.

Full article was not available, so the details of the study are not known. It is not evident, for example, what exactly 'music credits' refer to, does it only refer to music in school or does it take account of out-of-school musical experiences too?

Impact: better performance for 'music credit' students but not statistically significant difference.

Evidence: it seems weak – baseline equivalence was established in terms of GPA but other variables, such as group B's out-of-school musical experiences, could have influenced the results of the study.

18. Črnčec, R., Wilson, S. J., & Prior, M. (2006) The Cognitive and Academic Benefits of Music to Children: Facts and fiction. *Educational Psychology, 26(4)*, 579-594.

Type of instruction: Music listening and instruction

There is considerable interest in the potential non-musical cognitive and academic benefits of music listening and instruction to children. This report describes three lines of research relevant to this issue, namely, the effects of: (1) focused music listening on subsequent task performance (the Mozart effect); (2) music instruction; and (3) background music listening.

The main findings can be summarised as follows:

1. The Mozart effect does not appear to be demonstrable in children, and the unreliability of results in adults casts serious doubts over the general validity of this effect. Hence, there arise no direct educational implications from this specific area of research.

2. With regard to music lessons, the only robust finding is a small improvement in spatiotemporal reasoning. This improvement does not routinely translate into academic benefits, although some studies have reported this. At this stage, a plausible explanation for this spatiotemporal improvement is near transfer. It is likely, the authors argue, that providing direct additional instruction in academic skills, particularly in a one-to-one context (cf. Bloom, 1984), may be more beneficial than music lessons.

3. Background classroom music cannot be reliably shown to enhance children's cognitive and academic performance. In contrast, soothing background music in special education settings appears to be effective in focusing children and reducing arousal. Further research is needed to determine whether this effect can be reliably demonstrated in normal populations. The authors conclude that other factors may exert important and more direct influences on educational outcomes, including class sizes and teacher expertise (Ehrenberg, Brewer, Gamoran, & Wilms, 2001).

Impact: No reliable effects on adults, but small effect on spatio-temporal reasoning in young children.

Evidence: No strong evidence as yet. Further research needed

19. Deere, K. B. (2010) *The impact of music education on academic achievement in reading and math*. 3425720 Ed.D., Union University, Ann Arbor. ProQuest Dissertations & Theses Global database. (US)

Type of intervention: music

Age: 4th and 8th grade children (elementary and middle schools in West Tennessee)

Aim of the study: Examined the impact of music education on academic achievement in reading and maths for 4th and 8th grade children in two school systems (one with a music program and one without a music program). It also examined the perceptions of administrators, school board members, and educators in the two school systems.

(Secondary category)

Measurement: A music education survey was sent to the two schools to gain teachers' and administrators' perspective on the importance of music education and whether music instruction positively impact academic achievement, school climate and the learning environment (Research questions 1 and 2). TCAP test (Tennessee Comprehensive Assessment Program Test) data from the 2008-2009 school year from the two school systems in West Tennessee were used to determine if the school system with music education performed higher on the reading and math portions of the TCAP test. The two school systems were selected due to one school system, School System A, having an outstanding music program and the other school system, School System B, not having a music education program in the elementary schools. One elementary school and one middle school from school system A were selected for the study. Two elementary schools (kindergarten through 8th grade) out of School System B were chosen for the study.

Sample: A total of 217 4th grade and 174 8th grade reading and math TCAP scores were used for the comparison in reading and maths.

Impact:

- Positive perceptions of administrators, board members and educators. These did not differ between the two school systems – in both schools music education was perceived as having an impact on student achievement, school climate and the learning environment.
- Positive test findings for school A but not high enough to produce an overall statistical correlation:

- Students in the school system with music education (school system A) reported higher TCAP reading and math scores in the 4th grade. There was a high statistical correlation between music education and reading and math TCAP scores in the 4th grade. However, 8th grade students who have music education only outscored their peers significantly on the reading portion of the TCAP test.

Evidence: weak

Children from two different school systems are compared. We cannot be certain that any positive impact was due to their music education – the children could have differed in other ways, e.g. family background, socio-economic status, other extra-curricular activities and out of school engagement opportunities etc. Any impact is not causal, it just shows a relationship.

20. Degé, F., Wehrum, S., Stark, R., & Schwarzer, G. (2011) The influence of two years of school music training in secondary school on visual and auditory memory. *European Journal of Developmental Psychology*, 8(5), 608-623.

Type of intervention: Extended music curriculum in school

Age of children: 10 years old

[Full article was not found]

The study tested the effect of an extended music curriculum (EMC) for two years in secondary school, consisting of musical instrument, auditory perception, and music theory training, on children's visual and auditory memory. The authors tested 10-year-old children who had just started EMC and children without EMC (T0) in visual and auditory memory and retested the same children two years later (T1) to observe the effects of school music training. Confounding variables, like intelligence, socioeconomic status, extracurricular schooling, motivation to avoid work, and musical aptitude were controlled. Prior to the beginning of the music training no differences in the control variables and the memory variables between children with and without EMC were revealed. Children with EMC improved significantly from T0 to T1 in visual as well as in auditory memory. Such an improvement was not found for children without EMC. We conclude that extended school music training enhances children's visual and auditory memory.

Impact: positive on visual and auditory memory for the children with the extended music curriculum instruction.

Evidence: seems promising but there is not enough information available in terms of the size of the sample, the school setting, the measurement instruments and findings. It might be promising because of the statistically significant improvement reported in the abstract.

21. Degé, F., Wehrum, S., Stark, R., & Schwarzer, G. (2014) Music lessons and academic self-concept in 12- to 14-year-old children. *Musicae Scientiae*, 18(2), 203-215. (Germany)

Type of intervention: music lessons

Age: 12-14 years old

Aim of the study: The study investigated whether the number of music lessons was associated with a child's academic self-concept (related to academic achievement). Sample: The sample comprised 92 12- to 14-year-old children (45 girls) who varied in their musical background.

Measurement and outcomes: Academic self-concept and IQ were measured. Parents also provided detailed demographic background information (including information concerning music education). A hierarchical multiple regression was used in which socioeconomic status (i.e., parents' education), gender, nonmusical out-of-school activities, grade, and IQ were entered on the first step, and months of music lessons were added on the second step.

The criterion variable identified as academic self-concept was measured with a questionnaire (Skalen zur Erfassung des Schulischen Selbstkonzeptes (SESSKO); Schöne, Dickhäuser, Spinath, & Stiensmeier-Pelster, 2002) – it assessed a global estimate of academic self-concept and three specific frame-of-reference estimates of academic self-concept (individual, social, and criterion based). Intelligence was assessed with a short form of the Hamburg-Wechsler-Intelligenztest für Kinder (HAWIK) III (Tewes, Rossmann, & Schallberger, 2000) that consisted of two verbal (vocabulary, information) and two performance (picture arrangement, block design) subtests.

Impact: The multiple regression analysis revealed that music lessons contributed significantly to the prediction of academic self-concept scores and significantly improved the fit of the model. The data indicated a significant positive association between music lessons and academic self-concept - academic self-concept was significantly predicted by the duration of music lessons in months, even when demographic variables and IQ were held constant.

The authors conclude that the results support the idea that music lessons are associated with a personality variable (academic self-concept) that is related to academic achievement.

Evidence: moderate to weak evidence

However, the study is correlational, it does not show the direction of causation. The association between music lessons and academic self-concept could be due to a positive effect of music lessons on academic self-concept,

or it could be due to children with higher academic self-concepts being more likely to engage in music lessons.

- 22. DiEdwardo, M. P. (2005)** Pairing Linguistic and Music Intelligences. [Article]. *Kappa Delta Pi Record*, 41(3), 128-130.

Type of intervention: use of music in the language classroom

[Full article not found – this is not an empirical study. It discusses how the use of music in the language classroom setting can help develop reading, writing and understanding skills]

Abstract

This article describes how music in the language classroom setting can be a catalyst for developing reading, writing, and understanding skills. Studies suggest that pairing music and linguistic intelligences in the college classroom improves students' grades and abilities to compose these statements for research papers in courses that emphasize reading and writing skills. Pairing intelligences extends to motivational issues, comprehension goals, and specific lessons geared to achieving academic success. Rooted in educational theories of multiple intelligence, The Mozart Effect, and cooperative participation, pairing linguistic and music intelligences to improve and develop reading and writing skills is applicable in classrooms of all academic levels and types. Incorporating music that is representative of students' cultures can help them relate to the rhetoric in literary passages they read. Literature can be taught to all ages through music. Pairing linguistic and music intelligences triggers the brain's cognitive functions demanded for reading and writing. The lesson plan, with emphasis on integration, prepares students to read and write in a creatively constructed curriculum that can satisfy requirements and yet be sensitive to critical thinking processes.

This is a discussion paper.

- 23. Dobbs, S., Furnham, A., & McClelland, A. (2011)** The effect of background music and noise on the cognitive test performance of introverts and extraverts. *Applied Cognitive Psychology*, 25(2), 307-313. (UK)

Intervention: Background music on cognitive test performance

Age: Secondary school children

Aim of the study: The present study extends previous research by examining whether or not background noise would prove to be as distracting as music for the performance of introverts on complex cognitive tasks.

Sample: One hundred and eighteen female school children aged 11– 18 took part in the study. Each child completed the EPI (Eysenck & Eysenck, 1968) in order to measure her degree of extraversion.

In three conditions: 1. Silence, 2. Background UK garage music, 3. Background noise,

118 female secondary school students carried out three cognitive tests.

Subjects were randomly allocated to one of three groups and seated so that they could not see any other individual's responses.

IQ scores: Scores from the Middle Years Information System (MidYIS, CEM, 2008) were available for all participants. MidYIS scores are used by schools to predict pupil's future potential and academic performance; in this study, the overall score for each participant was used as a proxy for IQ.

Tests used: The tests were at an appropriate level of difficulty for the sample: (1) Raven's Progressive Matrices (Raven, Court, & Raven, 1992) is a graded test of abstract (perceptual) reasoning. (2) The Wonderlic Personnel Test is a test of general cognitive ability, which had a high correlation with the Weschler Adult Intelligence Scale (Wonderlic Personnel Test Inc., 1992). (3) The verbal reasoning test was compiled from test items presented in Bryon (2006) – antonym identification, sentence completion and grammar.

Impact: negative effect of noisy conditions on the performance of introverts. Performance in silence was superior to performance in simulated office noise; relative to silence, performance with background music was test-dependent.

Under noisy conditions, the performance of extreme extraverts was essentially unaffected, but increase in introversion was associated with a systematic decrease in test performance—with extreme introverts being markedly affected. The results under conditions of music were slightly less clear cut - whilst performance on Ravens and Wonderlic was positively related to extraversion (although the relationship was considerably weaker than in conditions of office noise) there was no relationship between extraversion and performance on the verbal reasoning test.

The authors argue for the detrimental effect of sound (music and noise) on task performance, in comparison to silence.

Evidence: moderate

- Small sample but carefully controlled study.
- MidYIS scores were available to control for ability and participants were randomly assigned into the three different conditions.
- The findings cannot be generalised to males as the sample consisted only of female students.

- Different types of noise (e.g. just irrelevant speech vs. machine sounds) or levels of loudness could have yielded different results.

24. Dryver, H. M. (2012) *The impact of music education on the retention and academic achievement of African American students in the urban public school setting*. 1516884 M.M.Ed., University of Nebraska at Omaha, Ann Arbor. ProQuest Dissertations & Theses Global database. (US)

Intervention: Music education on academic achievement and retention

Age: Cross age

This is a review of literature

Summary:

The purpose of the study was to identify and examine factors that contributed to low participation of African American students in urban music education programs. The study examines related apparent conditions such as, family structure and support, environmental distractions, neighborhood violence, crime, incarceration, low academic achievement and school dropout dilemma. The study draws upon successful school studies that have significantly raised academic achievement through music education programs with at-risk children. The concepts identified through this study identify the cognitive development benefits of music education which recommends to local schools, parents, teachers as well as to administrators the adoption of music education programs as core a subject to better prepare all students for academic leadership in the next generation.

Evidence: weak

The study provides a review of the literature – it is a superficial review in the sense that the 11 research questions are not explicitly discussed in relation to the literature or the research design of the included studies.

25. Duncan, D. J. (2007) *The relationship between creativity and the Kindermusik experience*. Ann Arbor, University of Central Missouri. 1448360: 61. (US)

Intervention: Kindermusik (private music school)

Age: Pre-school

Kindermusik is an international music and movement programme for children from birth to age 7. The curriculum is based on the principles of Suzuki, Kodaly and Orff – famous musicians well known for their individual method of teaching music.

This study examined the effects of using Kindermusik on the creative responses (measured using the Torrance Test of Thinking Creatively in Action and Movement) of 16 infants (age 3 to 6). In this study, Kindermusik children attended weekly sessions of 45 to 75 minutes (depending on age level) lessons for 8 weeks. Control children were taken from day care centres in the same area, matched by age and similar in demographics. The sample consisted predominantly of white children (n=29), 2 orientals and one

Eurasian. There were no black African American or Latinos. All children had some form of exposure to music in the home.

The study reported that compared to a control group of children (n=16), Kindermusik children showed significantly higher scores in originality. Multivariate analyses showed that parental involvement was a significant predictor of all test components except fluency, while participation in Kindermusik predicted originality and total creativity scores.

Impact: Positive impact on creativity and originality

Evidence: Weak

- Small sample (n=32).
- No random allocation of subjects; so cannot be certain that groups would be different since children whose parents sent them to private music school may be inherently different to those who did not or could not.
- Treatment children were predominantly white Caucasian, so the result may not be generalised to disadvantaged groups. However, it would be interesting to test the efficacy on a wider general population of children.
- Treatment children were also those whose parents volunteered to take part in the study. Results may differ from those whose parents did not volunteer. Participants are therefore self-selected.
- Results also indicated that parental involvement was a relatively more important influencing factor.
- The use of significant test is irrelevant in this context given the small and self-selected, non-random sample.

26. Elpus, K. e. u. e. (2013) Is It the Music or Is It Selection Bias? A Nationwide Analysis of Music and Non-Music Students' SAT Scores. [Article]. *Journal of Research in Music Education*, 61(2), 175-194. doi: 10.1177/0022429413485601 (US)

Intervention: Participation in music education on academic achievement

Age: 17 (sophomores)

This study examined the college entrance examination scores of music and nonmusic students in the United States, drawing data from the restricted-use data set of the Education Longitudinal Study of 2002 (ELS), a nationally representative education study (N = 15,630) conducted by the National Center for Education Statistics. Analyses of high school transcript data from ELS showed that 1.127 million students (36.38% of the U.S. class of 2004) graduated high school having earned at least one course credit in music. Sample members were resurveyed in 2004 and 2006. A third ELS follow-up began collecting data in the summer of 2012.

Fixed-effects regression procedures were used to compare standardized test scores of these music students to their non-music peers while controlling for variables from the domains of demography, prior academic achievement,

time use, and attitudes toward school. (sample membersime use, and entrance exam scores as reported by the Educational Testing Service or ACT, Inc., a continuous measure of SES, race and ethnicity, family composition (single- vs. dual-parent household), academic achievement as measured by an ELS-specific standardized test, academic achievement as measured by grade point average (GPA) in each high school grade, and a host of self-reported time use and attitudinal measures related to school engagement. Official high school transcripts were also used to identify the music students in the sample).

Impact: no impact

Results indicated that music students did not outperform non-music students on the SAT once these systematic differences had been statistically controlled. The obtained pattern of results remained consistent and robust through internal replications with another standardized math test and when disaggregating music students by type of music studied.

Evidence: medium to weak– representative large sample with carefully controlled confounding variables.

27. Fisher, D. (2001) Early language learning with and without music. [Article]. *Reading Horizons*, 42(1), 39-49. (US)

Type of intervention: music instruction integrated in the language curriculum

Age: Kindergarten

Aim of the study: to investigate the impact of music instruction on early language learning.

Sample and Research design: Participants came from one urban elementary school. All students in this school qualified for free or reduced lunch and 45 percent of the students participated in bilingual education programs.

Of the 160 kindergarten students who enrolled in bilingual classes, 80 students were randomly selected for participation in this study. All of the students spoke Spanish at home and qualified for free lunch. Each student was randomly assigned to one of four classroom teachers.

None of the teachers played an instrument at home, but each had taken a three unit music education class as part of her preservice credential program.

Each teacher maintained her students for two full years through kindergarten and first grade.

Each of the four teachers implemented the three-hour literacy block consistent with the district framework. The literacy block was divided into

read aloud, guided reading, writing, independent reading, and working with words. Two of the teachers used music as an instructional material during the literacy block while the other two did not. The two who did not use music did not have CD players in their classrooms and used the tape recorder for playing books on tape. All four teachers planned together and aligned their curriculum so that they were teaching the same thematic units at the same time.

Measurement: *Reading achievement assessments* (at the beginning of kindergarten and toward the end of first grade in April (19 months between the initial and final assessment)).

Students were given the Student Oral Language Observation Matrix [SOLOM] (California Department of Education, 1981), the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1995), and the Developmental Reading Assessment [DRA] (Beaver, 1997).

Classroom observations conducted in two of the classes each week, one class that used music and one that did not. Each classroom was observed twice per month over the 19 months of the study. The observations were unannounced and occurred during the literacy block of time and typically lasted between 60 and 100 minutes. Field note forms (LeCompte & Preissle, 1993) were used to create a record of classroom events and conversations.

Impact: Literacy achievement data suggests that music had a positive effect on oral language and reading scores. Differences focused on the use of music for morning opening, music and signing while working with words, and the use of music during listening stations. The two classes in which music was used consistently had a low buzz of student talk, general excitement about school on the part of the students, and students were often observed humming along as they worked. In addition, the two teachers who used music in their classroom reported that music helped them maintain their enthusiasm and demeanour. The two classrooms in which music was not part of the instruction were consistently more quiet and reserved.

Evidence: weak/moderate

Variables held constant for two years included the teachers, the students, the curriculum, the teaming structures, and the socio-economic environment.

However, teacher rapport with students and the climate that is created is difficult to control. It may be that the teachers' personalities played a significant role in the outcomes of the study.

In addition, there could have been diffusion of effects as all classes were in the same school and all four teachers worked closely together.

28. Fitzpatrick, K. R. (2006) The effect of instrumental music participation and socioeconomic status on Ohio fourth-, sixth-, and ninth-Grade proficiency test performance. [Article]. *Journal of Research in Music Education*, 54(1), 73-84. doi: 10.1177/002242940605400106 (US)

Type of intervention: Instrumental music participation

Age: 14-17 (high school students)

This study is a comparison of the Ohio Proficient Test (OPT) results of instrumental music students and their non-instrumental classmates according to socioeconomic status (free or reduced lunch status) over time. Subjects (N=15,431) were students in the Columbus Public Schools in Ohio, whose fourth-, sixth-, and ninth-grade OPT results were compared with others of like SES on the subjects of citizenship, math, science, and reading. (The study is an examination of the OPT results of the entire 2003-04 Columbus Public Schools high school student population).

Instrumental music students (N=915) were defined as those high school students who were enrolled in a band, orchestra, or jazz ensemble during the 2003-04 school year.

Impact: positive

Results show that instrumental students outperformed non-instrumental students in every subject and at every grade level. Instrumental students at both levels of SES held higher scores than their non-instrumental classmates from the fourth grade, suggesting that instrumental music programs attract higher scores from the outset of instruction. Results also show a pattern of increased achievement by lower SES instrumental students, who surpassed their higher SES non-instrumental classmates by the ninth grade in all subjects.

Evidence: weak

There is a large sample size and controlled SES. However, there could have been an achievement advantage in favour of the instrumental students prior to their initial enrolment in the band (initial ability did not seem to have been accounted for). In addition, the definition of instrumentalists in this study would not account for those children that were learning an instrument at home but did not take part in a band, orchestra or jazz ensemble – this could have confounded the results.

29. François, C., Chobert, J., Besson, M., & Schön, D. (2013) Music training for the development of speech segmentation. *Cerebral Cortex*, 23(9), 2038-2043. (France)

Type of intervention: music instruction – not evident whether it was in school time or out of school hours.

Age of children: 8 years old

Aim of the study: examine the influence of music training on speech segmentation.

Sample: 24 8-year old children

Research design:

In the first “test session”, 24 8-year old children listened to 5 min of an artificial sung language (Schön et al. 2008) built by random concatenation of 4 trisyllabic meaningless pseudo-words. After this familiarization phase, children were presented with 2 spoken items and had to decide which item sounded more familiar (32 trials). All items in the test were spoken and not sung. Both EEG and behavioral responses were recorded during the task. Children were then pseudo-randomly assigned to 2 training groups (controlling for age, school level, sex, socio-economic background, and musical expertise and for the level of performance in several neuropsychological tests assessing reasoning, memory, and attentional processing). One group of children took music and the other painting classes for 45 min, twice a week in year 1 and once a week in year 2. “Test sessions” 2 and 3 were identical to “test session” 1 (T0) and took place approximately after 1 and 2 years.

Two teachers professionally trained in music or painting were specifically hired for this project. Music training was based on a combination of Kodaly and Orff approaches.

The teaching activity was coordinated by the research group and care was taken to ascertain that both groups were similarly motivated and stimulated.

Impact: positive

Children with musical training improved their speech segmentation abilities while children in the painting group did not. Moreover, while the electrophysiological responses were different for familiar and unfamiliar words in both groups, this difference was greater in the music group than in the painting group.

The results show that music training directly causes facilitation in speech segmentation, pointing to the importance of music for speech perception and more generally for children’s language development. Finally, the authors argue that the results have strong implications for promoting the development of music-based remediation strategies for children with language-based learning impairments.

Evidence: moderate.

- Small sample size but carefully controlled experiment
- Shows promise in musical training facilitating speech segmentation for young children.

30. Garrett, M. L. (2009) *An examination of critical thinking skills in the high school choral rehearsal.* 3385254 Ph.D., The Florida State University, Ann Arbor. ProQuest Dissertations & Theses Global database. (US)

[This study does not seem particularly relevant as it investigates the time spent in engaging choir members in critical thinking skill rather than measuring the development of critical thinking skills]

Aim of the study: The purpose of the study was to examine the relationship between time spent in non-performance and critical thinking activities in high school choral rehearsals.

Sample: Participants included three high school chorus directors identified as master teachers using specific criteria.

Research design:

Three unscripted rehearsal samples were video recorded from one beginning level choir and one advanced choir from each participant's school. Based on a model used by Watkins (1993, 1996), observed rehearsal behaviors were coded into three categories of non-performance activity: lower order thinking, critical thinking, and nonspecific activity. Time spent in student performance was also recorded. Anderson and Krathwohl's revised Bloom's taxonomy (2001) served as the basis for defining lower order cognitive processes (remember, understand, apply) and processes used in critical thinking (analyze, evaluate, create).

Results indicated that participants spent an average of 45.94% of rehearsal time in student performance. Of the mean rehearsal time spent in non-performance activities (53.89%), 45.96% was spent in teacher-student interactions focused on lower order thinking skills, 6.36% was spent engaged in critical thinking skills, and 1.57% was spent in nonspecific activities including off task behavior and silence. *A significant, strong positive correlation was found between the amount of time spent in non-performance activities and time spent engaged in critical thinking skills.*

31. Ghasemtabar, S. N., Mofidi, F., Mohammadi, A. Z., & Ghasemtabar, S. A. (2011) Effectiveness of music training on preschoolers' learning of basic mathematical skills. *Journal of Iranian Psychologists*, 7(27), 245-254. (Iran)

Intervention: Music training on maths skills

Age: Pre-school

[Full article not found]

Abstract:

This study aimed to investigate the effectiveness of Orff music training on the preschoolers' learning of basic mathematical skills. Using convenience sampling method, 30 year old children (16 females and 14 males) with an intelligence quotient ranges of 110-130 were selected and examined in an intervention group and a control group. The intervention group received Orff music training two hours a week for three months. The Assessment of Basic Mathematical Skills Scale for Children (Kohansedgh, 1997) were then administered to both groups. Covariance analysis indicated that Orff music training increased the learning ability of preschoolers in classification, similarities/differences detection, conservation of numbers, and geometry skills. No significant difference was found between the two groups in seriating skill. The results were discussed in terms of the effect of music training on learning of basic mathematical skills of children. (PsycINFO Database Record (c) 2012 APA, all rights reserved). (journal abstract)

Impact: positive impact on preschoolers' learning ability in classification, similarities/differences detection, conservation of numbers and geometry skills

Evidence: weak due to the small convenience sample - Selection bias threat Children seemed equivalent in terms of IQ range but no more information is available as to other sample characteristics.

32. Gill, A., & Rickard, N. (2012) Non-musical benefits of school-based music education and training. In N. S. Rickard & K. McFerran (Eds.), *Lifelong engagement with music: Benefits for mental health and well-being*. (pp. 57-72). Hauppauge, NY, US: Nova Science Publishers. (Australia)

[Full book chapter not found]

Abstract:

Music training has been associated with a range of academic, cognitive and psychosocial benefits. These non-music benefits are often used to justify the importance of maintaining music education within a 'crowded' school curriculum. However, most of this type of research into music education has focussed on extra curriculum music training which typically involves expensive, one-on-one tuition rather than examining the effects of classroom-based group music that would normally occur within the school curriculum. Consequently it is unclear whether a school-based approach to music education can impact student learning in the same way. ***A critical review of the limited research into school- or class-based music training finds a number of methodological and design limitations and thus minimal***

experimental evidence to support the impact of school-based music training on student learning outcomes. However, there are some indications that school-based music may benefit the development of literacy, numeracy and verbal memory skills and may be a promising intervention for 'at risk' students. This highlights the need for more rigorous empirical research in this area, especially at the secondary school level, in order to reliably inform key educational decisions regarding the role of music education within schools. (PsycINFO Database Record (c) 2014 APA, all rights reserved).
(chapter)

33. Gleason, H, B. P. (1995) *The effects of beginning band instruction using a comprehensive, multicultural, interdisciplinary method on the knowledge, skills, attitudes, and retention of sixth-grade students.* (US)

Type of intervention: school-based band instruction

Age: 11 years old (6th grade)

The purpose of the study was to examine the effects of beginning band instruction using a comprehensive, multicultural, interdisciplinary (comprehensive musicianship) method on the knowledge, skills, attitudes, and retention of sixth-grade students.

Design: Post-test only control group design. The sample consisted of 134 sixth-grade students who were randomly enrolled in two sections of beginning band in a large midwestern middle school. Both experimental ($n = 67$) and control ($n = 67$) groups received performance instruction from one band director using Standard of Excellence (Pearson, 1993 – according to the published, it is the most comprehensive instructional band method available).

The experimental group received instruction using the complete method. This involved performance instruction interjected with components of comprehensive musicianship, multiculturalism (music from Europe, Asia, North and South America) and interdisciplinary study. The interjections involved workbook assignments and class lessons from the teacher's manual. The control group received instruction minus the interjections-i.e. a traditional performance-based method.

Three achievement measures, two performance measures, two attitudinal measures and a measure of retention served as the dependent variables. All subjects in both groups completed questionnaires soliciting information on musical background. Student dropouts from both groups completed exit questionnaires.

Most research questions were relevant to musical outcomes – there were three components of general knowledge (world history, world geography and foreign language) and a component of students’ attitudes to multiculturalism that are relevant to non-musical outcomes.

Impact: no impact

Non statistically significant differences between the two groups in music history, music theory and general knowledge achievement, individual and group performance skill, and attitude.

A significant difference was found in favour of the control group for attitude as measured by self-esteem of musical ability ($p < .005$). A chi-square test revealed a significant difference for retention between the two groups in favour of the control group ($< .05$).

Evidence: weak

- There was no baseline equivalence established using a pretest – the two groups could have differed to start with even though it is noted that they were all beginners in band work. However, they could have differed in their prior musical experiences and ability – a questionnaire was administered to gather information on participants’ musical background but this did not affect the consistency of the two groups. In fact, the author mentions that the two bands were not of equal temperament; the control group was more mature, more cooperative, and took direction better than the experimental group (possibly due to their richer musical background).
- Small number of participants (67 in each group) and all participants are all from one school – threat to external validity.
- There was also higher attrition in the experimental group. However, exit questionnaire responses reflected little relationship to the treatment.

34. Gooding, L. F. (2010) *The effect of a music therapy-based social skills training program on social competence in children and adolescents with social skills deficits.* 3415221 Ph.D., The Florida State University, Ann Arbor. (US)

Type of intervention: music therapy-based intervention in three different settings

Age: 11-16

The purpose of this study was to examine the effect of a music therapy-based intervention program on improving social skills competence in children and adolescents with social skills deficits. Three separate studies were conducted in educational, residential and afterschool care settings to test the effectiveness of a five session social skills training curriculum. Music-based interventions, which were primarily active in nature, were presented in a cognitive-behavioral group format. Specific deficits in the areas of peer relations and self-management skills were targeted. Interventions included a

variety of techniques such as music performance, movement to music and improvisation. Data were collected from the participants, from appropriate adult personnel and via behavioral observations before, during and after music therapy intervention.

Participants (n=12) in the first study were children aged 11-16 years in an educational setting. All participants were diagnosed with learning disabilities, Attention Deficit Hyperactivity Disorder (ADHD) and/or Asperger's Syndrome. Participants in the second study (n=13) were children aged 8-17 years in a residential treatment program. These participants were victims of abuse and neglect and had been diagnosed with Post Traumatic Stress Disorder, ADHD and/or anxiety disorders. All participants were unable to function within the community. Participants (n=20) in the third study were children aged 6-11 years who attended an inner-city after-school care program. Participants for this study included a mixture of typically developing children and children with generalized social, conduct and/or behavioral deficits.

The first study, which took place in an educational setting, used a one-group pretest posttest design. The dependent variables were:

- Teacher ratings of the participants' social functioning via a researcher-created social skills rating system;
- subject self-report ratings of social functioning using Likert-type ratings;
- researcher ratings of social functioning using Likert-type ratings;
- behavioral observations of on-task social behaviors in group sessions.

Results indicated a significant difference for subject self-ratings from the first to fifth sessions and a significant difference for researcher ratings from the first to fifth sessions. Additionally, significant increases were found in on-task behavior, while significant decreases were found in both on-task prompted behaviors and off-task behaviors. Teacher ratings of social functioning supported improved social competence but did not show significant improvement from pre to post treatment.

The second study occurred at a private residential treatment program. A one-group

pretest-posttest design was used at this site. Dependent measures included:

- Subject self-reported social functioning using the Social Skills Assessment—Adolescents;
- subject peer-reported social status via an adapted sociometric scale;

- staff social competence ratings via the Home and Community Social Behavior Scales—Social Competence and Antisocial Subscales;
- behavioral observations of on-task social behaviors in group sessions.

Results indicated a significant difference for the case manager’s pre and post treatment ratings on the Antisocial Subscale of the Home and Community Social Behavior Scales; however, no significance was found for the Social Competence Subscale. A significant difference for the behavioral observations was also found. No significant differences were found for either of the subject measurements (Social Skills Assessment—Adolescent or the Sociometric Scale), but both measurements did support improvements across time.

The third study occurred at an inner-city after-school care program. A pretest-posttest control group design was used for this study with participants randomly assigned to either the control or the experimental group. Social skills functioning in the after-school study was measured via:

- Subject self-reported social functioning using the Social Skills Assessment—Elementary Age;
- Staff Social Competence Ratings via the Home and Community Social Behavior Scales;
- Behavior Scales —Social Competence and Antisocial Subscales;
- Behavioral observations of on-task social behavior of the experimental group during treatment.

Results indicated no significant differences for staff ratings of participants’ social competence or antisocial behaviors pre and post music therapy intervention. However, a significant improvement from pre to post treatment in experimental subject self-ratings of social functioning was found, as well as a significant improvement in on-task behavior for the experimental group during music therapy sessions.

Impact: Benefits of the music therapy-based social skills training program were found in all three settings.

Evidence: weak

- There was no comparison group in the first two studies which limits the strength of the findings (we cannot be sure that the benefits observed were the result of the intervention, and not of other factors, such as other learning/social experiences within each particular setting).
- Small sample size in all three studies (study 1: 12 participants; study 2: 14 participants; study 3: 10 participants in the experimental and 10 participants in the control group). Constraints reported include the

difficulty in obtaining parental paperwork, inconsistencies in child attendance, space and time constraints)

- Inconsistent measures of data collection in the three sites which limits a cross-site comparison.
- It is reported that the sample in the third study included a mixture of typically developing children and children with generalized social, conduct and/or behavioral deficits –it is not obvious how different children have been affected by the treatment and, therefore, it is hard to make a judgement about how it would affect different groups of children with varying needs.

35. Gromko, J. E., & Poorman, A. S. (1998) The effect of music training on preschoolers' spatial-temporal task performance. [Article]. *Journal of Research in Music Education*, 46(2), 173-181. (US)

Type of intervention: music treatment engaging children in sensory motor actions in response to music.

Age: 3-4

The purpose of this study is to investigate the effect of music training on preschoolers' Performance IQ using five spatial-temporal tasks from the Wechsler Preschool and Primary Intelligence Scale-Revised (1989), based on commonalities among spatial and musical developmental progressions (Object Assembly, Geometric Design, Block Design, Picture Completion, and Animal Pegs). A music treatment was designed that engaged children in sensory motor actions in response to music and assisted them in perception of and memory for music's tonal contour and rhythmic pulse.

Initial sample: thirty-four preschool children from a private Montessori school in a midwestern city with 17 children in the treatment group and 17 in the control group. After approximately 3 months, two preschoolers dropped out of the treatment group. Before analyses, two children, whose pretest Performance IQ was the same as that of the children who discontinued treatment, were removed from the control group in order to assure matched Performance IQ means at the outset. 30 3- and 4-year-olds completed the study, with 15 in each group. The first author designed and taught the music treatment, assisted by the second author. All children were pretested on the WPPSI-R spatial-temporal tasks in September 1996 and posttested in May 1997.

The results show that when the Performance IQ gain scores (scaled and raw) were regressed on age, the slopes intersected at age 3, suggesting that for

the 3-year-olds in the study, an intellectually stimulating environment results in a gain in the ability to perform spatial-temporal tasks. However, the regressions showed that music training held the gain steady for older preschoolers in the treatment group, whereas without music training, the gains decreased significantly for children in the control group.

Impact: more gain in raw scores for the treatment group than the control group; the music training held the gain steady for older preschoolers in the treatment group.

Evidence: weak, but might be promising:

- The authors note that the results need to be interpreted with caution, given the close disparity between alpha levels for raw and scaled Performance IQ gain scores.
- Small sample size.
- The researcher also delivered the intervention – there might be a conflict of interest.
- The intervention took place in one private educational setting (Montessori school) which may have particular characteristics compared to other educational settings – for example, as the authors note, in this environment all children learn within an intellectually stimulating environment, receive a ‘traditional’ music class for 30 minutes every week and benefit from outside activities provided by their parents – confidence in the results could be strengthened if similar results were found in other types of preschool or daycare environments.
- However, the study shows promise in that both groups were drawn from intellectually stimulating environments and the music treatment group showed a significantly higher mean gain on the Performance IQ (raw), and the gain was held steady across ages within the treatment. Conclusion: Music training may have a positive effect on the development of spatial intelligence in preschool children.

36. Harris, D. J. (2011) Shake, rattle and roll - can music be used by parents and practitioners to support communication, language and literacy within a pre-school setting? *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, 39(2): 139-151. (UK)

Type of intervention: use of music in a pre-school setting

Age: 9 months to 4 years

The aim of this small-scale study was to evaluate whether music could support communication, language and literacy development within a pre-school setting.

The research focused on the involvement of a music specialist who initiated weekly

music sessions over a 20-week period with children aged between 9 months and 4 years and their parents, in a pre-school setting situated in an area of high deprivation in the West Midlands.

During the sessions, children were allowed to explore instruments at their own pace with adults facilitating learning where appropriate. Sessions concluded with a more structured adult-led approach to develop the range of skills previously experienced through child-initiated activities.

The locality in which the research was undertaken was an ethnically diverse area with 17.4% of its population registered as non-White British. The families who attended the pre-school sessions reflected this diversity with five out of the 17 families being of Asian or Asian British ethnicity.

Impact:

Initial interviews with parents indicated that music could be an important vehicle in developing children's social skills. Exit interviews identified that parents' views had changed with the primary benefits being identified as the development of children's musical skills, in particular singing, increased levels of concentration and an improvement in children's speaking and listening skills. Research findings also identified that effective adult-child interactions appeared to be key in fostering language development through music.

Methodology:Case study approach -

Structured interviews using a series of pre-determined open-ended and dichotomous questions allowed for the collection of both qualitative and quantitative data. These interviews were conducted with a total of 17 parents (initial interviews and exit interviews). Key informant interviews were conducted with the music specialist and one practitioner who was observed regularly supporting the music specialist. Observations were undertaken with children who initiated musical exploratory play and subsequently the adults who worked alongside them. Participant observations were also conducted when the focus of the session shifted from child initiated learning to a more structured adult-led approach. An additional method that was incorporated into the study was documentary.

Impact: no conclusive evidence to identify from this small-scale study that undertaking a range of musical activities with a music specialist had specifically developed communication, language and literacy skills in young children. However, the author concludes from the study findings that the involvement of adults was of fundamental importance to the facilitation of language through music sessions, as it enabled parents, the music specialist

and practitioner to introduce specialist musical and non-musical vocabulary, engage children in conversations, encourage the development of listening skills and model language appropriately. Additionally, the high levels of engagement between children and parents acted as a catalyst for the development of non-verbal and verbal communication.

Evidence: weak

- This is a small-scale study which is based on interviews with key stakeholders and observation of the children's engagement with music facilitated by the adult's intervention.
- The study took place in one setting with a small number of participants – it is, therefore, very context specific with the findings being applicable only in this particular pre-school sample group.
- There was no control group – we cannot be certain that it was the inclusion of music, songs and rhymes that led to the perceived benefits on language skills (non-verbal communication, listening skills and vocabulary development). Other factors such as adult attention, general interaction and the children's social involvement could have led to some of these positive findings.

37. Harris, M. (2008) The Effects of Music Instruction on Learning in the Montessori Classroom. [Article]. *Montessori Life*, 20(3), 24-31. (UK)

Type of intervention: Music instruction in the Montessori classroom

Age: primary (exact age not known)

[Full article not found]

This study examined the difference in mathematics achievement scores between Montessori students who received traditional Montessori education and those who received music-enhanced Montessori instruction. Participants were 190 Montessori students with some receiving music-enriched instruction.

Impact: positive

The participants who received music-enhanced Montessori instruction had higher levels of mathematics achievement than those who received conventional Montessori instruction.

Evidence: hard to judge the evidence as the full text was not available

It is not evident how the two groups were selected and whether baseline equivalence was established. It might be that the students receiving the music-enriched instruction had higher maths achievement at the start of the intervention.

38. Hetland, L. (2000) *The relationship between music and spatial processes: A meta-analysis*. Ann Arbor, Harvard University. 9992322: 237-237p. (US)

Intervention: Active participation in music (making music as well as listening)

Age: Primary 3-12

This was a meta-analysis of experimental studies evaluating the effects of active participation in music on spatial reasoning of young children based on studies conducted between 1950 and 1999. For the purpose of this review, we only analyse the results for young children, although the thesis also included studies for college students. The thesis reviewed 15 relevant studies looking into the effects of active music participation on performance of spatial tasks of young children aged 3-12. Typically the studies included in the meta-analyses compared 2 to 4 groups of children aged 3-7. Two studies were for older children aged 8-12. The duration and intensity of music instruction ranged from 4 weeks to 2 years, one to 5 sessions per week, each lesson lasting between 10 and 60 minutes. The majority of these lessons were in group format and involved learning a musical instrument using Orff or Kodaly method of instruction. Control children often either had no music instruction or were given an alternative programme. In one of the studies, control children had instruction on spatial-temporal reasoning or language instruction but without the music component. Spatial-temporal ability was measured primarily using the Object Assembly subtest of the WPPSI-R. Analyses were also conducted on 3 studies that used the Raven's Standard Progressive Matrices (RSPM) – a non-verbal assessment of general and logical intelligence. The author conducted a range of analyses comparing effects using different measures and different instruments.

Results suggest positive effect on measures of spatial-temporal reasoning (mental manipulation of shapes), but not for the Raven's Matrices tasks. Notation learning was found to enhance the effects. On the other hand, keyboard programmes were not more effective than other forms of active music making. The author cautioned that such effects may just be 'bonus' effects with short term benefits, and no implications for school achievement.

Impact: Positive effect of active music making (regardless of instruments) on children's spatial-temporal ability

Evidence: Weak

- It is not clear what effects such music programmes would have on disadvantaged children. No description of sub-group analyses was mentioned.
- Only in 5 of the 19 studies were the participants randomised to treatment conditions.
- Most of the studies involved very small number of cases. Total sample across the 15 studies was 701 (averaging about 47 cases in each study). Only 6 studies had sample size

between 5 and 70.

- The study also tested and found no evidence of Hawthorne effect (using studies that included control group being given an alternative treatment) and teacher-expectancy effect.
- Given the small number of cases and number of studies, the wide range of outcome measures and instruments, it is difficult to make a convincing conclusion either way.

39. Horton, R. W. (2012) *Differences in academic achievement among Texas high school students as a function of music enrollment*. 3536724 Ed.D., Sam Houston State University, Ann Arbor. (US)

Type of intervention: examine academic impact (reading and mathematics) of music enrolment.

Age of children: grades 10 and 11 in the US (usually second and third year of high school)

The purpose of this study was to examine the score differences on the Texas Academic Knowledge and Skills (TAKS) Reading and Mathematics measures among students in Grades 10 and 11 as a function of music enrollment. Specifically, gender, ethnicity, socioeconomic status, and enrollment in choir, band, or orchestra or no music enrollment were examined.

Participants were over 35,000 students in Grades 10 and 11 from two large (i.e., over 90,000 student enrollment) school districts in Texas. Students were classified as enrolled or not enrolled in high school music courses (i.e., Choir, Band or Orchestra).

In both school districts, music students had statistically significantly higher mean

TAKS Reading and Mathematics scaled scores than did their non-music peers in every category. Of the 28 MANOVAs conducted for students in Grade 10, 25 analyses were statistically significant. Reading and Mathematics scaled scores were compared for music students versus non-music students in the following ways:

overall Grade 10, boys, girls, White Students, Hispanic students, Black students, and students who were economically disadvantaged. Grade 10 univariate ANOVAs revealed statistically significant results for each of the previous seven categories: 18 of the effect sizes were small, and 7 of the effect sizes were trivial.

Results for students in Grade 11 were identical to the results for Grade 10 students. In both school districts, music students had statistically significantly higher mean TAKS Reading and Mathematics scaled scores than did their non-music peers in every category.

Impact: positive

- Grade 10 and 11 music students had statistically significantly higher mean scores in reading and mathematics.

Evidence: moderate

- Large sample size (35,000 students from two large school districts).
- The author cautions against attempting to compare the study's findings to a population outside Texas - Because the standardized test used as a measure of academic achievement in this study was only administered in Texas, convergent validity may be difficult to establish.
- There is also the issue of self-selection. As music was an elective course, students chose to participate in choir, band, or orchestra. Even though caution was taken to ensure that students who may have been enrolled in more than one course (i.e., choir, band, or orchestra) were not represented more than once in the sample, these music students might have been different before their music enrolment – they could have been higher achievers, with more motivating parents, with higher attitudes toward school and learning and with different enrichment experiences outside school. In other words, their music involvement might not be the cause of their higher scores in reading and maths – causality cannot be established.
- Data from only one year were examined; therefore, caution needs to be exercised to avoid the inference of trends from one data snapshot – temporal validity threats.

40. Hudziak, J. J., Albaugh, M. D., Ducharme, S., Karama, S., Spottswood, M., Crehan, E., Botteron, K. N. (2014) Cortical thickness maturation and duration of music training: Health-promoting activities shape brain development. *Journal of the American Academy of Child & Adolescent Psychiatry*, 53(11), 1153-1161.

Type of intervention: Instrumental playing

Age: 6-18

[Full article not found]

Aim of the study: To assess the extent to which playing a musical instrument is associated with cortical thickness development among healthy youths.

Method: Participants were part of the National Institutes of Health (NIH) Magnetic Resonance Imaging (MRI) Study of Normal Brain Development. This study followed a longitudinal design such that participants underwent MRI scanning and behavioral testing on up to 3 separate visits, occurring at 2-year

intervals. MRI, IQ, and music training data were available for 232 youths (334 scans), ranging from 6 to 18 years of age. Cortical thickness was regressed against the number of years that each youth had played a musical instrument. Next, thickness was regressed against an “Age × Years of Playing” interaction term. Age, gender, total brain volume, and scanner were controlled for in analyses. Participant ID was entered as a random effect to account for within-person dependence. False discovery rate correction was applied ($p \leq .05$).

Results: There was no association between thickness and years playing a musical instrument. The “Age × Years of Playing” interaction was associated with thickness in motor, premotor, and supplementary motor cortices, as well as prefrontal and parietal cortices. Follow-up analysis revealed that music training was associated with an increased rate of thickness maturation. Results were largely unchanged when IQ and handedness were included as covariates.

Conclusion: Playing a musical instrument was associated with more rapid cortical thickness maturation within areas implicated in motor planning and coordination, visuospatial ability, and emotion and impulse regulation.

Impact: Positive

Evidence: However, given the quasi-experimental nature of this study, the influence of confounding variables cannot be ruled out. What ‘music training’ consisted of is not known due to the full text not being available.

41. Jaschke, A. C., Eggermont, L. H. P., Honing, H., & Scherder, E. J. A. (2013) Music education and its effect on intellectual abilities in children: A systematic review. *Reviews in the Neurosciences*, 24(6), 665-675.

Intervention: Music education on intelligence

Age: Cross age (aged 4-13)

All randomised controlled studies included in this systematic review concerned the far transfer from music education to other cognitive skills in children aged 4-13 as compared with controls.

The systematic review yielded heterogeneous results and concluded that there is a need to address methodological and analytical questions in greater detail. There is a general need to unify methods used in music education research (the review has shown that a lack of uniform research methods in the study of far transfer from music education makes it difficult to achieve consistent results that can be reliably incorporated into the growing body of knowledge. Additionally, the hypothesis that intellectual skills, such as mathematics, reading, writing and intelligence can be divided into sub-

functions, needs to be examined as one approach to the problems considered.

Reading:

Studies by Tsang and Conrad (2011), Piro and Ortiz (2009), Jentschke et al. (2005) and Rickard et al. (2012) represent the effects on vocabulary in reading. The positive likelihood is close to 0 with $p < 0.05$, while the negative likelihood of the effect of music on vocabulary in reading is represented by an OR (odd ratios) with a probability of $p = 0.279$. A comparable observation can be made concerning measures of phonological awareness (Register, 2001; Tsang and Conrad, 2011; Dege and Schwarzer, 2011b).

Writing:

Studies analysing writing skills yielded contradictory findings. Rickard et al. (2012) have shown a clear negative effect of music on writing, with an OR of 0.378, $p = 0.03$ favouring the non-music intervention group. Register's (2001) data, by contrast, demonstrated a markedly positive effect with a confidence interval of $p < 0.01$.

Language not otherwise specified:

Costa-Giomi's (2004) findings yielded a negative effect on language expression with $p < 0.001$. However, there is no comparable study and the language domain is not further specified.

Mathematics:

The analysis of the transfer from music to mathematical skills appears to be most controversial of all of the fields. The authors argue that the difficulty of analysing transfer from music to mathematics is similar to that where reading is involved, as both target domains have to be divided into sub-groupings. While Rickard et al. (2012) and Courey et al. (2012) show a significant positive effect of music on mathematical skills ($p = 0.076$), Costa-Giomi (2004) showed a negative effect on mathematical computation skills ($p < 0.001$). These differences in results can possibly be attributed to the use of different study designs as well as differences in the tests administered. Furthermore, each study analyses a different subdivision of mathematics, which may be another reason for the differences observed.

IQ:

Of the four studies included, only one (Ho et al., 2003) failed to show a positive effect. The negative effects reported may be due to the type of music intervention involved (general arts involvement, listening, playing

and/or singing). By contrast, the study by Schellenberg (2004) showed a positive effect of music on IQ with $p=0.005$ with two different measures of intelligence: Raven's standard matrices and general (aspecific) intelligence.

The two different results can be attributed to a lack of uniformity in the test methods used. While both studies analyse intelligence, Schellenberg uses an aspecific measure of intelligence, which may have a stronger effect sensitivity in this case and is more liable to yield a positive effect. However, Schellenberg's study, the authors argue, is problematic because the non-music drama intervention group was merged with the no-intervention control group before comparison with the music groups. A direct comparison of the drama group with the music group would likely not have resulted in any significant difference in intelligence.

42. Johnson, C. M., & Memmott, J. E. (2006) Examination of Relationships between Participation in School Music Programs of Differing Quality and Standardized Test Results. [Article]. *Journal of Research in Music Education*, 54(4), 293-307. (US)

Type of intervention: examining the relationship between participation in contrasting school music programmes and standardised test scores.

Age of the children: elementary school - third or fourth grade & middle school – eighth or ninth grade.

The purpose of the study was to examine the relationship between participation in contrasting school music programmes and standardised test scores. Relationships between elementary (third or fourth-grade) students' academic achievement at comparable schools, but with contrasting music programmes as to instructional quality, were investigated. Relationships were also examined between middle school (eighth or ninth-grade) students' academic achievement and their participation in school music programmes that also differed in quality.

Participants (N=4,739) were students in elementary (N=1,119) and middle schools (N=3,620) from the South, East Coast, Midwest, and West Coast of the United States.

All scores were standardised for comparison purposes.

Analysis of elementary school data indicated that students in exemplary music education programmes scored higher on both English and mathematics standardized tests than their counterparts who did not have this high-quality instruction; however, the effect sizes were slight. Analysis of middle school data indicated that for both English and math, students in both exceptional

music programmes and deficient instrumental programmes scored better than those in no music classes or deficient choral programmes; however, the effect sizes were not large.

Impact:

- Positive for English and maths elementary school scores in the exemplary music education programmes, but small effect sizes (approximately 3% of the total differences noted).
- Positive for English and maths middle school scores in the exceptional music programmes and deficient instrumental programmes compared to those with no music classes or deficient choral programmes (but small effect sizes – approximately 6%).

Evidence: moderate (shows a relationship but not causality)

- Large sample size in comparable schools.
- The study examined relationships and not causality – it cannot be claimed that it was the high quality music instruction that led to higher academic achievement.
- However, the authors mention that other variables (particularly socioeconomic status) might have confounded the results.
- In addition, they mention that the data collected were ‘rather simple’ but this allowed them to have a larger sample.
- Another confounding variable might be the vast geographical representation – this meant that different tests were used as dependent measures. The test results were standardized to z-scores but this contains some potential for error and reduces some precision.
- More detail would be needed to ascertain what constitutes an ‘exemplary’ music education programme and a ‘deficient’ programme. It is mentioned that the differences in the music programmes were determined by guidelines established using the National Standards of MENC: The National Association for Music Education but this is not enough for the reader to understand what those differences might be.

43. Kaviani, H., Mirbaha, H., Pournaseh, M., & Sagan, O. (2014) Can music lessons increase the performance of preschool children in IQ tests? *Cognitive Processing*, 15(1), 77-84. (Iran)

Type of intervention: music instruction (Orff music lessons)

Age of the children: preschool children

The focus of the present study was on investigating the effects of music instruction on the cognitive development of preschool children. From a sample of 154 preschool children of Tehran kindergartens, 60 children aged between 5 and 6 were randomly assigned to two groups, one receiving music lessons (standard Orff music lessons) and the other (matched for sex, age and mother’s educational level) not taking part in any music classes – *experimental design*.

Children were tested before the start of the course of music lessons and at its end with 4 subtests of the Tehran-Stanford-Binet Intelligence Scale (TSB). The experimental group participated in twelve 75-min weekly music lessons. None of the children in either group had any previous music education, either formally (courses) or informally (by family members, friends, etc.), as self-reported. In addition, no children in either the experimental or control group were involved in any other music education during the course.

Statistical analysis showed significant IQ increase in participants receiving music lessons, specifically on the TSB verbal reasoning and short-term memory subtests. The numerical and visual/abstract reasoning abilities did not differ for the two groups after lessons.

Impact: positive

- Significant IQ increase, specifically on the TSB verbal reasoning and short-term memory subtests; no impact on numerical and visual/abstract reasoning abilities.

Evidence: weak, shows promise

- Small sample size but
- Some potentially confounding variables controlled for (e.g. any other music education before or during the intervention; age, sex, mother's education). However, other activities such as sport participation or better educational experiences (such as better teaching) or increased self-esteem perhaps due to group musical training could have influenced the results.
- Another intervention group attending one alternative, non-music training course (e.g. exercise, drama or dance) would help separate the possible effects of non-specific factors, such as group activity, social learning and the emotional experience of being with a peer group.

44. Kelstrom, J. M. (1998) The untapped power of music: its role in the curriculum and its effect on academic achievement. [Article]. *NASSP Bulletin*, 82(597), 34-43.

[This is a discussion paper on the role of music in the curriculum and its effect on academic achievement. Most cited studies are written before 1995]

45. Kingsriter, M. G. (1998) *The effects of instructional methods and materials which integrate music and literacy on reading attitudes and interests of second graders.* 9901252 Ph.D., University of Missouri - Columbia, Ann Arbor. (US)

Type of intervention: music elements integrated into literacy lessons

Age of the children: second grade children (elementary school)

This study involved two second grade classes in an elementary school located in a mid-sized midwestern city. The purpose of the study was to determine whether there is a relationship between student and elementary school music an addition of music to literacy lessons.

Sample: Two second-grade classes (total of 30 children). The children were randomly assigned to the experimental and control group.

The study design included measuring students' literacy through the use of McKenna and KearKe (1990) Elementary Reading Attitude Survey. The survey was first given as a pretest to determine student students a attitudes toward reading. It was followed by eight weeks of literacy instruction where half of the participants were also presented with various music elements integrated into the literacy lessons. A posttest using the survey was then administered when the lessons were completed.

Although no statistically significant difference was found between the groups studied, the investigator was able to observe certain affective results:

The students in the treatment group, which included the integration of music, entered the classroom more eagerly and settled down much more quickly than the control group. They showed interest by asking questions about what was to come in the lessons, in relationship to both music and reading, and were more attentive to the teacher and to the materials being used. They demonstrated greater creativity and worked more quickly with fewer disruptions. They also were more amiable with fellow students in cooperative learning groups and more expressive in their oral reading.

Impact: no difference between the two groups

Evidence: weak

- Small sample size and drawn only from one elementary school – not possible to generalise to another setting or larger population (threat to external validity).
- Baseline differences in participants' characteristics (ability, attitudes, motivation to learn etc.) could have confounded the results of the study.
- The aforementioned positive affective results noted by the investigator were based on classroom observations rather than resulting from systematic measurement and rigorous data analysis. Therefore, even though they are interesting, they are not valid research findings.

46. Kurt, J. T. (2011) *Factors affecting literacy achievement of eighth grade middle school instrumental music students.* 72, ProQuest Information & Learning. (US)

Type of intervention: examining a possible association between students' literacy achievement and participation in instrumental music.

Age of the children: eighth grade middle school instrumental music students

Study design: pretest-posttest comparative efficacy study

The purpose of this study was to analyze factors affecting literacy achievement of eighth grade middle school instrumental music students ($n = 38$) including (a) socioeconomic status (SES), (b) gender, (c) grade point average (GPA), (d) music motivation, (e) music involvement, and (f) instrument section.

The findings of this study indicate that, utilizing the Iowa Tests of Basic Skills (ITBS) reading comprehension, reading vocabulary, and science subtests and the Northwest Evaluation Association (NWEA) Reading Measure of Academic Progress (MAP) as the dependent variables for each of the six independent variables, significant growth over time was made in each of the measures among all the groupings.

The results of the repeated measures analysis of variance statistical tests indicate that there is an association between students' literacy achievement and participation in instrumental music. The findings from this research demonstrate that students who are actively engaged in music learning benefit from it and suggest that participating in music instruction also affects cognitive functions that influence other disciplines.

Impact: positive association between students' literacy achievement and participation in instrumental music.

Evidence: weak

- The sample is confined to eighth grade students enrolled in one middle school during one particular school year (2009-2010).
- The sample is very small ($N=38$).
- Instrumental music students were defined as only those students who were enrolled in the formal instrumental music program, limited to band, during the 2009-2010 school year. Instrumental music students who received out-of-school instruction from a private instructor were not considered in this study.
- There was no comparison group – all participants were instrumentalists. It is impossible to say whether the association found between students' literacy and participation in instrumental music is due to their musical involvement and not to other confounding variables, such as other extra-curricular involvement or developmental reasons etc.

47. LaCour, A. (2010) *Correlation between music programs and student test scores in elementary schools.* 3435257 D.M., University of Phoenix, Ann Arbor. (US)

Type of intervention: examine a possible association between school music programmes and student test scores in elementary schools.

Age of the children: grades 3 and 5

The relationship between student performance on the Texas Assessment of Knowledge and Skills (TAKS) test in reading, science, and mathematics and the availability of a music program in elementary schools was examined. The theoretical framework of the study was Gardner's theory of multiple intelligences. The total TAKS scores of students in elementary schools with music programs were compared with the total TAKS scores of students in elementary schools without music programs. The sample of the study consisted of 25 elementary schools providing a music program and 25 elementary schools providing no music program. The data were collected for the academic school year 2007-2008 and analyzed using analysis of variance.

Impact: no impact

- Students in schools with music programs do not achieve higher scores on standardized tests in the subject areas of reading, science, and mathematics than students in schools without music programs.

Evidence: weak

- The study was geographically limited to elementary schools in southern Texas – cannot be generalised to other geographical areas.
- The data were limited to the 2008 TAKS test scores of elementary schools.
- TAKS test scores were collected for all third and fifth grade students within the schools but the total number of participants is not clear.
- There were changes in school personnel that created inconsistencies in the quantity and quality of instruction. These inconsistencies may have affected the reliability of the assessment and the internal validity of the research study.
- The author notes that the identification of a school as having or processing a music programme was based on a website which was not verified – this provides a real threat to the internal validity of the study. Any detail on what these music programmes might consist of is missing.

48. Lu, C.-I. (2002) *The effects of creating activities on the learning of selected musical concepts and students' learning attitudes.* 3044164 Ph.D., University of Illinois at Urbana-Champaign, Ann Arbor. (Taiwan)

Type of intervention: integrating creative musical activities in school music education

Age of the children: seventh grade participants (1st year in junior-high in Taiwan)

This study investigated the effects of creative musical activities on Taiwanese students' learning of musical concepts. The methodology was a quasi-experimental, pretest-posttest control group design, which employed a random assignment to one of three instructional approaches of three pre-existing intact classes from each of two participating music teachers.

The first approach incorporated creating, listening, moving, performing, analyzing, and reading activities. The second approach incorporated similar activities except for the creating activities. The third approach was a traditional one and functioned as a control for the experiment.

A total of 206 seventh-grade participants received music instruction for six weeks, two 45-minute sessions per week. Students received music instruction for six weeks. Skills to analysing music were assessed through a pre- and posttest of listening. Results showed that creating activities in the first approach significantly developed participant's recall musical abilities and their ability to apply learned skills to analysing music in both males and females. The second approach improved only female students skills to analysing music on for six weeks. Students taught by the traditional approach did not improve either of the recall or application abilities. Creating activities increased students to analysing music on for six weeks, significantly contributed to students to studentseased students to analysing music on for six weeks.

Impact: positive for the group participating in creating activities.

Evidence: This study refers to the development of musical skills (musical concepts and learning attitudes to music) and does not examine the development of extra-musical outcomes. So, it is an interesting study that contributes to acknowledging the importance of musical creativity in the Taiwanese context, but it is outside the scope of our review.

49. Lyons, L. M. (2009) *The integration of music with reading concepts to improve academic scores of elementary students*. 69, ProQuest Information & Learning. (US)

Type of intervention: integrated music curriculum

Age of the children: 2nd grade students

The purpose of this research was to investigate the effect of an integrated music curriculum on reading achievement. The curriculum was delivered, via recorded DVD lessons, to 49 second graders. The majority of the students participating in the study were either Caucasian (50%) or Hispanic (37.5%).

Research design: The specific approach was quasi-experimental, with a control group used for comparison of pretest to posttest changes in reading scores. One class received the intervention, and one was designated as a wait-list control group which received the intervention during the second half of the semester. This design allowed all students to receive the intervention and added to the sample size ($N = 56$), thereby increasing the power of this research. A nationally-normed, standardized reading achievement test, the

Predictive Assessment of Reading (PAR), administered before and after each intervention, was the primary instrument used to assess gains in reading achievement levels.

Findings: A comparison of pretest -posttest gain scores revealed that students in the intervention groups, on average, scored significantly higher on all six subtests of the posttest. In addition, there was a statistically significant difference between the control group and the combined intervention groups on the gain scores of one subtest. Simple effects post hoc analyses also revealed that Hispanic students in the intervention groups had significantly higher picture recognition gain scores than Hispanic students in the control group.

Impact: positive effect on all six subtests of the posttest for the intervention group

Evidence: weak

- Small sample size drawn from one school (threat to the external validity of the investigation).
- No random assignment of participants (but the school chosen had near-random assignment of students at the beginning of the school year).
- Baseline equivalence could not be ensured due to the non-random allocation of participants – therefore, other confounding variables cannot be excluded.
- There was high attrition (N=56 participants out of a total of 70 including the wait-list group who subsequently received the intervention).
- The investigator argues that one advantage to using recorded lessons is the consistency of the music performance and the explicit teaching, which reduces variance due to differences in teaching styles and delivery of lessons. However, a disadvantage is that some portions of the lessons require interaction with the performer, e.g. in composing activities. The reproduction of such interactive activities did not have the richness or complexity of a live quintet working with the students on their compositions. Differences between the two teachers (in the experimental and wait-list group) are also reported in how they facilitated the lesson on the basis of the material presented in the DVD.

50. Manes, T. M. (2013) *Critical thinking explored through music compositions of sixth grade general music students.* 1537091 M.M.E., Arkansas State University, Ann Arbor. (US)

Type of investigation: integration of music composition in school music classes

Age of participants: sixth grade

The purpose of this quasi-experimental school setting study was to examine critical thinking in sixth grade general music students through their music compositions as measured through a critical thinking test. Through the use of the Cornell

Critical Thinking Test Level X, scores were compared between the treatment (music composition work based on Kratus' compositional processes –

improvising on Orff instruments) and control (regular music classroom curriculum) groups.

The participants were a convenience sample of approximately 193 students in 8 classes from a public school in the South of the United States. Each class contained a range from 27-30 students and was required to participate in music 50 minutes for five consecutive days, after which students would rotate to other classes such as physical education, art, and technology. Each class was randomly assigned to four groups:

(1) Experimental Group A (Pre/treatment/post, 48 students); (2) Control Group B (pre/post, 44 students); (3) Experimental Group C (treatment/post, 54 students); (4) Control Group D (post, 47 students). (Solomon four-group design)

Impact: lack of statistical evidence in favour of the treatment – critical thinking skills were developed in both treatment and control classes.

Evidence: weak

- The sample was a convenience sample which did not involve random allocation of the participants for experimental purposes.
- Group A had the lowest pretest and posttest scores – this was a strange finding which the investigator tried to explain: the two Group A classes were taught on separate weeks within the study so potential confounding variables associated with current happenings within the school/community environment were different.
- There was no comparison group with no music involved. Both treatment and control classes involved music, so it would be hard to judge whether the presence of musical activity had an effect (it was more the type of music used that was tested, and this did not show a significant difference).
- Lack of generalisation to other settings
- Limitations about the use of the CCT-X were noted by the authors, such as shortcomings in finding adequate information over validity and reliability and that open-ended responses to each question as suggested by Norris (1989) were not added in this study. The pre and post-treatment administration of the CCT-X took place only after 5 weeks which may have affected participants' ability to respond.

51. McDonel, J. S. (2013) *Exploring the relationship between music learning and mathematics learning in an interdisciplinary Pre-K curriculum.* 3598710 Ph.D., State University of New York at Buffalo, Ann Arbor. (US)

Type of intervention: interdisciplinary pre-K curriculum infused with music instruction

Age of children: pre-school children

The purpose of this study was to examine children music instruction learning in an inter as they participated in an interdisciplinary pre-K curriculum at a university-based Early Childhood Research Center (ECRC). The curriculum was

infused with weekly music instruction by a music specialist, and reinforced by early childhood specialists.

A non-experimental mixed-methods research design was employed: One intact class of 14 preschool children (8 three-year old, 5 four-year old, and 1 five-year old children) were observed at predetermined points throughout the Spring 2012 semester through participant observation and video footage of music classes, math activities, and other times where music was used in the curriculum. Interventions for classroom and music teachers were intended to foster developmentally appropriate practice in music and mathematics. Music aptitude and pre- and post-test measures of early music rhythm achievement and early numeracy achievement were correlated to embed a quantitative dimension.

Impact:

- Limited quantitative evidence was found regarding the relationship of early rhythm and early mathematics development.
- The authors argue that on the basis of this study, it cannot yet be concluded that a relationship exists between early rhythm achievement and early numeracy achievement.
- There were three qualitative themes that emerged from the analysis: *community of learning and sharing*, *expanded social conventions* and *reinforcement of learning*.

Evidence: weak

- Very small sample (14 children).
- One educational setting – threat to external validity.
- Convenience sample – the author acknowledges that there was a certain bias in the population of children at the ECRC – nearly half of these children had one or more parents who were either faculty or students at UB and chose the ECRC because they were looking for cutting-edge educational experiences for their children.
- No control group – any observed impact cannot be attributed to the music treatment.

52. Miksza, P., & Gault, B. M. (2014) Classroom Music Experiences of U.S. Elementary School Children: An Analysis of the Early Childhood Longitudinal Study of 1998–1999. [Article]. *Journal of Research in Music Education*, 62(1), 4-17. (US)

Type of intervention: Music experiences in the classroom

Age: longitudinal study following kindergarteners through to their eighth grade school year.

Aim of the study: to describe the music experiences elementary school children in the United States receive in the academic classroom setting.

The data were drawn from the Early Childhood Longitudinal Study of the Kindergarten Class of 1998–1999 (ECLS-K), a nationally representative study that followed kindergarteners through to their eighth-grade school year with the last data collection wave in 2006–2007. The variables pertaining to music experiences in the academic classroom that were available in the ECLS-K were (a) the frequency and duration with which children received music instruction, (b) the frequency that music was used to teach math, and (c) the percentage of children receiving formal music instruction outside of school. Each of these variables also was analyzed as a function of child urbanicity, socioeconomic status (SES), and race.

Impact: Statistically significant ($p < .001$) disparities among children based on urbanicity, SES, and race were found on each of the music experience variables. Overall, White suburban students of high levels of SES tended to receive significantly more music experiences than students of color from urban and rural settings and of low SES. The findings support the need to advocate for high-quality music programs for all students and particularly for those from traditionally underserved populations. Music was used as a tool for teaching math in kindergarten more often than in first grade. This finding makes sense given the fact that kindergarten is a time when play and active learning permeate the classroom. As a result, music would be utilized at this level as a way of engaging students in the learning process. The decline in the use of music as students got older could also be related to the increasing complexity of skills necessary in both math and music as age increases.

Evidence: moderate

- Large and nationally representative sample of children (21, 260).
- This data set is not representative of U.S. kindergarten teachers, schools and children beyond the 1998-1999 school year. It is representative of the original population cohort of children as they progressed through 8 years of schooling.
- However, this study does not investigate the impact of music-related activities to cognitive or non-cognitive outcomes for children but looks at the amount of music instruction within school and outside of school for the study participants.

53. Miller, B. A. (1995) *Integrating elementary music instruction with a whole language first-grade classroom*. 9624439 Ed.D., University of Illinois at Urbana-Champaign, Ann Arbor. (US)

Type of intervention: integrating music instruction in a language classroom

Age of children: first-grade children

The purpose of this qualitative study was to explore ways to integrate elementary music instruction with the classroom studies of a selected whole language first grade without sacrificing the integrity of the music education

agenda. The teacher-researcher used a collaborative action research model in planning units of study with the first grade teacher.

Five categories of integration were identified: topical, mechanical subject, conceptual, higher level thinking, and pedagogical. These five types of integration provided the researcher with a more differentiated mental construct of integration, making it easier to conceptualize and broaden the range of possible intersections. The researcher concluded that there are many authentic points of intersection between the music curriculum and the regular curriculum.

The study was primarily a qualitative paradigm employing techniques such as journalizing, videotaping, and interviewing. In addition, a researcher constructed criterion test was administered. An ANCOVA showed no significant differences among the integrated class and three other first grades. Students from the integrated class, however, demonstrated more enthusiasm during regularly-scheduled music lessons than the non-integrated classes, as judged by verbal and physical responses during instruction.

Impact: this was a qualitative study that sought to identify ways of integrating music instruction in a language classroom. Interesting integration-related and pedagogical issues are discussed but no impact on pupil outcomes (musical outcomes) between the integrated class and the other three first classes apart from a teacher reported pupil enthusiasm.

Evidence: weak

- One class within one school (no random allocation of participants).
- No baseline equivalence established.

54. Molnar, W., III. (2013) *Effect of Music Education on Reading Scores of Primary Inner-City Students*. 3588221 Ph.D., Walden University, Ann Arbor. (US)

Type of intervention: testing the effect of music education on reading test scores

Age of children: grades 3 and 4

This study examined the effect of music education on reading test scores, as measured by standardized test scores, among primary students in inner city, low socioeconomic situations (the students were from two different urban districts on the east coast of the United States).

It used results of the reading section of the Terra Nova reading assessment for a population of students currently in Grades 3 and 4 who had been exposed to music education from kindergarten through Grade 2. The control group consisted of students currently in Grades 3 and 4 who had not been exposed to music education from kindergarten through Grade 2. The sample

size consisted of 400 students from each group. Data were analyzed through descriptive statistics employing t-test and ANOVA.

The data sets used was from students in kindergarten, first grade, and second grade in the 2008-2009, 2009-2010, 2010-2011, and 2011-2012 school years, respectively. Standardized test scores were compared with those students currently in grades 3 and 4 who were in kindergarten in 2008-2009, in first grade in 2009-2010, second grade in 2010-2011, and third grade in 2011-2012. In addition, financial and demographic data was collected to be used in the analysis of variance (ANOVA).

Impact: The findings were not statistically significant.

Evidence: weak

- The study was delimited to students currently in Grades 3 and 4 and used their Terra Nova scores in grades K-2 within two school districts – not possible to generalise the results to other primary students of low socio-economic status.
- Many students did not remain in the same school for all three grade levels; complete test results were not available (threat to the internal validity of the data).
- No random allocation of participants (convenience sample was used).

55. Moreno, S., Marques, C., Santos, A., Santos, M., Castro, S. L., & Besson, M.

(2009) Musical training influences linguistic abilities in 8-year-old children: More evidence for brain plasticity. *Cerebral Cortex*, 19(3), 712-723. (Portugal)

Type of investigation: musical training

Age of children: 8 year old children

This was a longitudinal study with 32 non-musician children over 9 months. A total of 37 non-musician children from 2 elementary schools in Aveiro (Northern Portugal) were initially enrolled in the experiments. Five children were excluded from the final analysis (either because they moved during the academic year or because of too many artifacts in the electrophysiological recordings).

The study aimed to determine 1) whether functional differences between musician and non-musician children reflect specific predispositions for music or result from musical training and 2) whether musical training improves non-musical brain functions such as reading and linguistic pitch processing. Event-related brain potentials were recorded while 8-year-old children performed tasks designed to test the hypothesis that musical training improves pitch processing not only in music but also in speech.

Following the first testing sessions (neuropsychological assessment through the WISC-III and pitch discrimination tasks), non-musician children were pseudorandomly assigned to music or to painting training for 6 months and were tested again after training using the same tests.

Musical training:

Children participated in music or painting training for 24 weeks, twice a week for 75 min. Four teachers professionally trained in music or painting were specifically hired for this project and were assigned a subgroup of children (music: 10 and 8 children, respectively, and painting: 11 and 8 children, respectively). Musical training was based on a combination of Kodaly, Orff, and Wuytack methodologies and included training on rhythm, melody, harmony and timbre.

After musical (but not painting) training, children showed enhanced reading and pitch discrimination abilities in speech. The authors conclude that 6 months of musical training suffices to significantly improve behaviour and to influence the development of neural processes as reflected in specific pattern of brain waves.

It is concluded that the results reveal positive transfer from music to speech and highlight the influence of musical training. Finally, they demonstrate brain plasticity in showing that relatively short periods of training have strong consequences on the functional organization of the children's brain.

Impact: positive impact for the treatment group (enhanced reading and pitch discrimination abilities).

Evidence: moderate, shows promise

- Small sample size (17 in each group) but carefully controlled study (baseline equivalence was established in perceptual and cognitive abilities).
- The control group participated in a stimulating extra-curricular activity (painting) so it is expected that there would not be important differences in cognitive stimulation and motivation between the two groups.
- The teachers taking the classes were not blind to treatment, so there is an expectation of success. This could have motivated both pupils and teachers to do well. The positive effect may have been an indirect result of participation in the intervention.
- Control and treatment classes were taken by different teachers. This possible teacher effect could have accounted for the differences in performance. Different teaching styles and personalities of teachers could have affected the results – the music teachers could have been more enthusiastic and have more engaging teaching styles.

56. Murray, M. M. (2007) *Developing self-esteem through connections to music: Assessing effects on self-esteem in grade 3 students through learning to play the ukulele.* MR38141 M.Ed., Nipissing University (Canada), Ann Arbor. (US)

Type of intervention: playing the ukulele

Age of children: grade 3 in the US

This was mixed method research design. The aim of the study was to determine the effects of learning to play the ukulele on the self-esteem of Grade 3 students. The sample consisted of 14 participants (10 boys and 4 girls).

Administration of the Coopersmith Self-Esteem Inventory, parent surveys, anecdotal evidence, and oral and written student reflections were used during the 6 month instruction period.

Impact:

- Student and parental feedback indicated increased student confidence, risk-taking, pride and responsibility in addition to learning to play a new instrument. Attendance improved significantly during the testing period.
- However, the quantitative data did not substantiate the qualitative data. The author concludes that more research needs to be conducted to investigate the effects of standardized testing on self-esteem.

Evidence: weak

- Very small sample (14 participants).
- No control group – therefore, it is not possible to attribute any positive outcomes on the ukulele instruction.
- There are perceived benefits reported and discussed.

57. Myant, M., Armstrong, W., & Healy, N. (2008) Can music make a difference? A small scale longitudinal study into the effects of music instruction in nursery on later reading ability. *Educational and Child Psychology*, 25(3), 83-100.

[Full article not found]

Abstract

These three small-scale studies investigated the effects of Kodaly music teaching at nursery school on phonological awareness and later reading ability in an experimental group matched with a control group.

In study 1, phonological awareness skills were assessed near the beginning of the academic year and then again seven months later. The children in the experimental group showed a significant improvement in all four areas assessed while the control group only improved significantly on one measure. However the differences between the groups were not significant.

Study 2 followed both groups into school and their reading ability was assessed at the end of Primary 1 using a standardised test. Reading ages in the experimental group were significantly higher than those of the control group.

Study 3 assessed the same group of children at the end of primary 7. They were reassessed on a battery of standardised tests involving reading and phonological awareness. Word Reading ages in the experimental group were significantly better than those of the control group. Differences in the other measures did not reach significance.

No information on the sample and selection of participants. It would be interesting to know whether and how baseline equivalence was established in the two groups and the nature and length of the music instruction.

58. Nering, M. E. (2002) *The effect of piano and music instruction on intelligence of monozygotic twins.* 3045435 Ph.D., University of Hawai'i, Ann Arbor. (US)

Type of intervention: piano instruction

Age of children: 3-7 years old

This experimental pretest-posttest study attempted to approach the causation issue between music instruction and increased intelligence. To determine the effects of piano and music instruction on intelligence, a sample of preschool and primary-aged monozygotic twins was used. The sample consisted of **ten sets of monozygotic twins**, ages three to seven, with one of each set being the experimental subject who received private piano instruction and the other the control subject who received no training.

The duration of the experiment was from the beginning of November 2000, until the end of May 2001 (7 months). Each experimental twin received two private forty-five-minute piano lessons per week, for seven months, for a total of fifty-two lessons each. Twins were pretested and posttested with complete Wechsler standardized intelligence tests (either the WPPSI-R or WISC -1 11). Pretests determined the equivalence of both groups.

Experimental subjects showed statistically significant improvement in composite

Verbal Scaled scores ($p = .02$) and *Verbal IQ* scores ($p = .03$), as well as total *Full Scale*

IQ scores ($p < .05$). Subtests that showed significant improvement were *Arithmetic*

$p = .004$), *Information* ($p < .05$), and *Mazes* ($p = .03$). Control subjects did not show significant improvement.

Impact: positive impact on intelligence for experimental group

- This research indicates that music instruction through individual piano lessons increases intelligence in extra-musical areas, and that monozygotic twins appear to provide a more absolute design for approaching causation.

Evidence: moderate, shows promise because of the uniqueness of the sample (monozygotic twins).

- Small sample size but carefully controlled study.
- Strength of the study: because of the high equivalence of monozygotic twins, extraneous variables that may affect one twin also affect the co-twin – thus the threat of confounding variables on the treatment is reduced or eliminated, enabling the issue of causation to be approached more directly.
- The author also argues that to generalise that music training benefits intelligence may only be partially correct. The instrument (in this case piano) used to produce the results needs to be specified.
- It is also argued that experimental bias was not a threat in this study as the researcher was not familiar with any subjects involved beforehand.
- However, the researcher was the teacher that provided the music instruction (therefore, the teacher was not blind to treatment) – this may have affected the results due to experimenter expectancy effect and conflict of interest.

59. Olson, C. A. (2008) Test Scores Linked to Music Program Quality. [Article]. *Teaching Music*, 15(5), 23-23.

[Full article not found]

Abstract:

A recent study confirmed the effect of music education quality on test results in English and mathematics. The University of Kansas study of elementary- and middle-school students across the U.S. found huge gaps between the standardized test scores of students participating in exemplary music programs and those of students participating in deficient ones, with children in low-quality programs in many instances scoring lower on tests than those with no formal music education at all.

60. Olson, C. A. (2010). Music Training Causes Changes in the Brain. [Article]. *Teaching Music*, 17(6), 22-22.

Type of intervention: Music training

Age: 5-7

[Full article not found]

Abstract:

A study examined whether music instruction caused any changes in the brains of children. Data were obtained from scanned brains of five- to seven-year-old children beginning to study a musical instrument and another control

group of children not receiving any kind of musical instruction. There were no anatomical differences between the brain scans of the two groups of children before the instruction. Findings indicated that after 15 months of training, children studying a musical instrument had changes in three areas of the brain when compared to that of the control group. Additionally, the changes became more prominent with increased practice of the instrument. Findings suggest an association between the degree of brain change and the degree of change caused due to some behaviour change. However, no association was found between the music and academic performances of the two groups.

61. O'Reilly, N. (2011) *Writing raps to improve vocabulary: An empirical study on a culturally-relevant instructional method.* 3482075 Psy.D., Rutgers The State University of New Jersey, Graduate School of Applied and Professional Psychology, Ann Arbor. (US)

Type of intervention: music (writing raps)

Age of children: grades 6-8

Drawing upon existing ethnographic and empirical research on CRP (culturally responsive pedagogy), this dissertation investigated whether instruction that incorporates youth's affiliation with hip-hop culture can facilitate word learning among a sample of 48 African American, low-income students enrolled in grades six through eight in an urban charter school in New Jersey. Hip-hop was selected because it has been validated as "the representative voice of urban youth" (Morrell & Duncan-Andrade, 2002, p. 88). It was hypothesized that students who created lyrical raps would (1) acquire and (2) retain a greater number of word definitions than students who were exposed to novel words during instruction involving rote memorization alone.

A post-test analysis of variance (ANOVA) suggested no meaningful difference between the two groups for vocabulary acquisition and the first hypothesis was rejected. A second post-test ANOVA revealed a meaningful difference between the two groups for vocabulary retention and the second hypothesis was confirmed. Results suggested that traditional instruction can be effective for short-term vocabulary learning but CRP is more likely to facilitate meaningful learning, that is, retention.

Research design:

A two-group posttest-only randomised experiment was utilized to investigate the acquisition and retention of novel vocabulary words. This study's two-group post-test-only randomised experimental design utilized a contrast group in lieu of a control group due to the researcher's inability to control for the amount of time students spent studying word definitions after the treatment phase and during the time which elapsed in between each post-

test. However, the author reports that a baseline measure was administered to determine that participants in both groups scored equivalently on a pre-test; however, the nature of the baseline measure differed from that of the post-tests (the former utilized a fill-in-the blank format and the latter, a multiple-choice format). The independent variable was type of vocabulary instruction. The contrast group (DI) received direct instruction only and the treatment group (DI + RA) received a homework assignment that required they compose an original rap song using all words taught during direct instruction, which they also received. The dependent variable was word knowledge as measured by scores on multiple-choice tests administered at two- and four-weeks post-treatment.

Impact: positive impact between the two groups on vocabulary retention.

Evidence: weak

- The study took place in one school with a small number of students, therefore, there is a threat to external validity and the results are only applicable in this particular setting. The author also acknowledges that the study's sample may not be representative of the greater population because they had the implicit advantage of parental involvement. In addition, the sample may have been more motivated as a group than a typical classroom sample, as they accepted the invitation to participate in the study after parental consent was obtained.
- An attempt was made for baseline equivalence between the two groups but there are two issues to consider: 1) there is a contrast group rather than a control group and we cannot be sure that they had similar characteristics, and 2) the post- and pre-tests differed in their format and, therefore, their results are not equivalent (threat to internal validity).
- The pre and post-tests consisted of vocabulary tests created by the researcher using selected words from the Academic Word list – even though these tests were appropriately created for the purposes of the research, their findings cannot be generalised across contexts.
- A final limitation related to time sampling. It was not possible to know what occurred during the interval between instruction and assessments that may have influenced results, such as time spent on studying definitions or practicing raps. Participants were instructed to complete their work independently; as such, there may have been significant discrepancies among each student's time commitment to the project.

62. Peters, B. (2011) *A Formative Study of Rhythm and Pattern: Semiotic Potential of Multimodal Experiences for Early Years Readers*. NR78930 Ph.D., University of Manitoba (Canada), Ann Arbor. (US)

Type of intervention: music integrated instruction

Age of children: grades 1-3

The purpose of this research was to investigate the potential for the semiotic resource of rhythm to engage early years children in print and non-print literacy learning.

A twelve week mixed methods quasi-experimental study was conducted to examine the effects of a multimodal Orff-based learning design on elements of reading and rhythm for grades one to three children in four schools. Students (n = 169) from nine classrooms were non-randomly assigned to one of two groups. The researcher instructed both groups two to three times a week totalling twenty-five sessions in each homeroom classroom.

The experimental groups participated in Orff-based learning experiences that focused on elements of rhythm and prosodic oral reading fluency. The control group listened to and sang song-storybooks.

Beat performance and oral reading rate assessments (*Oral Reading Fluency* subtest of the Dynamics Indicator of Basic Early Literacy Skills Sixth Edition and part 1 of the *Rhythm Performance Test* revised) were administered as pre- and post-tests to each group. Struggling readers in the experimental group significantly improved on measures of oral reading rate compared to struggling readers in the control group using matched pairs t-procedures and analyses of variance. Associations between beat performance and oral reading rate were explored using bivariate and multivariate regression and correlation analysis. A strong positive correlation was found between measures of beat competency and measures of oral reading rate.

Qualitative methods using grounded theory, semiotic data analysis, multimodal analysis, action research, and design research methods placed within a bricolage framework (Kincheloe & Berry, 2004) and examined through the lens of complexity thinking (Davis & Sumara, 2006) added multiperspectival meaning-making of data. Findings pointed to the value of multimodal music and rhythm experiences for engaged, deep, meaningful print and non-print learning for diverse individual and classroom collective learners in both control and experimental classrooms.

Impact: positive correlation found between measures of beat competency and measures of oral reading rate. Struggling readers in the experimental group significantly improved on measures of oral reading rate.

Evidence: weak

- Small sample drawn from 4 schools (N=169) non-randomly assigned to one of two groups (quasi-experimental study).
- Due to the nature of the design, there is a selection bias threat in the study, as the treatment group could be systematically different from the control group on some unobservable characteristic.
- There is also the potential for testing bias as the researcher taught both experimental and control groups and she might have unwittingly helped children differentially in the treatment group by 'teaching to the test'.
- The qualitative data, however, provide a rich source of insights into the value of multimodal music and rhythm experiences.

63. Piro, J. M., & Ortiz, C. (2009) The effect of piano lessons on the vocabulary and verbal sequencing skills of primary grade students. *Psychology of Music*, 37(3), 325-347. (US)

Type of intervention: music integrated instruction (with formal piano instruction)

Age of the children: second grade students

The major aim of this quasi-experimental study was to examine the effects of a scaffolded music instruction program on the vocabulary and verbal sequencing skills of two cohorts of second-grade students. The two cohorts were drawn from two large public elementary schools in New York City having similar demographic characteristics.

One group (N=46) studied piano formally for a period of three consecutive years as part of a comprehensive instructional intervention program. The second group (N= 57) had no exposure to music lessons, either in school programs or private study. Both groups were assessed on two subtests (vocabulary and verbal sequencing) from the Structure of Intellect (SOI) measure (standardised testing instrument). Results revealed that the experimental group had significantly better vocabulary and verbal sequencing scores at post-test than did the control group.

Impact: significantly better vocabulary and verbal sequencing scores for the experimental group.

Evidence: weak

- This was a quasi-experimental study and did not employ random assignment. Therefore, it did not account for any unobservable differences between the experimental and control groups. In terms of observable characteristics, the author mentions, however, that at the end of the school year in which the study was conducted, 63.7 percent of students in the treatment school met state-wide standards in the English Language Arts test while 71.8 percent of students in the control school met the same standards (so a larger number of students in the control group met the state-wide standards in the literacy test). The author also mentions that the school where the treatment group was drawn from was not a magnet or musically 'themed' school requiring any special admissions requirements. Students attended before of where they

lived (this reduces the potential for large baseline differences between the groups).

- Another limitation of the study is the status of both groups when the research study commenced. When the study began, the treatment group had already experienced two years of piano lessons. The author mentions, however, that at pre-test, scores for both control and treatment groups on the vocabulary and verbal sequence tests were nearly identical. The author then tries to answer an intriguing question. If the children receiving piano instruction already had two years of music involvement, why did they not significantly outscore the musically naïve students on both measures at the outset?

64. Portowitz, A., Pepler, K. A., & Downton, M. (2014) In Harmony: A technology-based music education model to enhance musical understanding and general learning skills. [Article]. *International Journal of Music Education*, 32(2), 242-260.

[Full article not found]

Haven't included it yet

Abstract:

This article reports on the practice and evaluation of a music education model, In Harmony, which utilizes new technologies and current theories of learning to mediate the music learning experience. In response to the needs of twenty-first century learners, the educational software programs Teach, Learn, Evaluate! and Impromptu served as central components of the program's curriculum. Moreover, drawing on educational theories that value general learning skills as prerequisites to scholastic achievement, the In Harmony program provided a context in which students could improve their working memory, self-regulation, and cognitive flexibility. The model was adopted internationally in Bloomington, IN and Jaffa, Israel, and featured individual tasks administered through computer software, as well as group music composition activities. By incorporating computer technology within the program's design, and targeting the above-mentioned learning skills, we sought to strengthen the impact of the music lessons and deepen our understanding of the mechanisms linking music education and enhanced cognitive development. Quantitative and qualitative evaluation of the children's working memory, self-regulation, and cognitive flexibility, as well as qualitative analyses of data collected during the intervention, indicated that the In Harmony model and the educational software used successfully scaffold musical instruction, with beneficial outcomes in fostering *working memory, self-regulation, and cognitive flexibility*.

65. Previti, R. A. (2003) *The effects of musical keyboarding instruction on the self-efficacy scores of middle school students as measured on the Multiple Intelligence*

Developmental Assessment Scales. 3086357 Ed.D., Widener University, Ann Arbor. (US)

Type of intervention: general musical and synthesizer keyboarding instruction

Age of the children: 6th, 7th and 8th grade students

The purpose of this study was to measure the effects of musical keyboarding and related instruction on self-efficacy scores of middle school students as measured by a self-assessment instrument reflecting the multiple intelligences theory profiles of Howard Gardner.

This study specifically focused on the treatment effects of musical keyboarding instruction as it interacted with musical, spatial, and logical-mathematical survey cluster scale scores identified within the research instrument as well as the interaction effects regarding gender, socio-economic status, grade level and reading proficiency.

The Multiple Intelligence Developmental Assessment Scales (MIDAS) was used

to provide an objective measure and comparison of the self-efficacy of middle school students in a *quasi-experimental model*. This Likert type closed form questionnaire is based on the theory of multiple intelligences described by Howard Gardner. It is designed to provide a person's intellectual disposition in a profile summary for each of Gardner's eight intelligences.

The sample for the study was comprised of 292 sixth, seventh, and eighth grade students heterogeneously assigned to seven treatment and eight comparison groups. 157 students were in the comparison group and 135 were in the treatment group (51 (17.5%) were eligible for free lunch, 46 (15.8%) were eligible for reduced lunch).

Course content, supportive instructional music and piano level instructional workbooks were consistent for the treatment group. All students in the treatment group performed on the synthesizer keyboards during each instructional period.

An analysis of covariance model (ANCOVA) was used to test for the effects of keyboarding and related instruction as indicated by the pre and posttest scores for three sub-test scales of the multiple intelligence developmental assessment scale for musical, logical-mathematical and spatial intelligence as the dependent variables.

Other moderating variables were examined to measure the effects on the posttest scores adjusted by the pretest scores, for gender, socio-economic status, three grade levels as well as four reading quartiles.

The findings of the study revealed a significant difference in gender comparisons of post-treatment scores for treatment group participants after pretest scores as covariate adjustment. Significant data supports the position that student's perception of self, reflected in student self-efficacy profiles, can be significantly altered. There is a gender effect revealed in the study.

Impact: Female self-efficacy increased while male self-efficacy decreased.

- There were also significant grade level differences within group comparisons. Sixth grade male scores were 37.1% lower than eighth grade male ($m = 49.75$) scores on a measure of full-scale musical intelligence (Developmental differences concerning maturation, self-efficacy, and instructional readiness for musical keyboarding and formal music instruction may be present for preadolescent males).

Evidence: weak

- The sample was drawn from one school – threat to external validity.
- This was a quasi-experimental study and there is the possibility that the two groups differed on some important variable at the outset of the experiment.
- The study focused on self-reporting which is subject to personal distortions.

66. Putkinen, V., Tervaniemi, M., Saarikivi, K., de Vent, N., & Huotilainen, M. (2014) Investigating the effects of musical training on functional brain development with a novel Melodic MMN paradigm. *Neurobiology of Learning and Memory*, 110, 8-15.

Type of intervention: musical training

Age of children: 9, 11 and 13 years

[This study relates to musical outcomes (auditory discrimination) – it does not seem relevant for our study]

Sensitivity to changes in various musical features was investigated by recording the mismatch negativity (MMN) auditory event-related potential (ERP) in musically trained and nontrained children semi-longitudinally at the ages of 9, 11, and 13 years. The responses were recorded using a novel Melodic multi-feature paradigm which allows fast (<15 min) recording of an MMN profile for changes in melody, rhythm, musical key, timbre, tuning and timing. When compared to the nontrained children, the musically trained children displayed enlarged MMNs for the melody modulations by the age 13 and for the rhythm modulations, timbre deviants and slightly mistuned tones already at the age of 11. Also, a positive mismatch response elicited by delayed tones was larger in amplitude in the musically trained than in the nontrained children at age 13. No group differences were found at the age 9

suggesting that the later enhancement of the MMN in the musically trained children resulted from training and not pre-existing difference between the groups. The current study demonstrates the applicability of the Melodic multifeature paradigm in school-aged children and indicates that musical training enhances auditory discrimination for musically central sound dimensions in pre-adolescence.

67. Register, D. (2001) The effects of an early intervention music curriculum on prereading/writing. [Article]. *Journal of Music Therapy*, 38(3), 239-248.

[Full article not found but this study is included in the following systematic review, so it will be included in the data extraction process]

68. Register, D. (2004) The effects of live music groups versus an educational children's television program on the emergent literacy of young children. [Article]. *Journal of Music Therapy*, 41(1), 2-27. (US)

Type of intervention: Effects of Live Music Groups Versus an Educational Children's Television Program

Age: 5-7

Abstract:

The purpose of this study was to examine the effects of a music therapy program designed to teach reading skills versus the “Between the Lions” television program on the early literacy behaviors of Kindergarten children from a low socioeconomic background. Subjects (n = 86) were children, aged 5-7 years, enrolled in one of four different Kindergarten classes at a public elementary school in Northwest Florida. Each class was assigned one of four treatment conditions: Music/Video (sequential presentation of each condition), Music-Only, Video-Only, and no contact Control group. Growth in early literacy skills was measured using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and 3 subtests of the Test of Early reading Ability—3rd edition (TERA-3). Teachers' perceptions of classroom literacy behaviors were measured using a pre and poststudy survey. This study also compared on- and off-task behavior of students during video versus music conditions.

Results of the 7 subtests measuring early literacy were varied. The Music/Video and Music-Only groups achieved the highest increases in mean scores from pre to posttest on 4 of the 7 subtests. Students in the Video-Only group scored significantly better on the phonemic segmentation portion of the DIBELS than peers in the Music/Video condition. Furthermore, strong correlations were found between the Letter Naming, Initial Sounds Fluency tests, and total raw score of the TERA-3 tests for the both pre and posttesting. Additionally, graphic analysis of mean off-task behavior per session indicated

that students were more off-task during both video conditions (video alone and video portion of Music/Video condition) than during the music conditions. Off-task behavior was consistently lower during music sessions for the duration of the study. This study confirmed that music increases the on-task behavior of students. Additionally, the combination of music and video enrichment showed gains in 4 of the 8 tests used to measure students' progress. This pattern supports the need for further investigation regarding benefits of enrichment programs specifically designed to enhance curricula for students from low socioeconomic backgrounds, particularly programs that incorporate music activities.

Impact: mixed results

Evidence: weak

- The study design did not involve random allocation of participants – threat to the study's internal validity as it is mentioned that significant differences were found among the groups on several pre-test measures.
- Teachers were not assigned a treatment group but decided amongst themselves which of the four available treatment groups would best suit their teaching style/schedule – each teacher delivered the material in her own way, employing different strategies and pacing. The differential delivery, teacher characteristics and teacher quality might have affected the results (confounding variable).

69. Register, D., Darrow, A.-A., & Standley, J. (2007) The use of music to enhance reading skills of second grade students and students with reading disabilities. [Article]. *Journal of Music Therapy*, 44(1), 23-37. (US)

Type of intervention: *music integrated instruction*

Age of children: *second-grade children*

The purpose of the present study was to determine the efficacy of using music as a remedial strategy to enhance the reading skills of second-grade students and students who have been identified as having a specific learning disability (SLD) in reading. First, an intensive short-term music curriculum was designed to target reading comprehension and vocabulary skills at the second grade level. Each lesson included both passive and active music such as listening, singing, instrument playing and movement in order to appeal to multiple learning styles and sensory experiences.

The curriculum was then implemented in classrooms at two public schools in the Southeast. Reading skills were evaluated pre and post curriculum intervention via the vocabulary and reading comprehension subtests of the Gates-MacGinitie Reading Test for second grade.

Analysis of pre/posttest data revealed that students with a specific disability in reading improved significantly from pre to post on all three subtests: word

decoding ($p = .04$), word knowledge ($p = .01$), reading comprehension ($p = .01$), and test total ($p = .01$). Paired t-tests revealed that for 2nd grade students, both treatment and control classes improved significantly from pre to post on the subtests word decoding, word knowledge, and test total. While both classes made gains from pre to post on the subtest, reading comprehension, neither improved significantly. Analysis of Covariance revealed that the treatment class made greater gains pre to post than the control class on all 3 subtests (Including reading comprehension), and significantly greater gains on the subtest, word knowledge ($p = .01$).

Impact: positive impact for students with a specific disability in reading and for the treatment class on the 3 subtests.

Evidence: weak

- Small sample (students with a specific disability, $N=8$; 2nd grade students, $N=33$)
- No random allocation of participants to treatment and control group – there were two intact 2nd grade classes randomly assigned to the control condition ($N=16$) and the treatment condition ($N=17$). Students with a specific disability in reading participated only in the treatment condition; therefore, there was no comparison group for this group of students.
- There could have been a possible teacher effect due to the non-random allocation and lack of homogeneity of control and experimental groups.
- Standard deviations were also high on the three subtests, indicating that learning was not uniform among participants.
- Attendance was not good and may have affected learning for some students.
- The pretest scores of the treatment class were higher than the scores of the control class, thus contributing to a potential ceiling effect that may have limited their gain scores.
- The length of the treatment was short (4-week period).

70. Richardson, R. C. (2009) *Expanding geographic understanding in grade 8 social studies classes through integration of geography, music, and history: A quasi-experimental study.* 3384999 Ed.D., University of California, Irvine and University of California, Los Angeles, Ann Arbor. (US)

Type of intervention: integration of geography, music and history in the classroom

Age of children: Grade 8 students

This study took place in a high-achieving, suburban middle school and compared learning as a result of nine Grade 8 social studies workshops. Three classes ($N=84$) were the control group and four classes ($N=131$) were the treatment. As much as possible, classes were balanced in terms of gender, ethnicity, and proficiency in English.

The key question was whether treatment workshops that include music, hands-on geography activities, and cultural studies could result in greater understanding of physical and cultural geography and more positive

geography-related attitudes for students in the workshops, as compared to the control group who studied the standard curricula.

Quantitative analyses compared baseline and follow-up results on a multiple-choice geography exam and an attitude survey. Four research questions asked if control or treatment workshops led to greater: (1) geographic understanding, measured by the National Council for Geographic Education (NCGE) Intermediate Standards-Based Geography Test; (2) improvement in geography-related attitudes, measured by the Test of Geography-Related Attitudes (ToGRA); success on the NCGE or the ToGRA, when controlling for sub-groups (English learners, gender, low-achieving, ethnicity); and (4) understanding of connections between geography, history, and culture, as measured by qualitative observations, quick-writes, and focus group interviews.

Impact: There were statistically significant results for questions 1, 2 and 3 in favour of the treatment group. An unanticipated outcome was greater writing fluency for treatment group students. It is also reported that, even though the quantitative results showed "statistically significant" results, the actual changes in scores on the NCGE and ToGRA were modest.

Evidence: weak

- Small sample size drawn from one school – not possible to generalise to a larger population and presents a threat to external validity.
- It is not possible in this study to disentangle the effects of the music component of instruction from the influence of geography and history instruction.

71. Ritblatt, S., Longstreth, S., Hokoda, A., Cannon, B.-N., & Weston, J. (2013) Can Music Enhance School-Readiness Socioemotional Skills? *Journal of Research in Childhood Education*, 27(3), 257-266. (US)

Type of intervention: music enhanced instruction

Age of children: pre-school children

This study examines the effects of a school-readiness music program (Circle of Education music-based school-readiness program using 20 songs that focus on socioemotional skills, daily routines, self-esteem and self-care) on preschool children's socioemotional readiness to transition to kindergarten. Young children (N = 102) attending a preschool program (four classes) in a children's center run by a state university in the southwestern United States participated in this study. Two of the classes were assigned to the music

school-readiness group and two classes were assigned to the wait-list control group (no music school-readiness curriculum).

Baseline measures of children's development and readiness for school across multiple domains (cognitive, language, socioemotional, motor, self-help) were established before the implementation of the music program and the measures were readministered after the program to examine change over time.

The study examined (1) the impact of the school-readiness music program on children's acquisition of social skills as reported by teachers and parents and (2) the impact of the program on teacher reporting of school readiness that include measures assessing language, learning, and self-help skills.

Instruments: The Preschool and Kindergarten Behavioral Scale; the Kindergarten Readiness Survey (both have got acceptable levels of reliability) The results indicated that the music group improved on the social skills (total score) and specifically on the social cooperation, social interaction, and social independence scales. However, this effect was found for teachers, but not for parents' report of social behaviors.

There was also evidence that the program was successful in promoting children's positive approach to learning. Children in the treatment group were found to have higher approach to learning scores at Time 2 than at Time 1 (music and movement may have increased children's joy in learning. However, the results of the study did not find music effective in promoting academic skills. The authors found this surprising because several of the songs addressed early literacy (numbers, shapes, colours, letters).

Impact: positive impact in promoting positive socioemotional skills.

Evidence: weak, however,

- Small sample size
- Not diverse socio-economic background of the participants – the children were children of university students or professors which may have affected the effect of the music program.
- No random allocation of participants but baseline measures in a variety of domains were established.

72. Roden, I., Grube, D., Bongard, S., & Kreutz, G. (2014) Does music training enhance working memory performance? Findings from a quasi-experimental longitudinal study. [Article]. *Psychology of Music*, 42(2), 284-298. (Germany)

Type of intervention: extended music education program

Age of children: 7-8 years old

The study examined the assumption that instrumental music training enhances cognitive processing beyond general intelligence with regard to working memory performance in primary school-aged children (N = 50; 7–8 years of age) within a longitudinal study design. Half of the children participated in an extended music education program with 45 minutes of weekly instrumental music training, while the other half received extended natural science training (quasi-experimental design).

Each child completed a computerized test battery three times over a period of 18 months. The battery included seven subtests, which address the central executive, the phonological loop and the visuospatial sketchpad components of Baddeley's working memory model. Socio-economic background and basic cognitive functions were assessed for each participant and used as covariates in subsequent analyses of variance (ANOVAs). Significant group by time interactions were found for phonological loop and central executive subtests, indicating a superior developmental course in children with music training compared to the control group. These results confirm previous findings concerning music training and cognitive performance. It is suggested that children receiving music training benefit specifically in those aspects of cognitive functioning that are strongly related to auditory information processing.

Baseline equivalence: Participants were evaluated in terms of intelligence quotient (IQ), socio-economic background (parental education and income) and musical background (extra-curricular activities including instrumental music training) to determine any systematic differences in these variables prior to the intervention.

Impact: significant effect for phonological loop and central executive (those aspects of cognitive functioning that are strongly related to auditory information processing).

Evidence: weak

- Small sample size drawn from four primary schools located in different parts of Germany – the children were taught by different teachers, so the quality of teaching and teacher characteristics could have affected the results.
- Findings need to be treated with caution, mainly due to the quasi-experimental design of the study.

- There was some attrition to the study which resulted in varying N in statistical analyses in a few cases. However, the authors argue that attrition across groups and gender was small and uniform and did not induce bias in the respective variables.

73. Rodgers, L. M. (1999) *The effects and perceptions of early musical training on high school students*. 9955929 Ed.D., Pepperdine University, Ann Arbor. (US)

Type of intervention: correlational study exploring the relationship between early musical training and maths scores.

Age of children: high school students

The purpose of this study was to gather supportive data regarding the impact that

early musical training has on the development of a child's brain, and more specifically:

- To determine the relationship between early musical training and the Stanford 9 math scores of high school students.
- To determine the perceptions of parents, students, and teachers toward early musical training.

The first part of the study consisted of the data collection of Stanford 9 math scores from two high schools in the Long Beach Unified School District (non-music students, N=177 and music students, N=182). This information was then used to determine if there was a positive correlation between early musical training and students toward early math scores. The second part of the study consisted of a questionnaire that was sent to: (1) parents of students who play a musical instrument, (2) parents of students who do not play a musical instrument, (3) students who play a musical instrument, (4) students who do not play a musical instrument, and (5) public school music instructors.

Impact: the study showed a positive correlation between early musical training and the maths scores of high school students.

- There was a positive correlation between the Stanford 9 math scores of students who play an instrument and students who do not play an instrument, in favour of the students who play an instrument.
- There was a positive correlation between the students who began playing their instrument before the age of eight and students who do not play a musical instrument, in favour of the students who began playing an instrument before the age of eight.
- There was a positive correlation between the students who began playing an instrument before the age of eight and those students who began playing an instrument after the age of eight in favour of the students who began playing before the age of eight. The parents of students who played a musical

instrument the students who played a musical instrument and the public school music instructors were the most supportive of early musical training, private lessons, and music in the public school system. Eighty percent of the students who did not play an instrument said that they wished that they could play an instrument.

Evidence: weak

- The study found a correlation between music training and maths scores, but there is no evidence of causality (the relationship might be due to a number of confounding variables, such as better teaching, higher ability, higher motivation, more supportive family environment, higher socio-economic status etc. that are not controlled).
- Data were drawn from students in two schools in California and from a few selected grade levels – therefore, the findings are context and level specific and cannot be generalised to a broader student population. Information about the socio-economic background of the students is not known so any claims about possible impact on disadvantaged students cannot be made.
- The qualitative data are interesting and in-depth, but they do not provide strong evidence as they are based on participants' perceptions.

74. Root Wilson, K. A. (2009) *The effect of music education on early adolescents' adaptive skills, health-enhancing behaviors, and self-efficacy.* 3372721 Ph.D., University of Northern Colorado, Ann Arbor. (US)

Type of intervention: examining the relationship between musical participation in middle school and behavioural and emotional functioning.

Age of children: 5-8 grade students in the US

This study investigated the relationship between early adolescents' participation in middle school music programming and behavioral and emotional functioning. Specifically, the association between students' music involvement and the practice of certain healthy behaviors (diet, exercise, seatbelt use, helmet use, and sleep), adaptive skills (interpersonal relations, relationship with parents, self-esteem, and self-reliance) as well as levels of self-efficacy was examined.

Participants included 207 fifth through eighth grade students from two school districts in Western Massachusetts. Specifically, members of the school music program (band, choir) and a group of their peers who did not participate in the school music program were assessed. All participants completed a demographic questionnaire as well as the following battery of instruments: the *Health-enhancing Behaviors Index*, the *Behavior Assessment System for Children, Second Edition*, and the *Self-efficacy Scale*.

Results suggested that students involved in music programming significantly differed in relation to their health behaviors, with music students reporting higher levels of health enhancing behaviors than non-music students for one

school. Groups did not differ in regards to their self-reported levels of adaptive behaviors or self-efficacy. Gender, as well as length and breadth of music participation did not appear to contribute to the significant differences in health-enhancing behavior scores.

Impact: Significant differences in HEBI scores were found for music participants and nonparticipants in one of the two schools ($p = .01$).

Evidence: weak

- Participation to the study was voluntary and this could have led to selection bias (volunteers and those that refused to participate might have differed in levels of motivation).
- All data were collected using self-report measures – possible response bias threatening the internal validity of the study.
- Due to the correlational nature of the study, it is impossible to attribute any significant increases in the variables tested to music education participation, as it is possible that students may have entered those music programmes because they had high self-efficacy and good adaptive skills and health behaviours in the first place. In addition, extra-curricular musical participation was not controlled for either the music or the non-music group which is an extra factor that might have confounded the results.
- The results cannot be generalised to a broader student population as they are context specific and only drawn from two schools. The schools differed in terms of demographic characteristics (age, grade, gender, SES) as well as quality of music programme. In addition, the study included 30 fifth grade music participants from school A who were not represented in any other group.

75. Runfola, M., Etopio, E., Hamlen, K., & Rozendal, M. (2012) Effect of Music Instruction on Preschoolers' Music Achievement and Emergent Literacy Achievement. [Article]. *Bulletin of the Council for Research in Music Education*, (192), 7-27. (US)

Type of intervention: music integrated instruction by non-music specialists

Age of children: pre-school age

The purpose of this two-year study was to examine the impact of 'musically trained' early childhood specialists on the music achievement and emergent literacy achievement of preschool children.

The sample consisted of 11 teachers (control N=4; experimental N=7 – the primary reason for attrition was lack of motivation by some teachers to be in the control group) who met the criteria for the project and their respective students (N=165, 94 males and 71 females). Following a year of intensive staff development training in musicianship skill and pedagogical strategies for guiding young children's musical development, the teachers implemented the curriculum in the second year and several measures were used to collect data relative to student music and literacy outcomes.

Results were mixed for music achievement. Median scores were similar for the experimental and control groups on use of singing voice. Students' tonal pattern achievement in the experimental group was significantly higher but no significant differences were found in children's rhythm-pattern achievement. When controlling for age and prior knowledge, the music intervention significantly increased children's oral vocabulary and grammatic understanding and was especially effective for children who began with lower literacy skills (Literacy development was measured using the Test of Language Development which is a standardized measure comprised of different components of spoken language and key emergent literacy development skills such as phonemic analysis and word discrimination). Each child's oral-language abilities were tested prior to the music intervention to provide a baseline measure.

Impact: mixed results for music achievement; positive literacy outcomes in favour of the treatment group

Evidence: weak

- High attrition of teachers in the control group and their students (threat to internal validity)
- Potential inherent differences because of various literacy programs used in the sample (this may account for the increased literacy skill).
- One of the music measures (the T-EAA) was piloted in the study and the author raises concerns related to this music criterion measure.
- The children participants were not randomly allocated into control and experimental groups; therefore, no baseline equivalence (in terms, for example, of ability, motivation, social status etc.) seems to have been established; this limits the internal validity of the study.

76. Schellenberg, G. (2004) Music lessons enhance IQ. *Psychological Science*, 15(8), 511-514. (Toronto, Canada)

Type of intervention: music instruction

Age of children: six year old children

The present study tests the hypothesis that music makes you smarter with random assignment of a large sample of children (N=144) to two different types of music lessons (keyboard or Kodaly voice for 1 year) or to control groups that received drama lessons or no lessons. Children in the no-lessons group received keyboard lessons the following year. Twelve children (8.3%) discontinued taking lessons and did not complete the second round of IQ testing (keyboard: 6, voice: 4, drama: 2). Therefore, analyses of pre- to postlessons changes included data from 132 children. The lessons were taught for 36 weeks at the Royal Conservatory of Music (Toronto). In each lessons group (keyboard, voice, drama), two different instructors taught three

classes each; each class had 6 children. The instructors were trained, female professionals. Each was an “associate” of the conservatory, having completed the requirements for teaching level (i.e., highest) certification in music or in speech and drama.

IQ was measured before and after the lessons. The WISC-III (Wechsler, 1991), the Kaufman Test of Educational Achievement (K-TEA; Kaufman & Kaufman, 1985), and the Parent Rating Scale of the Behavioral Assessment System for Children (BASC; Reynolds & Kamphaus, 1992) were administered initially during the summer months before the onset of music or drama lessons (and before the children entered first grade at school).

Outcome measures from the WISC-III that were subjected to statistical analysis included full-scale IQ, the four index scores (Verbal Comprehension, Perceptual Organization, Freedom From Distractibility, and Processing Speed), and the 12 subtests (Picture Completion, Information, Coding, Similarities, Picture Arrangement, Arithmetic, Block Design, Vocabulary, Object Assembly, Comprehension, Symbol Search, and Digit Span). The K-TEA has five subtests (Mathematical Applications, Reading Decoding, Spelling, Reading Comprehension, and Mathematical Computation) that were examined separately. The Parent Rating Scale of the BASC provides separate composite measures of maladaptive and adaptive social functioning: Six subtests measuring maladaptive behavior (Hyperactivity, Aggression, Anxiety, Depression, Atypicality, and Attention Problems) are combined to form the Behavioral Symptoms Index, and three subtests measuring adaptive behaviors (Adaptability, Social Skills, and Leadership) form an Adaptive Composite Score. Both measures were used in the statistical analysis.

Findings: All four groups had significant increases in IQ, $p < .005$. This finding is most

easily attributed to the increase in IQ that is known to be a usual consequence of entering grade school (Ceci & Williams, 1997). The two music groups had increases of similar magnitude despite differences in teaching style ($p > .8$). The two control groups also had similar increases ($p > .7$). The author mentions that the similarities between the two music groups and the two control groups justified collapsing the data across groups in order to maximize power in tests of the central hypothesis. Compared with the control groups, the music groups had reliably larger increases in full-scale IQ (effect size = 0.35). The effect was relatively small, but it generalized across IQ subtests, index scores, and the standardized measure of academic achievement. Unexpectedly, children in the *drama group* exhibited

substantial pre- to posttest improvements in adaptive social behavior that were not evident in the music groups.

Impact: small but statistically significant effect on IQ in favour of the music group.

Evidence: moderate (well-controlled study with a relatively large sample size)

- As mentioned by Jaschke et al (2013), Schellenberg's study has been criticised because the non-music drama intervention group was merged with the non-intervention control group before comparison with the music groups. A direct comparison of the drama group with the music group might not have resulted in any significant difference in intelligence.
- There was some attrition but this was less than 10%, so this shouldn't have biased the findings.

77. Schlaug, G., Norton, A., Overy, K., & Winner, E. (2005) Effects of Music Training on the Child's Brain and Cognitive Development. In G. Avanzini, L. Lopez, S. Koelsch & M. Manjno (Eds.), *The neurosciences and music II: From perception to performance*. (pp. 219-230). New York, NY, US: New York Academy of Sciences. (US)

[Two studies are reported here]

Study 1:

Type of intervention: longitudinal study of the effects of music training on brain development and cognition in young children.

Age of children: 5-7 year old children

Fifty, five- to seven-year-old children were tested at baseline prior to beginning music lessons. Approximately two-thirds chose to take piano, while the other third chose string lessons. A smaller, untreated control group (N=25) was also tested. *The control group was matched to the instrumental group in age, SES and verbal IQ.* Each child underwent a battery of behavioural tests, including the Object Assembly, Block Design and Vocabulary subtests from either the Wechsler Intelligence Scale for Children (for children six years and older) or the Wechsler Preschool and Primary Scale of Intelligence (for children under age six); and other tests measuring phonemic awareness, musical skill/aptitude and speed and dexterity in both right and left hands. Children also underwent structural and functional MR scans of their brains using a specially designed, child-appropriate protocol.

There were no pre-existing cognitive, music, motor or structural brain differences between the groups at baseline, making it unlikely that children who choose to play a musical instrument do so because they have atypical brains and suggesting that the brain atypicalities seen in adult musicians are more likely to be the product of intensive music training rather than pre-existing biological markers of musicality.

In their preliminary analyses of the effects of one year of music training, the authors found significantly greater change scores in the instrumental group compared to the control group in behavioural tests directly linked to instrumental music training: fine motor skills and auditory discrimination skills. The authors also mentioned that, although they have not yet found evidence for transfer effects in domains such as verbal, visual-spatial and math after 14 months of observation, the instrumental group showed trends in the anticipated direction. Brain data also supported this trend. No significant changes were seen when the control group's baseline was compared with their second set of results 14 months later.

Impact: small cognitive and brain effects from instrumental music training and in domains such as fine motor and melodic discrimination (these were preliminary analyses based on half of the children who had completed their second round of testing) but shows promise.

Evidence: weak but shows promise (carefully controlled study with a number of variables controlled).

Study 2:

Type of intervention: cross-sectional comparison between a group of instrumentalists with an average of four years of training and a group of noninstrumentalists (matched in age, handedness, and SES).

Age of children: 9-11 year old instrumentalists

This group of children underwent the same battery of behavioural tests and imaging studies as the children in the longitudinal study of 5-7 year old children.

Findings: the instrumental group performed significantly better on the Gordon's Intermediate Measures of Music Audiation, the maximal left hand index finger tapping rate, and the Vocabulary subtest of the WISC-III. Strong, nonsignificant trends were seen in the phonemic awareness test, the Raven's Progressive Matrices and the Key Math test.

There were also significant differences in the brain for the instrumental group (more gray matter volume).

Impact: the study's findings suggest that the predicted effects become stronger, and that transfer effects begin to emerge in addition to those strong effects in closely related motor and auditory domains.

Evidence: weak

This study is correlational and therefore cannot prove causality and test the role of other predictors such as intensity of training, skill at reading musical notation, and level of musical achievement.

78. Schmidt, C. P. (2005) Relations among motivation, performance achievement, and music experience variables in secondary instrumental music students. [Article]. *Journal of Research in Music Education*, 53(2), 134-147. (US)

Type of intervention: examining relations among motivation, performance achievement and music experience variables in secondary instrumental music students.

Age of children: grades 7-12

The purpose of this study was to (1) reexamine academic achievement motivation orientations within the context of instrumental music, and (2) examine relations among achievement motivation orientations, self-concept in instrumental music, and attitude to band in relation to teachers' ratings of performance achievement and effort, and students' grade level, gender, instrument, self-reported practice time, and selected music experience variables.

Sample: Participants (N = 300) were band students (Grades 7-12) in four school districts. Data were gathered concerning students' (a) motivation orientations (mastery, intrinsic, individual, cooperative, ego, competitive, approach success, avoid failure), self-concept, and commitment to band; (b) instrument, grade level and gender, practice time per week, and experience in private lessons, solo festival, and all-county band; and (c) performance achievement and effort as rated by their teachers.

Results indicated that ratings of performance and effort were most strongly correlated with self-concept and intrinsic motivation, respectively. Practice time was most strongly correlated with intrinsic motivation. Factor analysis revealed three factors of motivation: Learning/Task Orientation, Performance/Ego Orientation, and Individual Orientation. The factors essentially replicated those found in a general academic achievement setting. Learning/Task Orientation was positively correlated with practice time, ratings of performance and effort, solo festival and private-lesson experience, and grade level. Performance/Ego Orientation was negatively correlated with grade level and solo festival ratings. Individual Orientation scores were positively correlated with ratings of performance and effort and solo festival ratings. Differences by gender and instrument group were non-significant.

Impact: There were a number of interesting correlational findings in this study relevant to the relations among motivation, performance achievement and music experience. The overarching finding was that there was a strong correlation between ratings of performance and effort with self-concept and intrinsic motivation.

Evidence: weak

This was a correlational study. There was no control group so it cannot be claimed that these findings are necessarily due to the music training as other confounding variables in the lives of the children that the study did not control, could have influenced the results.

79. Sharma, M. (2012) Academic functioning of slow learners: A therapeutic music intervention. *Music and Medicine*, 4(4), 215-220.

[This paper hasn't been found – it falls outside the scope of this study as it refers to a music therapy session for children outside mainstream school]

Abstract:

The objective of the present research was to explore whether a music therapy program might influence academic functioning of slow learners. A total of 20 children identified as slow learners (12 boys and 8 girls), evaluated in key areas of learning (ie, reading, writing, mathematical ability and IQ) relative to their current level of functioning, as determined by the "Seguin Form Board" test and the "draw a man" test, served as participants in this study. Music therapy was provided for 2 months on working days (Monday to Friday) between 10 and 11 am for 45 minutes. Independent assessors evaluated the academic functioning at the beginning of the therapy and at the end. A pre-post assessment design was adopted. Paired t test was used to assess the change in academic functioning in reading, writing, and mathematical abilities. Results indicated that the music therapy program implemented in this research improved academic functioning of the slow learners who participated in this study.

80. Sparks, S. D. (2013) Studies Highlight Brain Benefits From Music Training. [Article]. *Education Week*, 33(13), 6-6.

[Not found]

Abstract:

The article discusses studies released at the Society for Neuroscience meeting held in November 2013, which found that music training may increase creativity, decision making, and complex memory skills. Sensory-processing tests held at the University of Montreal in Canada, the effect of early music education on brain development, and the benefits of music education to children with behavioral problems, are also discussed. Musical disorders such as tone-deafness are also discussed.

81. Smolinski, K. (2010) *Original science-based music and student learning*. 3398870 Ed.D., Walden University, Ann Arbor. (US)

Type of intervention: science and music integrated instruction

Age of children: 7th grade

Employing the theoretical framework of brain-based learning, the purpose of this study was to examine the impact of original, science-based music on student content learning and student perceptions of the music and its impact on learning.

This study was related to the content of a 4-week cells unit in science (the 93 children in the treatment group were involved in the school chorus program, which met three times a week for a 45-minute chorus class). The chorus (treatment group) was split into two classes. An equally sized control group was taught the same material using existing methods. The content retention and learning experiences of the students in this study were examined using a concurrent triangulation, mixed-methods study.

Using independent sample *t* test and ANOVA analyses, the study found that the science posttest scores of students in the treatment group ($N = 93$) were significantly higher than the posttest scores of students in the control group ($N = 93$), and the relative gains of the boys in the treatment group exceeded those of the girls.

The qualitative analysis of 10 individual interviews and 3 focus group interviews followed Patton's method of a priori coding, cross checking, and thematic analysis to examine the perceptions of the treatment group. These results confirmed that the majority of the students thought the music served as an effective learning tool and enhanced recall.

Impact: positive change in favour of the treatment group and in favour of the boys compared to the girls in the treatment group.

Evidence: weak but shows promise

- This study used a quasi-experimental design (with a convenience sample) and it did not involve random allocation of participants. There were also varied numbers of students and an unequal male to female ratio in the different treatment and control classes. The two groups could have differed in a number of observable and/or observable characteristics which might have affected the results – threat to internal validity.
- The study took place in one school and it is not possible to generalise to a larger population.
- The treatment group comprised of two separate chorus classes – even though the same teacher instructed both classes, it is possible that the children may have experienced slightly different instructions and different teacher mannerisms which could have possibly influenced the findings.

- Teacher characteristics or the quality of teaching in the control and treatment groups could have also influenced the findings.
- The research acknowledges that there was a possibility of diffusion as treatment effects might have spread from the treatment to the control group.

82. Strait, D. L., Parbery-Clark, A., Hittner, E., & Kraus, N. (2012) Musical training during early childhood enhances the neural encoding of speech in noise. *Brain and Language*, 123(3), 191-201. (US)

Type of intervention: tested whether musical training in early childhood enhances the neural encoding of speech in noise.

Age of children: 7-13 years old

Given adult musicians' perceptual and neural speech-in-noise enhancements, the authors asked whether similar effects are present in musically-trained children.

They assessed the perception and subcortical processing of speech in noise and related cognitive abilities in musician and nonmusician children that were matched for a variety of overarching factors.

Outcomes reveal that musicians' advantages for processing speech in noise are present during pivotal developmental years. Supported by correlations between auditory working memory and attention and auditory brainstem response properties, they propose that musicians' perceptual and neural enhancements are driven in a top-down manner by strengthened cognitive abilities with training.

Thirty-one normal hearing children between the ages of 7–13 participated in this study. Parents completed an extensive questionnaire addressing the participant's family history, musical experience, extracurricular involvement and educational history. Musicians (Mus, N = 15) were self-categorized, were currently undergoing private instrumental training, began musical training by age 5 (mean = 2.0, SD = 1.4) and had consistently practiced for at least 4 years. Nonmusicians (NonMus, N = 16) were self-categorized and had <5 years of accumulated musical experience throughout their lifespans. Three of the 16 NonMus participants had some degree of previous musical experience, including preschool music programs (e.g., Kindermusik and Wiggleworms classes). Mus and NonMus groups did not differ according to age, sex, IQ (as measured by the 2-subtest Wechsler Abbreviated Scale of Intelligence, comprised of vocabulary and matrix reasoning subtests), by extent of extracurricular activity involvement or by socioeconomic status (as inferred from maternal education). SIN perception was measured in a soundproof

booth using two standardized measures that varied with respect to the amount of contextual cues conveyed in the target signal: the Words in Noise Test (WIN) and the Hearing in Noise Test (HINT).

Findings: Musically trained children outperformed nonmusicians on speech-in-noise perception when the two signals were spatially segregated (HINT_{right} and HINT_{left}), as well as on the auditory working memory and auditory and visual attention tasks. Musicians also demonstrated less auditory brainstem response degradation with the addition of background noise compared to nonmusicians, although neural enhancements in musicians were observed in both quiet and noise conditions. Perceptual (speech in noise) and cognitive (auditory working memory, attention) performance correlated with auditory brainstem function as well as with musicians' extent of musical training.

Impact: positive findings in favour of the musically trained children.

Evidence: weak due to the following reasons (but carefully controlled experiment).

- Small sample size
- The study shows correlation and not causation. The authors acknowledge an alternate hypothesis that children who begin musical training at a younger age (and thus would have received more years of practice) are genetically predisposed to have more robust auditory brainstem function. This interpretation may be supported by work demonstrating relationships between music aptitude, language ability and auditory cortical function in nonmusician children, regardless of musical training.

83. Tendall, R. A. (2010) *The effects of singing and movement in a k--1 reading first program*. 70, ProQuest Information & Learning. (US)

Type of intervention: extracurricular music class

Age of children: kindergarten and first grade students

The purpose of the study was to explore the possible effects of music activities, specifically singing and movement on certain reading test scores in beginning and pre readers in a Reading First school. Participants were 8 kindergarten and 17 first grade students ($N=25$) at a Reading First elementary school in an urban school district in the Midwest.

The consenting participants were divided into experimental and control groups based on matched reading pretest scores on the Developmental Reading Assessment for Grade 1 students and PAT subtests for kindergarten students. After matching children with same or similar pretest scores, the researcher randomly assigned the students into one of the two groups by a coin toss.

All students in the study participated in either an extracurricular music class (experimental group) or in extracurricular interactive reading games (control group) twice a week for 7 weeks. Both sets of activities were focused on the language arts curriculum used during the 7-week experimental phase. The study compared reading test scores of kindergarten and first grade students in the areas of phonemic awareness and fluency as predictors of reading readiness and ability.

Pre and posttest scores from the Developmental Reading Assessment, subtests of the Phonological Awareness Test, and a Graded Word List were compared through the use of the Mann-Whitney t/-test.

Findings: The results showed no significant difference between the reading scores of the reading games group (control) and the music activities group (experimental) in any of the posttest scores although several individual music group students showed notable and surprising individual growth.

The present study demonstrated that students who were in the extracurricular music class (experimental group) scored as well in tests of necessary reading skills as the students who participated in the interactive reading games (control group).

Impact: no difference between experimental and control group

Evidence: weak

- Small sample size (N=13 for the experimental group and N=12 for the control group).
- early morning music class and the control group ($n=12$)
- Short intervention (twice a week for 7 weeks)
- Participants were volunteers who could be at the school early enough before the school day began to join a volunteer class (This self-selected sample might have unique characteristics, so this limits the generalizability of the findings)
- Possible confounding variables such as ability, socio-economic levels, English as a second language or levels of motivation were not controlled for – threat to the internal validity of the study.
- The author acknowledges a limitation in the study that might have due to a ceiling effect for some students. In the pretesting, a few students reached the highest possible score in that subtest, which gave them no room to show any actual growth they may have made from the pretest to the posttest scores. Students in this category might have increased their skills, but the results of the posttest means would not have accurately shown any anticipated growth.

84. Thompson, D. J. (2005) *The impact of classical music on the developmental skills of preschool children.* 3184341 Ph.D., Mississippi State University, Ann Arbor. (US)

Type of intervention: listening to classical music (Mozart sonata)

Age of children: 4 year old

This study investigates the impact of music on the developmental skills of preschool Head Start children. Skill development areas addressed by the study are: fine motor writing, cognitive matching, fine motor manipulation, cognitive counting, language naming, language comprehension, gross motor body movement, gross motor object movement. The study is a pre-experimental study using the pretest/posttest control group design. Washington County Opportunities Head Start Agency located in Greenville, Mississippi, was the agency used for the study.

Sample: N=91 (51 boys and 40 girls); the children were from the community's low socio-economic population. The classes remained intact and were assigned to Group A (treatment group) or Group B (control group). It is mentioned that all classes shared similar characteristics, such as gender, developmental readiness, socioeconomic background and ethnicity. Children in the treatment group listened to Mozart Sonata for Two Pianos in D Major for 30 days just prior to nap time, and the control group received no musical intervention.

A pretest and posttest were given using the LAP-R test, a criterion reassessment exam. The pretest was administered prior to the musical intervention, and the posttest followed the musical intervention.

Findings: The treatment group scored higher than the control group in all developmental areas except fine motor writing and cognitive counting. The differences in these two areas were small and not significant. There were significant differences between the groups in the developmental areas fine motor manipulation and gross motor object movement. The treatment group scored significantly higher than the control group in both these areas.

Impact: significant differences in favour of the experimental group fine motor manipulation and gross motor object movement.

Evidence: weak

- Small sample drawn from one child care center in Mississippi – threat to external validity as it is not possible to generalise the study findings to a larger population.

- No random assignment to experimental and control group – the classes could have differed in terms of observable and/or unobservable characteristics, such as ability, motivation, prior early musical experiences etc.
- The classes were taught by different teachers – teaching quality and teacher characteristics may have influenced the results.

85. Ulfarsdottir, L. O. (2002) *The effects of short term Interpersonal Cognitive Problem Solving therapy with young children.* U601181 Ph.D., University of Leicester (United Kingdom), Ann Arbor. (Iceland)

Type of intervention: there were four studies conducted as part of this work with the third one being the most relevant for this review.

Age of children: 5 year old children

Abstract:

The primary aim of this study is to investigate the effects of short term Interpersonal Cognitive Problem Solving (ICPS) training with pre-school children compared to an alternative treatment of Music Therapy (MT). The MT treatment served to investigate the relationship between creativity and Alternative Solutions Thinking (AST). No treatment control was included in the design (Study I). Seven-month follow-up measures of effects from the treatments are included (Study II), to determine the stability of therapeutic gains. The results reveal a successful elevation of AST and Consequential Thinking (CT) following ICPS training, stable over at least seven months and a sleeper effect from the MT treatment. Behavioural observation revealed improved social interactive behaviours following treatment, but there is some indication that behavioural gains may not be stable.

The influence of music on AST and CT was further examined in Study III by comparing AST and CT fluency of children who attended a musically enriched pre-school to that of the children who received short term MT treatment and a non-treatment Control group. The children in Study III proved significantly better at AST and CT than the children in the previous studies were. Finally, in Study IV, an alternative mode of mediating ICPS skills was attempted. This involved a short training of pre-school staff to apply ICPS training techniques in daily dealings with the children. Girls benefited more from this treatment, and only CT skills were elevated.

The most relevant study for this review is study III which was conducted to search for possible effects of general musical activities on social cognitive thinking. Measures were taken at a pre-school where music played an important part in the daily routines of the children. These measures were compared to measures from study I and II, to examine the different effect of short-term music training and on going music practise on AST and CT skills.

The results suggest favourable effects on social cognitive skills from musical activities.

Sample: N=77 (17 children in the musical preschool group, 27 children in the MT group and 33 children in the control group) drawn from four pre-schools in the city of Reykjavik.

Impact: significant difference between the three groups on measures of AFT and CT. The children from the Musically enriched pre-school were significantly more fluent at AST and CT than both the comparison groups (the Music Therapy intervention group and the Control group).

Evidence: weak

- Small sample size that presents a threat to the study's external validity.
- The author acknowledges that there is a possibility that something, other than the music, in the musically enriched pre-school, is stimulating the social cognitive skills of the children. The physical setting is poorer than in other pre-school settings and there are considerably fewer toys at this pre-school than the others, both indoors and outside. This may be stimulating the children's' creative thinking as they spend their days playing, but need to think of different ways to play with limited amount of toys. The family housing, rather than purpose built pre-school, calls for regular consideration for younger children from the older ones, as the older ones need to help the little ones up and down stairs.
- It is not clear to what extent baseline equivalence was established for the three groups and there is a possibility that the groups differed in their social cognitive skills from the beginning of the study.

86. Van der Vossen, M. R. (2013) *Mathematics achievement among secondary students in relation to enrollment/nonenrollment in music programs of differing content or quality.* 73, ProQuest Information & Learning. (US)

Type of intervention: examining the relationship between enrollment/nonenrollment in music programs and mathematical achievement.

Age of children: grades 8-12

This study examined the relationship between enrollment/nonenrollment in music programs of differing content or quality and mathematical achievement among 739 secondary (grades 8-12) students from four different Maryland counties. The students, both female and male, were divided into sample groups by their participation in a general music or music performance class during their eighth-grade school year. The students were further divided into three groups based on their class score at the district music festivals resulting in five music groups (nonmusic, general music, music performance

with a score of I [the highest score], music performance with a score of II, and music performance with a score of III).

The researcher used the retrospective causal-comparative approach to examine the relationship between music instruction and mathematical achievement.

The results showed that students who participated in music-performance programs (instrumental or choral) scored significantly higher on mathematical measures (Maryland School Assessment [MSA] and High School Assessment Algebra/Data Analysis [HSA]) although the effect size was small. The quality of the music performance programs did not have a significant effect.

Impact: significantly higher gains in mathematics achievement for the music performance group with a score of III as compared to both non-music students ($p < .05$) and general-music students ($p < .05$). However, the higher rated performance groups did not significantly differ from the nonmusic and general-music students.

Evidence: weak

- The study used a convenience sample. It did not involve random assignment of students to music or nonmusic instruction.
- Students were divided into comparison groups based upon their participation in a school music performance program in their eighth-grade year. They might have been exposed to musical training prior to the study and/or to musical training outside of the school program during the study period. In addition, the author found that students who chose to participate in music performance programs were more skilled in mathematics prior to their enrollment in music programs – therefore, there is a variety of possible confounding variables that may have influenced the study results.
- The study included only schools that participated in district music festivals. This criterion may have excluded schools with high-quality programs but few economic resources to pay for the transportation and substitute teachers necessary to attend a festival. It may also have excluded some low quality performance programs because such schools may choose not to participate in the festivals – therefore, the sample may not be representative of the four counties in Maryland.
- Furthermore, as the author mentions, although only a single HAS (High School Assessment) score was provided by the LEAs, many of the students sat for the exam multiple times. Students who do not pass the algebra/data analysis HSA initially are afforded additional opportunities to sit for the exam. Only their highest scores were used in the study. As a result, the variance in the scores has been reduced.
- Finally, the study did not address the grade level of the music performed by each performance group. Festival music is rated on a scale from 1-6 based upon difficulty. It is possible that the quality ratings of the various

performance groups may have changed if the difficulty of their festival music was considered as part of the variable.

87. Wade, C. E. (2011) *Exploring the development of mathematics patterning skills and concepts in young children who experience integrated music and math lessons*. 3485050 Ed.D., University of Houston, Ann Arbor. (US)

Type of intervention: integration of music and mathematics in pre-kindergarten curriculum.

Age of children: 4 and 5 year old children

This study explores how mathematics patterning skills and concepts develop when pre-kindergarteners experience mathematics and music lessons. The participants were 11 pre-kindergarteners, aged four and five, who enrolled in pre-kindergarten at a private preschool in a suburb of a major metropolitan city. The children were taught 8,20 minute mathematics and music lessons for two weeks. Using qualitative methods, data was collected using four "windows of observation" (adapted from Clements and Sarama, 2009) and provided an analysis of pre-kindergarteners' patterning abilities. These four windows included: performance tasks from the Performance Task- Pattern Path Assessment, focused observation, video-taping, and metacognitive fieldnotes. The researcher analyzed the Performance Task Pattern Path Assessment by color coding the developmental levels of the children. The remaining three sets of recorded data were analyzed by highlighting and coding recurring themes in the data collected. Commonalities and points of interest among the data were examined and discussed according to themes generated.

The researcher found that Child 1 and Child 3 showed no change from the pretest to the posttest (both easily completed the color and shape pattern tasks and Child 3 also correctly completed the rhythmic pattern tasks). Child 2, Child 4, and Child 5, did have a change from the pretest to the posttest. All three demonstrated change in the same categories. Each had a change in the "Pattern Fixer", "Pattern Extender", and "Pattern Unit Recognizer" sections. Child 2 also showed a change in the "Numeric Patterner" section. The researcher also found that during the music and math lessons, each of the 5 children created a color and shape pattern-ABABA and AABBAABB-and read the patterns in rhythm. Additionally, each of the children (with the exception of Child 4) created a unique pattern during the lessons.

Impact: positive observed changes for about half of the children in the study (for 3 out of the 8 children).

Evidence: weak

- The study is purely qualitative. It is based on observation, a performance task that yielded qualitative information and analysis of video extracts and metacognitive fieldnotes. (there is no comparison group).
- The study is based on a very small sample of children. Even though the data are interesting and provide some deep insights into the development and mathematics patterning skills of these children, the results cannot be generalised to a wider population.

88. Waller, G. D. (2007) *The impact of music education on academic achievement, attendance rate, and student conduct on the 2006 senior class in one southeast Virginia public school division.* DP19265 Ph.D., Virginia Polytechnic Institute and State University, Ann Arbor. (US)

Type of intervention: examining high school academic achievement data, attendance rates and student conduct of music and non-music students

Age of children: Grades 9-12

This study examined high school academic achievement data, attendance rates, and student conduct of the 2006 graduating class in one Southeast Virginia school division.

In addition, this study briefly explores the impact that music education has on the human brain and on academic achievement at the elementary school and secondary school levels. Moreover, influences that integrating music has on academic achievement in general education courses, arts integration programs, and elements of an effective music education program are explored.

Sample: N=1,741 (music population N=454, non music population N=1,287)
The data indicate a reflection of the total population of the sampled school division (in terms of gender and ethnicity)

The research design includes the independent variables: subject and number of years enrolled in formal music courses or no formal music courses, gender, ethnicity, and enrolment in formal music courses or no formal music courses in high school, grades nine through twelve. The dependent variables include: academic achievement as measured by grade twelve weighted cumulative grade point average (GPA), attendance rate as measured by the number of absences in grade twelve, and student conduct as measured by the number of discipline referrals in grade nine through grade twelve.

Conclusions were based upon descriptive and inferential statistics, correlations, analysis of variance (ANOVA), and regression statistics. These tests confirmed the four research questions and null hypotheses that music

students outperform their non-music counterparts in academic achievement, attendance rate, and student conduct.

Impact: statistically significant difference in academic achievement among the study population with respect to subject, gender and ethnicity and number of years enrolled in formal music courses or no formal music courses and participation in formal music courses and in no formal music courses. Similar positive impact in terms of absences and student conduct.

Evidence: weak

- The study was limited to one urban school district in Southeastern Virginia. Not possible to generalise the results to a broader population.
- The music students were self-selected in instrumental music or vocal music or course selection (music or core areas). It may be that the ones that choose music courses have higher ability from the start of their musical involvement.
- The author states that several categories in the independent variable subject and number of years enrolled in formal music courses or no music courses and the independent variable ethnicity have ten participants or fewer. This limitation threatens the internal validity of the study.
- It was not possible to control for the quality of the teacher. There is the possibility that excellent teachers who are enthusiastic and who relate well to students may make a greater difference in educational outcomes than the students' musical participation.
- Other uncontrollable variables such as the influence of outside sources (e.g. private music lessons, church affiliations etc.) might have influenced the results and threaten the internal validity of the study.

89. Walton, J. P. (2013) *The effect of music on the reading achievement of grade 1 students*. 3589782 Ed.D., Jones International University, Ann Arbor. (US)

Type of intervention: music integrated in the curriculum

Age of children: grade 1

The purpose of this quantitative, quasi-experimental study was to determine if a first grade reading curriculum infused with music (listening, singing, instrument playing) would produce test results that are statistically significantly different than the traditional, non-music reading curriculum. The sample consisted of two intact first grade reading classes—a control group and an experimental group—in a Title I public elementary school in Maryland. The teacher for the experimental group integrated music into the first grade reading curriculum for six weeks. The control group received the traditional first grade reading curriculum without music instruction. First graders' reading achievement was measured before and after the six-week study using the Gates MacGinitie Reading Test (GMRT), level BR (beginning reading).

Although the experimental group made greater gains than did the control group from pretest to posttest, there was no statistically significant difference

(at the 5% confidence level) between the pre and posttest mean scores for the treatment group. The results of this study indicate that music may improve reading ability when integrated into a reading curriculum.

Impact: no statistically significant difference between the pre and posttest mean scores for the treatment group (however, there was an observed improvement in the scores of the experimental group compared to the control).

Evidence: weak

- Small sample size (N=19 for control group; N=18 for experimental group) drawn from one school – threat to external validity and not possible to generalise to a larger population.
- Brief duration of treatment (six weeks is not a long enough intervention).
- Quasi-experimental design that lacks random assignment – no baseline equivalence established in terms of observable or unobservable characteristics. The experimental group could have been better from the start (possible selection bias).
- The classes were taught by different teachers – differences in test scores could have resulted from teachers' different characteristics and the quality of teaching instruction, rather than being the result of the intervention.

90. Wellman, R. L. (2007) *Music as a pre-reading education tool for non-music preschool teachers.* 3283735 Ph.D., Capella University, Ann Arbor. (US)

Type of intervention: use of music in preschool

Age of children: preschool children

This is a quasi-experimental pretest-posttest control group design study which examined the effectiveness of music composed by the researcher and used as a teaching tool by non-music preschool teachers. Teachers from Chicago area preschools were taught how to functionally use music within their teaching experiences. Children in both music and non-music groups were given the Rhyming Awareness sub-test of the Pre-Reading Inventory of Phonological Awareness as a pretest and posttest to determine if the teacher's use of music increased children's pre-reading abilities. Both groups were found to make gains in their test scores between the pretest and posttest. There was a significant difference between their pretest scores which may have impacted the study from the beginning; however the music group's posttest were still significantly higher.

Sample: The total sample size was 12 teachers. Each group (n=6) had different numbers

of students in their classrooms based on enrollment and consented participation. Six teachers and their students were randomly allocated the non-music group and six teachers and their students were randomly allocated the music group. Each teacher had six to eighteen children in each class.

Impact: there was a positive change in posttest for both control and experimental groups but experimental group scores were significantly higher.

Evidence: weak

- The teachers in the study were not trained musicians or music educators. The author acknowledges some training difficulties as training times were limited and often in one-on-one situations without having peer support from other teachers – this may have affected the successful delivery of the intervention.
- The number of pupils varied in each class – this would have impacted in the differential delivery of the intervention and threatens its internal validity.
- This was a quasi-experimental study without randomised experimental and control groups. There were also some differences in pretest scores which may have impacted the study from the beginning (no true baseline equivalence established).
- The study cannot be generalised outside of the context where the intervention took place (Chicago schools).

91. Woody, R. H., III. (1998) Music in the education of young adolescents. [Article]. *Middle School Journal*, 29(5), 41-47.

[This is a discussion paper on the benefits of music for adolescents. It does not contain much empirical research and the few sources that are cited were published before 1995]

92. Zafranias, N. (2004) Piano keyboard training and the spatial-temporal development of young children attending kindergarten classes in Greece. *Early Child Development and Care*, 174(2), 199-211.

[Not found]

Abstract:

This research had three main goals: to control whether children would show significant improvement in cognitive test scores following piano/keyboard instruction; to compare whether the spatial tasks would show greater improvement than other tasks; and to examine whether the effects of piano/keyboard training on spatial tasks are gender differentiated. Sixty-one kindergarten children received two piano/keyboard lessons weekly during one school year. Six Kaufman Assessment Battery for Children subtests were administered before and after the instruction period. Following piano/keyboard instruction, participants improved significantly in Hand Movements, Gestalt Closure, Triangles, Spatial Memory, and Arithmetic but not in Matrix Analogies. Boys had significantly better gain scores than girls in Triangles. It is hoped that these findings contribute to the growing body of research investigating the extra-musical effects of music instruction.