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Dr. Rena Upitis &
Dr. Katharine Smithrim
Faculty of Education
Queen's University
Kingston, ON K7L 3N6

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Learning Through the Arts™

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*National Assessment
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*Final Report to The Royal Conservatory
of Music*

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Executive Summary

In 1999 The Royal Conservatory of Music commissioned a three-year study on the effects of *Learning Through the Arts*[™] for participants in schools at six Canadian sites. This report describes the effects of the LTTA program on students, concentrating in particular on the students who were in Grade 4 at the beginning of the study and at the end of Grade 6 at the conclusion of the study. Beliefs and practices of parents, artists, teachers, and administrators are also described.

The total student sample consisted of 6,675 students from Grades 1 through 6, from LTTA schools and two types of control schools. On most measures of mathematics and language, there were no significant differences between the Grade 6 students in the LTTA schools and students in the two types of control schools. Thus, it can be concluded that involvement in the arts for the students in the LTTA schools did not come at the expense of achievement in mathematics and language.

While there were no differences at the end of the three years on mathematical tests of geometry and of applications of mathematical concepts, the Grade 6 LTTA students scored significantly higher on mathematical tests of computation and estimation than students in the two types of control schools, equivalent to a difference of 11 percentile points in raw scores. There were no baseline differences in mathematics achievement or in socioeconomic status of the students in the three types of schools. Further, there was no interaction effect between socioeconomic factors and program type. Thus, insofar as there was a program effect, the benefits of the LTTA program occurred for children of all socioeconomic classes.

The findings suggest that involvement in the arts contributed to engagement in learning. Students, teachers, parents, artists, and administrators talked about how the arts motivated children, referring to the emotional, physical, cognitive, and social benefits of learning in and through the arts.

Activities outside of school had an impact on student achievement in math and language. Music lessons outside of school and reading for pleasure were significant contributing factors for achievement in math and language after the effects of socioeconomic status and the LTTA effects were considered. The data also indicated that some kinds of student activities were more likely to group together than others (for example, children who read for pleasure and take music lessons are also likely to belong to clubs and engage in organised sports, and are unlikely to spend their leisure time playing videogames).

Nearly all parents (90%)—regardless of school type—reported that the arts motivated their children to learn. Fewer than 1% of parents questioned the importance of arts programs. Artists also observed a wide variety of benefits to students engaged in the arts, including the development of arts skills, exploration of curriculum topics through the arts, and laying the foundation for a lifelong love of the arts.

By the end of the three-year period, there were significantly more LTTA teachers, as compared to teachers in other types of schools, who believed that the arts were an effective way to teach language, science, and math. LTTA teachers reported a number of changes in classroom practices that reflected their increased commitment to teaching through the arts, and their growing skills and confidence in embedding the arts in their teaching practices. In a similar vein, principals of LTTA schools were more likely than principals in the control schools to personally consider the arts as ‘very important’. Principals also identified a number of barriers to further implementation of the arts in their schools. Site coordinators kept close tabs on the LTTA program in their cities and regions, and reported far-reaching benefits to schools, teachers, students, and artists. Coordinators were instrumental in keeping the channels of communication open between all parties. School district superintendents confirmed the positive effects of the LTTA program. All of the superintendents viewed the arts as critical in education, and viewed the LTTA program as a partial solution to chronic underfunding and lack of expertise in elementary arts education.

In conclusion, it was clear that the students in the LTTA program benefited from the program in many ways. Some benefits lent themselves to measurement, such as gains in computation test scores. Others were more ephemeral, but perhaps even more important in the long term, as students’ and teachers’ lives were transformed through the arts. The report closes with recommendations for further research.

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Context

The benefits of the arts to the development and well-being of adults and children alike have been widely reported (Dewey, 1934; Dissanayake, 1995; Gardner, 1973, 1983; Greene, 1995). Nevertheless, in many elementary schools virtually no arts instruction takes place. While some Canadian provinces, such as Saskatchewan, have strong arts programs including arts specialist teachers at the elementary level (Bartel, Dolloff, & Shand, 1999), in most provinces resources for arts education are limited. Further, Canadian teacher education programs do not emphasise the arts (Upitis, 2001; Vagianos, 1999). Thus, lively system-wide programming in the arts is not available to many children.

In recognition of the importance of the arts and in response to the declining support for arts programs in schools, some public schools have become specialised arts schools with teachers and students selected for their arts interests and experiences. Although there are benefits to students attending such schools, as Pitman (1998) observes, “Setting up elite arts schools for those who see their future employment in the arts does not address the main concern—that every child must be brought to a level of arts literacy that will make life joyful and productive” (p. 60).

Several models have been developed to increase the level of arts literacy in public schools across the country (Vagianos, 1999), but empirical research assessing such models is scarce. The research described herein provides an analysis of extensive and longitudinal empirical research on one such model: *Learning Through the Arts*TM (LTTA).

In the *Learning Through the Arts*TM elementary education model, professional artists work directly with students after developing curricula with teachers (for a full description of the program, see Elster, 2001). Earlier research indicated that LTTA led to the transformation of teachers’ practices and changes in administrative practices to increase support for arts curricula (Wilkinson, 1998).

The research reported here was designed to determine whether LTTA is an effective program for the revitalisation of elementary education as experienced by students and their parents, teachers, administrators, and artists. Grade 6 student achievement and engagement form the focus of the student analysis, although other issues are also considered, such as gender differences in terms of out-of-school activities and attitudes towards school and school subjects. Changes to teachers’, parents’, artists’, and administrators’ beliefs and practices over the three-year period are also described.

Related Research

Over the past century, the arts have enjoyed prominence during times of progressive reforms while being regarded as an extra during the 'back-to-basics' movements (Oreck, 2002). In the years between 1950 and 1980, arts education proceeded under the mantle of aesthetic education and was justified by aesthetic or intrinsic ends and not, for example, to enhance self-esteem or improve reading skills (Reimer, 1970). To conduct research on the non-arts effects of arts education was "out of vogue at best, out of touch at worst" (Cutietta, Hamann, & Walker, 1995, p. 5).

In the mid-1970s, Eisner (1974) began calling for the evaluation of the impact of arts programs. Consequently, there is a growing body of evidence showing that arts education positively affects other aspects of living and learning beyond the intrinsic values of the arts themselves. Reported benefits of the arts include the development of the imagination (Greene, 1995); greater motivation to learn (Csikszentmihalyi, 1997); increased student creativity, lower drop-out rates, and increased social skills (Catterall, 1998; Luftig, 1995).

Researchers also report that students involved in the arts may exhibit higher academic achievement than their peers who are not involved in the arts (Catterall, 1998; Catterall, Chapleau, & Iwanaga, 1999a, 1999b; Deasy, 2002; Fowler, 1996; Hamblen, 1993; Hetland, 2000; Luftig, 1995; Moore & Caldwell, 1993; Murfee, 1995; Music in World Cultures, 1996; Parks & Rose, 1997; Welch & Greene, 1995). Much of this research is correlational in nature, although it is not unusual for researchers and others to go beyond the evidence to make causal claims about the arts and academic achievement (Winner & Cooper, 2000).

There is another concern associated with research on the arts and academic achievement. By suggesting that the arts might serve as handmaidens to other subjects, there is a danger that the arts will not be valued for their distinct contributions to education (Winner & Hetland, 2000). Arts educators have tried to strengthen the position of the arts by claiming that the arts can enhance the learning of other subjects. But as Winner and Cooper (2000) argue, it is foolhardy to expect that the arts can be as effective in teaching another subject as direct teaching of that subject. They further argue that "advocates should refrain from making utilitarian arguments in favor of the arts [because] as soon as we justify arts by their power to affect learning in an academic area, we make the arts vulnerable" (p. 66-67). Any justification for the arts should be made in terms of the important and unique contributions that arise from arts education. For example, the arts are particularly important for experiencing the joy of creating, developing attention to detail, and learning ways of expressing thoughts, knowledge, and feelings beyond words (Eisner, 1994, 2002; Greene, 1995; Howard, 1992).

Another issue that is crucial to consider in arts education research is that of socioeconomic status. The report by Catterall, Chapleau and Iwanaga (1999b), cited in the Champions of Change initiative of the U.S. Secretary of Education, addressed this issue. The researchers analysed differences in achievement and attitude for 25,000 students over a ten-year period, treating students who were disadvantaged in terms of socioeconomic status as a separate group. For all students, but particularly for those in the low SES group, academic performance, attitudes and behaviour were positively correlated with long-term involvement in the arts. For example, for low SES students, 43.8% of students highly involved in the arts scored in the top 2 quartiles in reading, compared to 28.6% for students with little or no arts engagement. When the entire student sample was considered, 70.9% of high arts students scored in the top 2 quartiles in reading, compared to 46.3% of the low arts students. Catterall et al. also found that the probability of being highly involved in the arts was twice as great for economically advantaged students.

The LTTA national research reported here both complements and extends prior research on arts education and social and cognitive development in several ways. First, the inclusion of control schools with a special initiative (usually a technology focus) and schools without a specific school-wide curriculum focus, allowed for comparisons not only within LTTA schools, but between LTTA schools and other types of schools as well. This quasi-experimental design is the kind of approach that Winner and Cooper (2000) recommended for studies on arts education and achievement. Second, the research takes into account the

effects of socioeconomic status on achievement by the inclusion of household income and mother's education level in the analyses. Third, the research was designed to ascertain the distinct contributions of the arts to learning, such as the development of the capacity for attention to detail mentioned earlier, as well as the ability to make judgments in the absence of clear rules, and awareness of the importance of nuance (Eisner, 2002). These factors were included because it was hypothesised that such factors may contribute to any achievement gains exhibited in other subjects, possibly because of transfer (Burton, Horowitz, and Abeles, 2000), or possibly because of overall increased engagement in school (Burton et al., 2000). By engagement, we mean the involvement of the sensorimotor or physical, emotional, cognitive, and social dimensions (Csikszentmihalyi, 1997; Noddings, 1992). Csikszentmihalyi also describes a transcendent dimension as "the very real feeling we have after an aesthetic encounter that some kind of growth has taken place, that our being and the cosmos have been realigned in a more harmonious way" (1997, p. 25). It should also be stated that this attention to engagement is included because we hold the view that justification for the arts should ultimately be made in terms of the unique contributions of arts education and not primarily on the basis of achievement in other subjects. Further, we expect that any contributions made by the arts to achievement are likely to be complex; it could be that the arts offer a way for students to become more motivated to learn (Csikszentmihalyi, 1990). It could also be the case that there are specific cognitive links between some of the arts disciplines and other subjects that are usually considered 'core' school subjects (e.g., the often touted link between music and mathematics; Vaughn, 2000).

Teacher transformation was another expected outcome of the LTTA program, as one of the foci of the LTTA program is that of professional development for teachers. In an earlier study, using a different model for enhancing arts education in elementary schools, Upitis, Smithrim, and Soren (1999) concluded that fundamental changes to teachers' practices and beliefs arose when teachers worked directly with artists and experienced the artistic process while making their own art, and that lasting changes occurred for approximately 20% of the teachers after two or more years of professional development. Among the benefits teachers ascribed to the program were confidence to try new things, a new appreciation of the planning and work involved in art-making, a revitalisation of teaching in other subject areas, and a commitment to provide more time, materials, instruction and support for students' art-making. Data were analysed using a three-level matrix developed by Upitis, Smithrim, and Soren (1999) to assess and describe teacher transformation. The first level of the matrix identified conditions that were necessary, but not sufficient, for teacher transformation (e.g., exploration of new art forms and media). The second level identified the potential for sustained transformation (e.g., changing images of artists). The third level identified ways in which profound changes were operationalised (e.g., long-term pursuits of new art forms). These kinds of transformations to beliefs and practices were also considered in the LTTA national research. Similarly, changes in administrative beliefs were considered, as were changes in artists' perspectives.

Research Objectives

There were six overall research objectives established over the course of the three-year study that encompassed issues related to students and their parents, teachers, artists, principals, LTTA site coordinators, and school district superintendents. The objectives were:

1. To determine if students in LTTA schools benefited from the program, as evidenced by:
 - ♦ positive changes in attitudes towards the arts and learning reported by students and their parents, teachers, and administrators, through surveys, focus groups, and interviews;
 - ♦ achievement on standardised tests of language and mathematics as compared to control schools using the Canadian Achievement Tests (CAT•3) for language and mathematics, as well as criterion-referenced writing samples;
 - ♦ positive changes in out-of-school activities reported by students and their parents through surveys, focus groups, and interviews, with particular attention to gender patterns in attitudes and activities.
2. To characterise students' views and experiences of school subjects and out-of-school activities, as evidenced by:
 - ♦ self-reports on surveys;
 - ♦ information provided in focus groups.
3. To determine if there were changes in parents' beliefs over the three-year period, as evidenced by:
 - ♦ survey results;
 - ♦ open-ended comments.
4. To determine if there were changes in teacher practices at LTTA schools as compared with teachers in control schools, as evidenced by:
 - ♦ changes in attitudes and practices over the three-year period, as reported through surveys, focus groups, and interviews;
 - ♦ observations made by parents, artists, and administrators.
5. To determine if there were changes in administrators' beliefs and practices as evidenced by:
 - ♦ self-reported changes through surveys and interviews.
6. To describe observations made by artists about the LTTA program as evidenced by their comments on an exit survey.

Research Sites and Subjects

The *Learning Through the Arts*TM national research study involved schools at six Canadian sites: Vancouver, Calgary, Regina, Windsor, Cape Breton, and Western Newfoundland. At some sites, more than one school board or district was involved.

LTTA schools were selected at each site by the following process (Elster, personal communication). The Royal Conservatory of Music extended letters to every school board/district in Canada, describing the LTTA program and inviting interested boards/districts to identify schools that might take part. Superintendents and/or curriculum consultants who were interested in the initiative responded with proposals from schools interested in the program. Those schools that met the criteria listed below were accepted as LTTA schools. Criteria for participating schools were:

- Schools would make a three-year commitment to the program and to the research;
- Over the course of the three years, all students in Grades 1 through 6 would participate;
- All teachers of Grade 1 through 6 students would be willing to be part of the initiative;
- Release time (equivalent of 2.5 days/year) would be provided for professional development for teachers for each of the three years.

At the beginning of the study (July, 1999), there were 8 to 11 LTTA research schools at each site. From these schools, a random sample of approximately 650 students per grade was selected, with a staggered entry by grade over the three-year period, corresponding to the pattern by which the LTTA program was introduced. That is, in Year 1 of the study, when the LTTA program was introduced to students in Grades 1 and 4, the same group of Grade 1 and 4 students was sampled for research purposes. In Year 2, the students who were previously in Grades 1 and 4 were involved once again in the research and in the program. In addition, in Year 2, a new group of Grade 1 and 4 students was added to the overall sample. In the final year, the students who were originally in Grades 1 and 4 participated in both the research and the program, as did the students added in Year 2. A final group of Grade 1 and 4 students was added in the third year as well. By the end of Year 3 there were 4063 LTTA students sampled from 55 LTTA schools.

At each site, control schools were also selected. Almost half of the control schools had a school-wide initiative in place that was not related to the arts. Most of these schools had an initiative focusing on the integration of technology across the curriculum. Other control schools had no special initiative in place. Control schools were matched as closely as possible with the LTTA schools for size, location (e.g., urban vs. rural), and socioeconomic status. An additional 2602 students in total were sampled from the six sites from the two types of control situations. There were 15 special initiative and 20 regular schools involved in the study.

When the final data collection for Year 3 occurred (Spring, 2002), there had been an overall attrition rate in the student population from Year 1 of approximately 32%.

Year and Grade	LTTA	Special Initiative	Regular	Total sampled	Total remaining in the sample in Year 3 and attrition rate (%)
Year 1 Grade 1	651	198	173	1022	683 (33% attrition)
Year 1 Grade 4	687	195	218	1100	747 (32% attrition)
Year 2 Grade 1	628	203	225	1056	—
Year 2 Grade 4	655	199	209	1063	—
Year 3 Grade 1	747	242	237	1226	—
Year 3 Grade 4	695	213	290	1198	—
Total Sample	4063	1250	1352	6665	—

Table 1. Student Sample Sizes and Attrition for the Original Cohort

Note. Total sample numbers are based on the number of parent consents, and the total sample remaining is based on CAT•3 tests completed.

There were over 900 teachers and 130 principals associated with the three types of schools over the course of the three-year national research study. Response rates to surveys for principals and teachers were high, ranging from 72%–86% in each of the three years. School district superintendents also participated throughout the three-year study, with at least one superintendent involved at each of the national sites. LTTA program site coordinators (N=5) and artists (N=85; 35% response rate) took part only in the final year of the study (2001-2002).

	LTTA	Special Initiative	Regular	Total sampled
Teachers	567	160	194	921
Principals	84	19	30	133

Table 2. Total Number of Teachers and Principals Sampled

Note. There were more principals than schools because there were changes in principalships over the three-year period. There were also changes in teacher populations.

Method

Instruments

A variety of quantitative and qualitative instruments was used to gather data from students, parents, teachers, artists, and administrators. The quantitative tools included standardised achievement tests, holistically scored writing samples, and surveys regarding attitudes and practices. The qualitative data were gathered through open-ended survey questions, one-on-one interviews, and focus group interviews.

Examples of the instruments can be found in previous reports: *Learning Through the Arts™ National Assessment: A Report on Year 1, 1999-2000* (Upitis & Smithrim, 2001) and *Learning Through the Arts™ National Assessment: A Report on Year 2, 2000-2001* (Upitis & Smithrim, 2002). A full compendium of instruments appears in *Learning Through the Arts™: Assessment Tools* (Upitis & Smithrim, 2003).

Students

Achievement

For students in Grades 1 and 2, two problem-solving criterion-referenced constructed response tasks for mathematics from the Canadian Achievement Tests were used. For Grade 1, one task dealt with manipulating mathematical figures and the other with money concepts and attention to detail. For Grade 2, one task involved interpreting graphs, and the other was a patterning problem.

Students in Grades 3 through 6 completed the appropriate levels of the Canadian Achievement Tests (CAT•3) for their grade. The reading tests measured abilities in comprehension, story sequencing, vocabulary, and grammar. The mathematics tests measured abilities in geometry, application of mathematical concepts, computation, and estimation.

All students (Grades 1 through 6) wrote letters of appreciation according to a standardised prompt. These letters were used as writing samples, and were criterion-referenced and scored centrally (see Upitis & Smithrim, 2002, for examples of writing sample rubrics). The full set of rubrics for writing samples and criterion-referenced constructed response tasks for mathematics appears in *Learning Through the Arts™: Assessment Tools* (Upitis & Smithrim, 2003).

Attitudes

Survey instruments for Grades 1 through 6 were developed to determine students' attitudes towards school and learning in general terms, and towards the arts and other subjects in particular. The surveys were also used to gather information regarding students' interests and activities outside school (e.g., reading for pleasure, playing videogames, watching television, playing sports, taking music lessons).

In Years 2 and 3, researchers conducted focus group interviews for selected students in Grades 5 and 6 at all sites. These focus groups, of five or six participants each, were held in the schools and were designed to help the researchers understand and enlarge upon the survey data.

Parents

Parents responded to a brief set of questions on the permission form at the outset of the study regarding their own leisure activities and their children's out-of-school activities. They also were asked a set of optional questions regarding mother's educational level and household income.

At the end of the study, parents were asked to respond to a survey with the same questions which appeared on the initial permission form. In addition, the exit survey included questions regarding parental attitudes towards arts in schools and children's experiences with the arts in schools.

Teachers

At the beginning of the study a teacher questionnaire was designed to assess how teachers felt about the arts in schools and about more general issues regarding teaching and classroom practices. An exit survey for teachers was designed to determine if any changes in teachers' beliefs and practices occurred throughout the research period. In addition, telephone and in-person interviews were conducted with individual teachers at the end of Years 2 and 3 of the study. In Year 3, focus group interviews were conducted with lead teachers across LTTA schools at several sites, as well as with teachers from within LTTA schools.

Principals

Three instruments were prepared for use with principals: a comprehensive baseline survey designed to assess principals' beliefs and practices, an exit survey that was administered in Year 3, and an in-person interview for LTTA principals regarding their ideas and feelings about arts in schools.

Superintendents

One survey instrument (Year 1) and one in-person interview instrument (Year 3) were designed for superintendents. The initial survey sought basic background information and asked questions about arts related issues, including support of the arts in terms of personnel and finances. The purpose of the in-person interview was to assess changes in superintendents' beliefs about the arts in schools after involvement with the LTTA program.

Site Coordinators

The site coordinator in-person interview instrument was developed in the third year to deepen the researchers' understanding of some of the findings regarding hard-to-educate students and the success of the artists in working with teachers and in making curricular links.

Artists

A survey for artists was developed to assess self-reported changes in artists' beliefs and practices which were attributed to the LTTA program. This survey was administered in Year 3 of the study.

Data Collection

The LTTA program was introduced into schools through a staggered entry by grade. Students and teachers in Grades 1 and 4 received LTTA programming in the first year (1999–2000), with Grades 2 and 5 being added in the second year (2000–2001), and Grades 3 and 6 added in the final year (2001–2002). The testing and survey schedule corresponded to the program structure, in that only Grade 1 and 4 students were surveyed and tested in Year 1, with Grades 1, 2, 4, and 5 students being surveyed and tested in Year 2, and students in Grades 1 through 6 being surveyed and tested in Year 3.

Each student was issued an identification code containing information about the child's grade, type of school, sex, and other characteristics, allowing all measures taken over the course of the study to be coded and analysed for individual students. Confidentiality and anonymity were maintained throughout the process. Teachers indicated which students had special programs/accommodations in effect. Accommodations were made for data collection accordingly, and this information was coded along with other individual student information.

In two sites, the program was in place to begin in the fall of 1999, and hence baseline data collection occurred that fall. In four sites, the program was in place to begin in the spring of 2000, and baseline data collection occurred in the spring. The tests are normed for fall or spring administration, and two sets of norms tables are used for these administrations. This allowed for the differences in performance from fall to spring of the same grade cohort to be accounted for statistically. Hence the scores from the two sites which administered the CAT•3 in the fall could be equated with the four sites which administered the same test in the spring. The six sites were combined for statistical analyses of baseline findings in this way.

The schedules for data collection for teachers, students, artists, parents, principals, site coordinators, and school district superintendents appear in the following three tables.

	Fall Year 1	Spring Year 1	Fall Year 2	Spring Year 2	Fall Year 3	Spring Year 3
Students	Gr 1, 4		Gr 1, 2, 4, 5	Gr 1, 2, 4, 5	Gr 1, 4	All students
Parents	Gr 1, 4		Gr 1, 4 (new)		Gr 1, 4 (new)	Gr 3, 6
Teachers	Gr 1, 4	Gr 1, 4	All teachers	All teachers		All teachers
Principals	All principals	All principals	All principals			All principals
Superintendents		All superintendents	All superintendents			All superintendents
Artists						All artists

Table 3. Survey Data Collection Schedule

	Fall Year 1	Spring Year 1	Fall Year 2	Spring Year 2	Fall Year 3	Spring Year 3
Gr 1		Math CR Level 11; writing sample		Math CR Level 11; writing sample		
Gr 2				Math CR Level 12; writing sample		
Gr 3						CAT•3 Level 13; writing sample
Gr 4	CAT•3 Level 13 (2 sites)	CAT•3 Level 13 (4 sites); writing sample (all sites)	CAT•3 Level 13; writing sample		CAT•3 Level 13; writing sample	CAT•3 Level 14; writing sample
Gr 5						CAT•3 Level 15; writing sample
Gr 6						CAT•3 Level 16; writing sample

Table 4. Language and Mathematics Achievement Data Collection Schedule

	Spring Year 2	Spring Year 3
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Grade 5	Focus group interviews	
Grade 6		Focus group interviews
Teachers	Individual interviews	Individual and focus group interviews
Principals		Individual interviews
Superintendents		Individual interviews
Site Coordinators		Individual interviews

Table 5. Interview Data Collection Schedule

Data Analysis

The data collected allowed for various individual and group comparisons to be made. However, at the time that consent to take part in the research was acquired at the outset of the study, participants were assured that none of the national results would be reported by individual student, school, or region.

The data were entered into computer files so that they could be analysed using SPSS software (Norusis, 1993). Double data entry was carried out for 10% of the data, to ensure that data were entered accurately and consistently. Based on the double entry, it was estimated that 97% of the data were entered accurately.

Group comparisons were made between those students in the LTTA program and those students in the two control conditions. Comparisons began with simple descriptive statistics, cross-tabulations, and t-tests to ascertain group differences. In cases where significant group differences were found in the means analyses in the student populations, regression analyses were also conducted to determine effect sizes. In all regression analyses, a measure of socioeconomic status (household income and/or mother's education) was designated as the first independent variable. Under the more stringent regression analyses, some of the original differences that appeared in the t-tests were not found (e.g., the LTTA students scored better, as a group, on most of the mathematics measures, but when regression analyses were conducted, higher performance was found only on the test of computation and estimation). In addition, factor analyses were conducted to help characterise students' views and experiences with the arts, both within and outside school settings. These factor analyses were conducted for students in Grades 1 through 6.

Student focus group interviews were used to help identify underlying reasons for differences in students' attitudes, interests, and achievement levels. Focus group field notes and audiotapes were transcribed and analysed using ATLAS.ti software designed to parallel traditional methods of theory-building based on a grounded theory approach to qualitative analysis (Muh, 1997). The data from the focus group interviews were coded by several researchers and analysed by at least two members of the research team for triangulation purposes.

Hypotheses generated in Years 1 and 2 as a result of LTTA analysis were then tested on the data gathered through the National Longitudinal Study on Children and Youth, administered by Statistics Canada and sponsored by the Council of Ministers of Education, Canada/ Conseil des ministres de l'Éducation (Canada). These analyses, carried out by statisticians at Statistics Canada under the direction of researchers from our team, are also described in the Year 2 report (Upitis & Smithrim, 2002). Some of the public domain survey questions of the National Longitudinal Study on Children and Youth (NLSCY, 1997 & 1999) were included on the LTTA surveys, and both the NLSCY and LTTA studies share the CAT•3 as a common measure.

Teacher, artist, and principal surveys, and teacher and administrator interviews, were transcribed and coded, again using ATLAS.ti to assist with the analysis. The teacher transformation matrix developed in an earlier research project (Upitis, Smithrim, & Soren, 1999) and adult transformative learning theory (Mezirow, 2000) provided a theoretical basis for the development of the codes for these groups. Again, the

data were coded by the research team, using ATLAS.ti. The use of triangulation procedures ensured that the coding was both valid and reliable.

Baseline Results

There were no significant baseline differences in the comparison measures between students in the three types of schools in terms of socioeconomic status, achievement, attitudes towards school, participation in the arts, and parental attitudes toward the arts. This was also the case for teacher and principal beliefs and practices. The lack of significant baseline differences in Year 1 was extremely important, as it allowed for legitimate and meaningful comparisons between the three types of schools in Year 3 of the study.

A full description of baseline results can be found in the Year 1 report (Upitis & Smithrim, 2001), and in the paper published in the *International Journal of Education and the Arts* (Upitis, Smithrim, Patteson, & Meban, 2001; <http://ijea.asu.edu/v2n8/>). Some of the most important baseline findings are highlighted below.

Student Achievement, Socioeconomic Status, and the Arts

Socioeconomic status, as indicated by household income and mother's education level, was a significant predictor for academic achievement on all language and mathematics measures. That being said, those Grade 4 students who took music lessons outside of school scored significantly better on all language and mathematics measures than their peers who did not take music lessons outside of school.

Student Desires, Beliefs, and Practices in the Arts

While students preferences did not vary between types of schools, there were strong differences by gender. These differences were apparent as early as Grade 1, with more girls than boys enjoying arts activities. By Grade 4, gender differences also appeared in students' perceptions of their skills in various arts forms. These gender differences are discussed at length in the report on Year 1 (Upitis & Smithrim, 2001).

Parents and the Arts

Parents who valued arts activities, as indicated by their own leisure choices, were more likely to have children who took music lessons outside school.

Teacher Beliefs and Practices in the Arts

The vast majority of teachers, from all three types of schools, believed that the arts are fundamental to learning, that students could express knowledge and skills through the arts, and that the arts were an effective way of teaching math, science and language arts. Nevertheless, only one in five teachers had any specialised training in arts education.

Grade 6 Achievement Results

Achievement

There were no significant differences on language measures between the Grade 6 students in the LTTA schools and students in the two types of control schools. There were some differences in mathematics scores, favouring the LTTA student group. This allows us to make an important conclusion:

Involvement in the arts for the students in the LTTA schools did not come at the expense of achievement in mathematics and language.

Mathematics

At the end of three years of LTTA programming, the Grade 6 LTTA students (10- to 12-year-olds) scored significantly higher on a test of computation and estimation than students in the two types of control schools ($p < .05$). Percentile differences were calculated by using the standard deviation of the LTTA group and the mean of the comparison group. The difference was equivalent to approximately 11 percentile points in raw scores.

There was also a significant difference in means on the tests of geometry and applications of mathematical concepts between the LTTA students and students in regular schools ($p < .05$), but this difference did not remain significant once other variables, such as household income, were entered into the regression analysis.

There were no baseline differences in mathematics achievement or in socioeconomic status of the students in the three types of schools.

It is important to stress that the single most important factor that determines scores on achievement tests is the ability of the individual child. In fact, the correlations between each of the five language and mathematics measures were very high ($p < .001$ in each case, with correlations ranging from 54% to 75% within subjects and 20% to 57% between subjects). In other words, if a child scores well on one language measure, he or she will likely score well on the other language measures, and on the math measures as well. Some studies have shown that up to 90% of the variability in test scores can be accounted for by factors associated with the individual child (Ma & Klinger, 2000). In the regression analyses that were conducted, the first predictor that was entered, therefore, was the child's score for the particular subject area at the beginning of the study.

That the LTTA program accounts for *any* of the variance in one of the mathematics scores is not trivial. As can be seen from the regression table, the LTTA program accounted for approximately 1.2% of the variance, once initial test scores, household income, and mother's education were taken into account.

There was no interaction effect between socioeconomic factors and program type. This finding indicated that, insofar as there was a program effect, the benefits of the LTTA program occurred for children of all socioeconomic classes.

The regression table summarising the explained variance in computation and estimation scores appears below. Both household income and mother's education are used as indicators of socioeconomic status (N=408).

	r^2	r^2 change	β	p	F
Computation and Estimation					
Step 1					
Grade 4 math score	.243	.243	.493	.000	136.07 *
Step 2					
Grade 4 math score			.474	.000	
Household income			.121	.008	
Mother's education	.256	.013	.037	.414	48.32 *
Step 3					
Grade 4 math score			.471	.000	
Household income			.104	.022	
Mother's education			.028	.528	
LTTA program	.268	.012	.110	.010	38.42 *

Table 6. Regression Analysis Predicting Computation and Estimation Scores from Previous Mathematics Scores, Household Income, Mother's Education, and LTTA Program.

* $p < .001$

Language

There were no statistical differences in overall language scores at the end of the three-year period. While the mean scores for writing for Grade 6 LTTA students were higher than those of the Grade 6 students in the other types of schools, they were not significantly higher. It remains to be seen if the difference grows to significance over time, and this is a question worthy of further study.

Engagement

There are indications that involvement in the arts goes hand in hand with engagement in learning at school. In interviews and on surveys, LTTA students, teachers, parents, and administrators talked about how the arts engage children in learning, referring to the emotional, physical, cognitive, and social benefits of learning in and through the arts. There were thousands of references to emotional engagement and to joy. The overall evidence suggests that students who engage in the arts are also more likely to enjoy school.

There were indications that students desired more **physical activity** in their learning environment and that physical activity contributed to their engagement in learning. LTTA programming emphasised physical activity through dance, music, drama, and the literary and visual arts.

Significantly more Grade 6 students in LTTA schools stated that they liked dance than students in other schools at the end of the three-year period ($p < .05$). But even more interesting—and ultimately more important—was the finding that all students, in all three types of schools and across all grades, reported an overwhelming preference for physical education (gym) over all other school subjects. Approximately four out of five students *strongly* agreed that they *like* gym and *do well* at gym.

The vast majority of Grade 6 students (all schools) also stated they would *like more* gym. The next most popular subjects, as indicated by the desire to have more time devoted to these subjects, were the arts. Other subjects were less popular, as indicated in the table below.

Subject	% of Grade 6 students who ‘strongly agree’ that they would like more school time devoted to the subject
Gym	78%
Art	65%
Music	40%
Drama	40%
Dance	29%
Science	25%
Math	23%
Social Studies	19%
Language Arts	15%

Table 7. Grade 6 Students’ Subject Preferences

Many people involved with the LTTA program commented directly on the benefits of physical activity. A sample of their comments appears below:

The dramatics—being able to act out the life cycles of the frog and butterfly—the children really learned those lessons—experiencing it physically made the difference. (teacher)

LTTA often involves physical activities which help keep young children motivated and attentive. (teacher)

LTTA reinforced the fact that all children, even those with physical and mental limitations, can learn and enjoy through movement. (artist)

There is evidence that learning requires **emotional involvement** (Goleman, 1995). Comments show how important this aspect of the program was to participants:

LTTA opens up the door for how you can express yourself. (Grade 6 student)

The arts taught us how to bring out inner feelings, how to cooperate, listen, and express ourselves through movement. (Grade 6 student)

I see the joy in students. I want to see that joy. (teacher)

Oh, that was such a great experience, I got to dance in front of everybody. It made me feel like a star! (Grade 6 student)

The **cognitive benefits** of the LTTA program were described in various ways.

They are so attentive during the artist's stay and therefore learn more. (teacher)

She is more diligent about doing homework and remembering important information. She is more excited about school and her subjects, even the ones she isn't particularly fond of. (parent)

Teachers say LTTA opens up new pathways to learning and to teaching. (administrator)

Students, parents, teachers, and administrators alike value the **social benefits**, such as the growth of self-esteem, which they attribute to LTTA.

Arts are important to meet new people, make friends, stay out of trouble, and be with a 'good group'. (Grade 6 student)

My daughter is more interested in everything going on. She seems to be more outgoing and interested in the other students. (parent)

A child that is very held back or not that assertive comes to life in a setting like that. And that's what we found, there are kids we really can say—"Oh my heavens—that's how these kids learn!" They learn more through the arts than they learn through us doing it the way WE do it. (administrator)

LTTA got a whole bunch of people working together. Willingly. This increases their teamwork; everyone walks in the same direction for a while. (teacher)

Attendance on the LTTA days (even during the flu season!) is excellent. In one case, seven students in one class admitted they were ill enough to stay home but chose to come to school because it was an LTTA day. (administrator)

In a few cases, effects of the LTTA program could be described as **transcendent**, that is, going beyond the perceived limits of physical, cognitive, social and emotional experience and moving towards deep transformation of personal beliefs and practices (Csikszentmihalyi, 1997). Examples include:

I learned the inner meaning of art. (Grade 6 student)

It has enhanced my life. I am a better person and teacher because of it. (teacher)

He comes home with a project and talks about it to me. He tells me exactly how and what they've done (dance, art activities) and if I don't understand he'll explain in detail. He doesn't share information like that unless he's prodded to—but this he's not prodded to. He's a much happier child. He loves going to school now. (parent)

My background is in science, so I'm archetypically not an 'arts person'. So it's really a view that shifted when I was a principal of an LTTA school. In the next 5-10 years I believe we need to talk about student engagement. This is where I believe the strength of LTTA is. I really believe this. (administrator)

As a result, my daughter took up the djembe and her own teacher, along with another teacher at the school, took her to drumming lessons outside of school. She also attended two-hour drumming circles, with her school teacher, one evening a week last term. As a result, both our daughters (and myself) participated in the Guinness World Record Breaking drumming circle. Both my children have benefited immensely and as a family we have had a whole new world open up to us. (parent)

In one case, an elective mute student chose to speak for the first time in the school year when the drama artist was in the class doing a drama unit on traditions. (administrator)

In addition to the qualitative evidence, there were significant quantitative findings that also supported the speculation that LTTA children were engaged at school (and may therefore have performed better on tests of computation and estimation). Boys in Grade 6 at LTTA schools more often reported that they did well or very well at school (77%) than did their peers in other schools (73%), although this finding was not statistically significant. By the end of the three-year study, Grade 6 girls in LTTA schools were happier to come to school than their peers in other schools ($p < .05$). This difference did not exist at the beginning of the study when the children were in Grade 4. As will become evident in a later section of the report, girls are more likely to favour the arts than boys. It is therefore not surprising that the girls in LTTA schools were happier to come to school than the girls in the other schools, given the increased emphasis on the arts.

By the end of three years, there were significantly more LTTA teachers, as compared to teachers in other schools, who believed that the arts were an effective way to teach math, science, and language ($p < .01$). A larger percentage of LTTA teachers than teachers in other schools reported that they frequently used the arts as teaching tools and that they believed that the arts were effective in reaching the hard-to-educate students, but neither of these two findings was statistically significant. Principals of LTTA schools were more likely than principals in control schools to personally consider the arts as ‘very important’ ($p < .05$).

English as a Second Language

Seventy-five percent of the students in the study came from unilingual families, where the language spoken at home was English. In families where other languages were spoken exclusively, or in addition to English, the numbers were too small to conduct any meaningful statistical analyses. This is an issue that is worthy of further exploration in LTTA sites where languages other than the language of instruction are spoken at home in greater proportions.

Out-of-school Activities

In some cases, students’ out-of-school activities also had a significant impact on their achievement in math and language. In particular, music lessons outside of school and reading for pleasure were significant contributing factors for achievement in math and language after the effects of socioeconomic status and LTTA program effects (for computation and estimation) were accounted for. Taking music lessons outside of school was a significant contributor to achievement on the computation and estimation test. Reading for pleasure significantly contributed to both language measures; indeed, the out-of-school habit of reading for pleasure explained more of the variance in scores than did household income. Reading for pleasure also approached significance for the test measuring geometry and mathematical applications.

The effects of these contributing factors appear in the regression tables below (N=431).

	r^2	r^2 change	β	p	F
<i>Geometry and Applications</i>					
Step 1					
Grade 4 math score	.293	.293	.541	.000	177.89 *
Step 2					
Grade 4 math score			.521	.000	
Household income	.301	.008	.096	.021	92.55 *
Step 3					
Grade 4 math score			.510	.000	
Household income			.092	.026	
Reading for pleasure	.307	.006	.077	.059	63.27 *
<i>Computation and Estimator</i>					
Step 1					
Grade 4 math score	.243	.243	.493	.000	136.07 *
Step 2					
Grade 4 math score			.471	.000	
Household income	.255	.012	.110	.011	72.20 *
Step 3					
Grade 4 math score			.469	.000	
Household income			.095	.027	
LTTA program	.267	.012	.112	.008	51.16 *
Step 4					
Grade 4 math score			.461	.000	
Household income			.087	.043	
LTTA program			.116	.006	
Music lessons	.275	.008	.089	.035	39.81 *
Step 5					
Grade 4 math score			.452	.000	
Household income			.085	.049	
LTTA program			.116	.006	
Music lessons			.076	.076	
Reading for pleasure	.279	.004	.066	.126	32.42 *

Table 8. Regressions Predicting Mathematics Scores from Earlier Mathematics Scores, Household Income, LTTA Program, Music Lessons Out of School, and Reading for Pleasure

* $p < .001$

	r^2	r^2 change	β	p	F
<i>Reading/Language – Part 1</i>					
Step 1					
Grade 4 Part 1 score	.358	.358	.599	.000	236.39 *
Step 2					
Grade 4 Part 1 score			.574	.000	
Household income	.372	.014	.120	.002	125.14 *
Step 3					
Grade 4 Part 1 score			.537	.000	
Household income			.117	.003	
Reading for pleasure	.389	.017	.136	.001	89.48 *
<i>Reading/Language – Part 2</i>					
Step 1					
Grade 4 Part 2 score	.393	.393	.627	.000	274.36 *
Step 2					
Grade 4 Part 2 score			.608	.000	
Household income	.405	.012	.109	.004	143.63 *
Step 3					
Grade 4 Part 2 score			.579	.000	
Household income			.102	.007	
Reading for pleasure	.427	.022	.150	.000	104.43 *

Table 9. Regressions Predicting Language Scores from Earlier Language Scores, Household Income, and Reading for Pleasure.

* $p < .001$

Taking music lessons outside of school was significantly correlated with reading for pleasure ($p < .001$), and both reading for pleasure and music lessons were significantly correlated with household income ($p < .05$, in each case). Reading for pleasure and music lessons were also significantly correlated with mother's education level ($p < .05$, $p < .001$, respectively). These two variables are further explored in the next section, where various components are grouped for factor analysis.

The percentages of students involved in music lessons in LTTA and control schools appear below. The differences in these percentages were not statistically significant.

	Year 1 (Grade 4)	Year 3 (Grade 6)
LTTA students	25%	31%
Students at other schools	30%	34%

Table 10. Music Lessons Out of School

The correlation between reading for pleasure/taking music lessons and academic achievement in mathematics and language, after controlling for household income, was also found when analyses were conducted using the data from the National Longitudinal Survey on Children and Youth (NLSCY). These findings are further substantiated in the meta-analyses of other research. Vaughn's (2000) meta-analysis of six experimental studies on the relationship between music and mathematics achievement indicated that music study appears to cause increases in mathematics achievement ($r = .23$, $p = .004$). In addition, Butzlaff's (2000) meta-analysis of 30 studies on the relationship between music instruction and performance in reading included 24 correlational studies and six experimental designs. Butzlaff found consistent correlations between reading and music instruction, but did not find a reliable causal link between these two activities.

There are other factors that may have an influence on children's achievement in mathematics and language, including taking part in organised sports and the playing of videogames. In looking at performance across all types of schools (LTTA and the two control situations), there was a weak positive relationship, approaching significance, between playing sports and achievement on the mathematics score dealing with geometry and applications when a simple t-test was calculated on the difference of means ($p = .08$). The relationship between organised sports and achievement in mathematics and language scores was positive for the population sampled by the National Longitudinal Survey on Children and Youth, but only approached significance once socioeconomic status was taken into account in a regression analysis ($p = .056$).

Again, in looking at performance across school types, t-tests on mean differences found a negative relationship between the playing of videogames on a *daily basis* and performance on the two language scores and computation ($p < .001$ in each case). However, this finding was not significant when household income, mother's education, and LTTA program were entered into the regression analysis. There was no relationship between computer use and television viewing and achievement in the LTTA national study. However, there was a strong negative relationship between achievement and 'screen time' (which included videogames, computers, and television) in the NLSCY data, after accounting for socioeconomic status ($p < .001$). These 'screen' variables are further considered in the following section of the findings, where various factor analyses are reported.

The analyses on the NLSCY data indicated that there was a significant negative correlation between bullying and reading for pleasure ($p < .001$), and a negative correlation approaching significance between participation in the arts and bullying ($p = .056$) after controlling for socioeconomic status.

School Subjects and Out-of-School Activities

In this section, we characterise students' views and experiences with the arts, both within and outside of the context of school-based arts activities. We also characterise their views and experiences of school subjects and schooling in general. Students in all three types of schools were combined for these analyses.

Factor analysis was used for this portion of the analysis. That is, the various components or variables that were determined for each child (e.g., reading for pleasure, television viewing habits, subject preferences at school) were considered together to see which ones grouped or 'loaded' with one another. Standard methods for data reduction were employed.¹

Once the factors were determined, they were correlated to various other measures, including gender, household income, and achievement. In each case, the primary sources of data were the student interest and attitude surveys, administered to students in all grades (1 through 6) throughout the course of the study. In order to provide a fuller description of the factors, comments made by Grade 5 and 6 students during the focus group interviews in Years 2 and 3 were analysed, and appear throughout the sections dealing with those students.

The results of the factor analyses appear below. We begin with a description of Grade 1 and 2 students' views of school, and then show how their preferences continue to develop through to Grade 6. The data confirm other research findings regarding student preferences, where it has demonstrated that preferences emerge at an early age. In the case of musical preferences, for example, Perry and Peery (1986) reported that at four and a half years of age, children liked all kinds of music. At age five, children had developed a preference for popular music. In an examination of musical preferences in children from six to eight years of age, May (1985) found that earlier preferences became more established with age. Conformity becomes an increasingly important element in preference as children reach adolescence. In a review of the literature on conformity and age level stratification, Hoffer (1992) concluded that "[v]irtually any observation of youngsters between the ages of 11 and 17 reveals the effects of conformity pressure almost to the point of uniformity in terms of dress, use of slang, and preferences in music." (p. 720).

Views on School Subjects and School

Grades 1 and 2 (N=1714)

For the students in Grades 1 and 2, 18 components were considered, 17 of which related directly to school and school subjects. The school components included responses to various art activities (e.g., drawing, singing, dancing, playing with puppets, telling stories, listening to music), as well as other subjects (e.g., math, reading and writing, computers). School components also included general dispositions (e.g., how children feel at school, how children feel about trying something new). The home activity that was included in the analysis for students in Grades 1 and 2 was whether the children read books at home.

Clear factors were already apparent in Grade 1 and 2 students, in terms of attitudes towards school and school subjects, and in terms of reading for pleasure. Some of these factors, particularly those associated with the arts, were correlated with gender, as indicated in the Year 1 report (Upitis & Smithrim, 2001).

The factor analysis yielded three factors for Grade 1 and 2 students. One factor included components that had to do primarily with *enjoyment of school and language and math activities*. Specifically, the components that loaded on this factor² included doing math (.65/.64 for Grades 1 and 2, respectively), telling stories (.33/ N.S.), looking at or reading books (.31/.63), writing stories (.42/.35), and reading

¹ Principal component analysis was used as the extraction method for the various components. The Varimax rotation method was employed, with Kaiser normalization. Factor loadings were for components at values of .30 or greater. Eigenvalues were all greater than 1.

² Factor loadings appear in brackets next to each component.

books at home (.32/.59). This factor also included components associated with enjoyment of school as indicated by “I feel happy to go to school” (.78/.73) and “I am happy when I am at school” (.72/.73). This factor was not correlated with gender in Grade 1, but by Grade 2, it was very weakly correlated with gender, with girls being more likely to be associated with this factor ($r = .13, p < .01$). Not surprisingly, this factor was also correlated with achievement, although again, the correlations were small ($r = .17$ for mathematics, $p < .01$; $r = .11$ for writing, $p < .01$).

Another factor included the components that related to the arts and literary activities—drawing, singing, dancing, puppetry, and story telling.³ This factor also included looking at books and writing stories. This factor was correlated with gender in both grades, with girls being more likely to display this factor ($r = .29$ in Grade 1, $p < .01$; $r = .42$ in Grade 2, $p < .01$). By Grade 2, drawing was no longer a component. This factor did not correlate with achievement.

The final factor for Grade 1 and 2 students included components related to the exploration of new ideas and media, and the use of imagination. The strongest component was that of using the computer (.63/.45), followed by pleasure in doing something for the first time (.52/.48). This factor also included looking at or reading books (.48/.31), and pretending to be someone in a story (.31/.46). By Grade 2, this factor also included taking pleasure from drawing (.47), from playing with puppets (.66), and seeing puppet shows (.69). This factor was correlated with boys at the Grade 1 level ($r = .14, p < .01$), but there was no gender correlation in Grade 2 students. This factor did not correlate with achievement.

Grades 3 through 6 (N=4140)

There were 24 components considered in the factor analyses for students in Grades 3 through 6, including whether students liked various school subjects (language arts, math, social studies, science, art, music, drama, dance, French, gym, computers), whether they wanted to have more time in those various subjects, whether they enjoyed group work, and whether they were happy to come to school. Components related to activities out of school were analysed separately, as by the time children reached these grades, out of school activities were many and varied.

When these 24 components were analysed, three clear factors were identified. The first factor is closely related to the first factor described for students in Grades 1 and 2. It included students who were happy to come to school on most days, and who liked language arts, math, social studies, and science and wanted more time devoted to those subjects. The arts as subjects were either mildly positive or neutral for this factor. This factor, which might best be described as enjoyment of school and the ‘core’ subjects, was not correlated with gender for students in Grades 3 through 6. This factor was weakly, but positively correlated with achievement (with r values ranging from .10 to .17, $p < .01$).

Another factor was that of enjoyment of the arts. This factor also has its roots in the early grades. The components loading on this factor, throughout the four grades, included the various art forms, in slightly varying combinations, as well as French. Both liking the various arts activities and subjects, as well as wanting more of them, were common to this factor. In some cases, factor loadings were quite high (Grade 6, .78 through to .82 for components relating to dance and drama). This factor was correlated with gender, with girls being more likely to display this factor (r values ranging from .36 to .49 across the four grades, $p < .01$). This factor was weakly, but positively correlated with computation and estimation in Grade 3 ($r = .13, p < .01$).

The final factor relating to school and school subjects also appears to have its roots in the early grades in what was termed the ‘exploration’ factor. This factor included enjoyment of gym, computers, art, and friends. Students displaying this factor appeared to be neutral about school in general, but favoured the subjects of gym and visual arts, both in terms of liking the visual arts and gym, and wanting more time devoted to those subjects (for Grade 6, .75 and .41, respectively). They also liked working with computers (.54) and wanted more time on computers (.64). They liked working in groups with their friends (.43). Boys were somewhat more likely to display this factor (Grade 6: $r = .16, p < .01$). By Grade 6, this factor

³ Factor loadings for these components ranged from .40 to .69 in Grade 1, and .30 to .72 in Grade 2.

was negatively associated with achievement in one of the language measures, but again, the correlation was weak ($r = -.11, p < .01$). This third factor was also negatively associated with household income ($r = -.14, p < .01$).

Students' Out-of-School Activities

Grades 3 through 6 (N=4140)

There were 13 components considered in this analysis for students in Grades 3 through 6: reading for pleasure, organised sports, taking part in clubs, taking arts lessons of various kinds (music, drama, dance, visual art), singing with a group, performing with a musical group, listening to music, playing videogames, watching television, and playing alone. When these 13 components were analysed, three clear factors were identified for each grade level. There was some variation between the four grades as discussed in the following section.

The first factor identified those students who engage in various forms of arts activities outside of school, including performing and singing with a group, drama lessons, dance lessons, and visual arts lessons. In Grade 3, taking music lessons out of school loaded strongly on this factor as well (.49). Music lessons became a weaker component for this factor over time, as it began to load more strongly on the third factor reported in this section. By Grade 6, music lessons did not load on this factor (.21). There was a weak correlation with this factor and gender, with girls being more likely to fall into this category (Grade 6: $r = .21, p < .01$). This factor was not correlated with household income nor with achievement. It was positively correlated with liking arts at school (Grade 6: $r = .28, p < .01$).

The second factor identified those students who are most likely to spend their leisure time on sports and solitary/screen activities. The components that loaded on this factor included playing videogames on a daily basis (Grade 6: .72), watching television (Grade 6: .69), playing alone (Grade 6: .47), and listening to music (Grade 6: .53). In Grade 5, this factor included reading for pleasure (-.59) and music lessons (-.44) as negative components. This factor was independent of the other two factors dealing with activities outside of school, and was correlated with gender, with boys more likely to fall into this category (Grade 3: $r = .35, p < .01$; Grade 6: $r = .27, p < .01$). There was a weak negative correlation between language achievement and this factor (Grade 6: $r = -.12, p < .01$). This factor was also weakly, but negatively, correlated with household income (Grade 6: $r = -.14, p < .01$).

The final factor regarding out-of-school activities identified components dealing with reading, music, sports, and clubs. This factor included the components of reading for pleasure outside of school (Grade 6: .55), taking music lessons (Grade 6: .65⁴) performing with musical groups (Grade 6: .46), taking part in organised sports (Grade 6: .48), and taking part in clubs (Grade 6: .52). This factor was correlated with gender, with girls more likely to fall into this category (Grade 6: $r = .13, p < .01$). This factor was weakly, but positively associated with all achievement measures (Grade 6: $r = .09$ to $.15, p < .01$), and also, with household income (Grade 6: $r = .14, p < .01$). This factor also correlated with the first two school factors described in the previous section. That is, enjoyment of school and core subjects (Grade 6: $r = .21, p < .01$) and enjoyment of the arts at school were correlated (Grade 6: $r = .22, p < .01$). This factor is completely independent of the factor described immediately above, that is, sports and solitary/screen activities.

Views and Experiences Related to the Arts In and Out of School

There were 22 components considered in this analysis, including taking lessons of various kinds out of school, performing with a musical group, and components dealing with the importance placed on the arts as school subjects. Students were also asked to indicate whether they liked the arts as school subjects, and whether they wanted more time devoted to those subjects. Students' views of the arts are complex—of all of the sets of factor analyses, this one is the most complicated and subject to change from year to year. It is speculated that part of the reason for this complexity is that as students gain more experiences in the arts, both within and outside of school, these various kinds of experiences interact with one another, and

⁴ The loading of this component was not significant in Grade 3. It first emerged in Grade 4 (.45).

strong views about the arts—both positive and negative—form. Some of the views of students were strongly stated in the student focus groups, and these views are incorporated throughout the remaining factor analysis.

Grade 3 (N=682)

The first of the four factors to emerge in Grade 3 is the one dealing with all components that have to do with *enjoyment of the arts in school*. The components that load on this factor include taking pleasure in music (.38), drama (.74), dance (.79), singing (.57), and wanting more of those subjects and activities in school. The component regarding the importance of arts as school subjects also loads on this factor (.45). With the exception of dance lessons (.32), this factor does *not* include the pursuit of arts activities outside of school. This factor is correlated with gender, with girls being more likely to display this factor ($r = .31$, $p < .01$).

The second factor includes every component that has to do with the *enjoyment of the visual arts* at school. Components include liking art (.81), enjoying drawing (.78), painting (.71), and wanting more art at school (.75). There are no out-of-school arts activities associated with this factor. Like the first factor, this factor is also correlated with gender, with girls being more likely to display this factor ($r = .13$, $p < .01$).

The third factor includes only components relating to *involvement in the arts outside of school*. The components include performing with a musical group (.66), taking drama lessons (.67), taking visual art lessons (.64), taking dance lessons (.62), singing with a group (.72), and taking music lessons (.48). There is no expression of wanting more arts in school associated with this factor. This factor was correlated with gender, with girls being more likely to favour some combination of the components associated with this factor ($r = .19$, $p < .01$).

The fourth factor includes components relating to the *enjoyment of music*. The components include liking school music (.69), enjoying playing an instrument at school (.63), enjoying singing at school (.42), wanting more music at school (.66). This factor also included valuing the arts as school subjects (.39), and holding the belief that studies in the arts would help students find jobs when they were older (.47). At this age, out-of-school music activities do not load on this factor, but it will be seen that these activities become related to school music as students gain more experiences in music over time. This factor, like the others, was very weakly associated with gender, with girls being more likely to favour these components ($r = .08$, $p < .05$).

Grade 4 (N=1088)

In Grade 4, only three factors emerge. The first is similar to the first factor identified for Grade 3 students, namely, the *enjoyment of the arts in school*. As with the Grade 3 students, the one art form that does not appear on this factor is that of visual arts. For this factor, the arts are considered important school subjects, (.54) and Grade 4 students displaying this factor believe that much can be learned from the arts (.32). As in the earlier grade, this factor is associated with gender, with girls more likely to display this factor ($r = .38$, $p < .01$).

The second factor that emerges in Grade 4 is that of the *enjoyment of music and visual art activities* in school. None of the components regarding arts activities outside of school load on this factor. The components that load on this factor include liking various activities associated with visual art—for example, drawing (.64) and painting (.65), and the subjects themselves (e.g., music, .36). The desire for more music (.42) and art (.76) are also associated with this factor. This factor includes the three components regarding learning from the arts (.48), regarding arts study as valuable (.31), and the arts being perceived as helpful for finding jobs in the future (.44). This factor is very weakly associated with gender, with girls more likely to display this factor ($r = .08$, $p < .05$).

The third factor, as before, identifies the *enjoyment of the arts outside of school*. Once again, there is no desire for more arts in school associated with this factor. Girls are more likely to display this factor as well, but only marginally ($r = .08$, $p < .05$).

Grade 5 (N=1756)⁵

In Grade 5, four factors emerge again and follow a similar pattern to those that appeared in Grade 3. Once again, there is a factor related to the *enjoyment of the arts in school*, particularly with respect to drama (.82), dance (.81), and singing (.54). The components relating to wanting more time on those subjects and activities also load on this factor, as does the view that the arts are important school subjects (.56). This factor is relatively strongly associated with gender, with girls being more likely to display the components in this factor ($r = .41, p < .01$).

As for Grade 3 students, the second factor that emerges is related to the *enjoyment of the visual arts* in school and valuing of the arts as school subjects. Arts activities outside of school do not load on this factor. This factor is correlated with gender, with girls being more likely to display the components of this factor ($r = .15, p < .01$).

The third factor is that with components related to the *involvement in the arts outside of school*. As with the previous grades, students who are involved with the arts outside of school appear to have no interest in more arts time within school, nor do they particularly seem to like their experiences with the arts in school. This factor is extremely weakly correlated with gender, with girls being more likely to display the components of this factor ($r = .08, p < .01$).

The fourth factor for the Grade 5 group was that of *enjoyment of music*, both in and outside of school. This factor was correlated with gender, with more girls exhibiting this factor than boys ($r = .11, p < .01$). More details are given on this factor in the following section.

Grade 6 (N=614)

For the Grade 6 sample, there are four factors, but they are somewhat different from the four factors identified for Grade 5 students.

The first factor identified components related to the *enjoyment of the arts in school*, particularly music, drama, dance, and singing. These students indicated that they would like to do more of those art forms at school. Generally speaking, these students were not engaged in the arts outside of school. There was no correlation with this factor and gender.

In focus groups across the country, students identified the importance of the LTTA program as an opportunity to expand their knowledge about, and skills in, a variety of arts forms. As one Grade 6 girl stated, *"I think the arts are very important because when you were working with all those people [artists] you just thought "WOW! There is so much more to art than you would have thought of before. It's not just painting, it's not just drawing, it's so much more"*. Many students indicated that school arts programs were important because they provided opportunities to try new things. A Grade 6 girl commented: *"With arts, you get to do lots of new things and experiment."* A similar comment was made by a Grade 6 boy: *"Kids would not have the opportunity outside school"*. Students who liked the arts made comments such as *"We should do it more; we don't do it enough"*. They also made specific reference to the balance of art forms in the programs they receive. As one girl stated, *"I think we do too much of the visual arts. I think we should balance it out more. I think there should be more drama and stuff"*.

Even though this factor included components that related to the enjoyment of the arts, it did not mean that students necessarily thought that they learned a lot from studying the arts in school or that studying the arts would help them find a job when they were older. In focus group interviews, students who stated that they did not feel the arts were important school subjects made statements such as *"How will it help in the future? [They're] no help for future careers; [you] only learn about art, nothing more"*.

⁵ The number of subjects is larger in the Grade 5 analysis because data were available from two cohort groups at this level.

This factor was correlated with gender, with girls more likely to display this factor ($r = .35, p < .01$). It was weakly, but positively, correlated with achievement in the writing score ($r = .15, p < .01$). This factor was not related to household income.

The second factor identified *enjoyment of the visual arts* in school. As was the case in the earlier grades, these students did not engage in the arts outside of school. These students felt that they learned a lot from studying the arts at school (.43), that the arts would help them find a job when they were older (.41), and that the arts were important school subjects (.37). When students spoke about the role of the arts in education, they described the opening of otherwise unknown possibilities. One Grade 6 girl said, “*I think it’s really important because other stuff that you might need in life, like the technical stuff, math and science, we already learn. But it lets you consider a career in something else, something like the arts*”. Another student commented: “*I don’t want to be something scientific, so it gives me another opportunity*”. Again, there was a weak correlation with this factor and gender, with girls being more likely to fall into this category ($r = .18, p < .01$). Although this factor was not related to household income, it was correlated with parents who took part in arts activities in their leisure time ($r = .10, p < .05$). This factor was not related to achievement.

A third factor was that of *involvement in the arts outside of school*. These students did not enjoy the arts at school—in any form—although they were engaged in arts activities outside of school. It is possible that these students did not enjoy the arts at school because they had ample opportunity to take part in the arts outside of school, and, therefore, did not perceive the need for any more arts instruction in school. It is also possible that these students found school arts experiences wanting, in comparison to the activities in which they took part outside of school. There was a weak correlation with this factor and gender, with girls being more likely to fall into this category ($r = .16, p < .01$). This factor was neither related to household income or to achievement.

The fourth factor was comprised of components relating to the *enjoyment of music* both in and out of school. The components that loaded on this factor included taking music lessons outside of school (.65), performing with a musical group (.53), and enjoying school music (.53), including playing an instrument at school (.70). The component relating to wanting more music in school also loaded on this factor (.53). Some students commented upon the emotional support that music provides them: “*Music helps you relax*”. One boy commented: “*Music brightens up the mind.*” Students also described benefits of music in terms of developing memory, concentration, precision and time-management. As one Grade 6 girl suggested: “*You sort of need to really be thinking so much that you have to remember the words to everything, or you have to remember the notes, and all that remembering, it sort of catches on with everything in your life*”. Once again, there was a very weak correlation with this factor and gender, with girls being more likely to fall into this category ($r = .08, p < .05$). There was also a correlation between this factor and parents who took part in arts activities in their leisure time ($r = .10, p < .05$), but there was no correlation with household income.

Summary

In summary, the factor analyses have indicated that there are strong and robust patterns of practice and views on the arts and schooling held by children as young as six years of age. These patterns appear to deepen over time, and, while there is some diversification as children age, many of the basic patterns are in place by Grade 1.

When considering school and school subjects, three factors emerged. The first related to the enjoyment of school and the ‘core’ subjects, the second related to enjoyment of the arts, and the third related to enjoyment of gym, computers, visual arts, and group activities. While the first school-based factor was largely gender neutral, more girls were associated with the arts factor, and more boys were associated with the factor relating to gym, computers, visual arts, and group activities.

Consideration of the students’ out-of-school activities produced similar patterns of results: girls were more likely to engage in arts activities while boys were more likely to engage in sports and solitary or screen-related activities.

Of the three sets of factors analysed, the factors relating to the arts, both in and out of school appear to be the most complex. Generally, those students who enjoyed school arts were not involved in arts activities outside of school, and those who were engaged in the arts outside of school indicated no desire for more school arts instruction. The one exception to this pattern was the factor relating to music: students who were engaged in music outside of school were also likely to enjoy music in school. The complexity of this factor points to the importance of arts programs that are responsive to meeting the needs of children with differing experiences and preferences. This is entirely possible, even within the context of elementary schooling. Indeed, even though some students reported that they didn't like the arts in schools, teachers and artists commented over and over again how surprised they were that all students were able to involve themselves in the LTTA activities. Several reasons for this discrepancy between the self-reported data and the response to the LTTA arts experiences come to mind.

As mentioned earlier, conformity to a group of peers can have a strong effect on self-reported preferences. It could be that students surprise themselves when they find they do enjoy certain kinds of arts activities, even though they claim that don't like the arts. Many students commented that the artists were interesting, happy, and enthusiastic about their work. It could be that arts in the context of professional artists seem *real* and *worthwhile*, while other school arts experiences may appear contrived and trivial.

In any case, it is obvious that a variety of arts experience is necessary in order to engage all individual and groups of students. In a study of music education practices in England, Sloboda (2001) concluded that the key concept in a viable arts education for today's students is variety—variety in providers, in funding, in locations, in roles for educators, in trajectories, in activities, in accreditation, and in routes to teacher competence. Sloboda suggested that teachers must take on a wider range and variety of roles. In the case of music education, those roles might include: teacher, amateur, coach, mentor, impresario, fund-raiser, programmer, composer, arranger, and studio manager (p. 22).

It is also important for educators, including arts educators, to be willing to expand their own views of what constitutes art. For example, Forrister, an Appalachian art teacher taught the following in his high school visual arts program: macramé, pottery, fibers, weaving, drawing, photography, silk-screening, papermaking, batik, stitchery, quilting, lettering, and airbrushing (Barone, 2001, p. 13). Music education now includes, in addition to the traditional trio of choir, band and orchestra; computer assisted composition, steel band, fiddle, folk music, popular music, soundscapes, musics from many cultures, jazz band, jazz choir, Orff, Kodaly, Dalcroze Eurhythmics, guitar, synthesized music, technological enhancement of sound, and more. With enough variety in arts curricula and modes of arts experience, any gender differences in arts preferences might well decrease, and student preferences, engagement, and achievement in general could be altered for the better.

Parents

Nearly all parents (90%)—regardless of school type—reported that the arts motivated their children to learn. Fewer than 1% of parents questioned the importance of arts programs or expressed negative opinions regarding arts education.

Indeed, parents were eager to talk about the positive effects of arts education on their children. Seventy-seven percent of LTTA parents, when asked if their child had reported school arts activities, gave concrete examples of arts activities their children had talked about at home (15% higher than parents in the other two types of schools). Some of these examples described events that had occurred up to three years previously.

Parents (of students in all three school types) attributed the following kinds of benefits to arts education:

- Increased interest in arts outside school;
- Greater incentive for children to attend school;
- Increased confidence and self-esteem in children;
- Increased social skills as children become less shy and more outgoing;
- Increased skills in the arts;
- Greater ability to express emotions;
- Increased abilities in other curriculum areas;
- Opportunities for children to thrive who might lack interest or ability in other subjects;
- Increased enthusiasm for school on days when there was art, music, and/or gym.

Parents regarded school-based arts programs as vital in providing equal opportunities for exposure to the arts for all students. Most parents indicated that the arts were valuable in learning other subjects (89%) and in motivating children to learn (90%).

Parents of children involved in LTTA commented that they valued the relationships that their children developed with professional artists and with their teachers as a result of the LTTA program. Parents of children involved in LTTA were significantly more likely than other parents to consider the arts as ‘very important’ school subjects ($p < .05$). This finding is of particular interest, as parents did not choose to send their children to LTTA schools, and therefore, it is likely that these parents came to regard the arts as ‘very important’ over the course of the three years that their children were involved with the program.

There was a significant correlation between parents valuing the arts, as indicated by their leisure activities, and parents reading for pleasure ($p < .001$). There was also a significant correlation between parents valuing the arts, as indicated by their leisure activities, and their children taking music and other arts lessons outside of school ($p < .05$).

A summary of activities correlated to household income and mother's education appears on the following table.

	Household Income (N=697)	Mother's Education (N=897)
Parents read for pleasure	.17 ***	.14 ***
Parents do arts	.09 *	.14 ***
Children read for pleasure	.10 *	.10 *
Children take music lessons	.10 *	.14 ***
Children play videogames daily	-.17 ***	-.11 **

Table 11. Simple Spearman's Correlations Between Household Income, Mother's Education, and Activities

Note. Household income and mother's education were also correlated (.39, $p < .001$).

* $p < .05$

** $p < .01$

*** $p < .001$

The correlations between parents' and children's activities is summarised in the following table.

	Parents read for pleasure (N=1108)	Children read for pleasure (N=700)	Children take music lessons (N=689)	Children play videogames daily (N=701)
Parents do arts	.18 ***	NS	.09*	NS
Children take music lessons	NS	.22 ***	—	-.15 ***
Children play videogames daily	NS	-.16 ***	NS	—
Children play organised sports	NS	NS	NS	.08 *

Table 12. Simple Spearman's Correlations Between Parents' and Children's Activities

Note. Parents' reading for pleasure was not correlated with children's reading for pleasure.

* $p < .05$

*** $p < .001$

Artists

The artists involved in the LTTA program responded to a survey with questions regarding their personal artistic practices as well as their experiences with the LTTA program. Sixty artists received the online questionnaire and 25 received a hard copy. The data set is comprised of 31 returned artist surveys, 11 on paper and 20 electronically.

Three themes emerged: the artists' perceptions of how their involvement with LTTA had affected their own art-making, the artists' perceptions of themselves as teaching artists, and changes in artists' views of teachers and of the importance of the arts in education.

Artists as Artists

About a third of the artists spoke about ways in which LTTA has enhanced their own artistic practice. Some found inspiration in the classroom for their own art-making. Some reported making more art and felt their skills had improved. Some felt renewed and inspired. By far, the most frequently mentioned benefit was the growth of self confidence. Eighteen out of the 31 artists spoke about confidence.

It's built up my self-confidence. I feel I am ready for anything and don't hesitate to say, "Yes, of course I can do that!" to any new project or proposal that comes along.

Three of the artists reported that the LTTA experience had been personally and artistically transforming.

One reported, "I turned from thinking about retiring to auditioning for a TV/film company with my storytelling method they have said they will produce it."

Artists as Teachers

Artists described their perceived role in the classroom in three main ways. A few regarded their role as teaching the art form, e.g., Asian bamboo brush painting. Half of the artists described their role in terms of curriculum, including enlivening the classroom experience and enabling teachers. One artist explained *[I'm a] catalyst—energizer—creative spark plug. I brought to both the teachers and students the reality that creativity enhances all of our lives in a myriad of ways.* A third of the artists spoke of the 'big picture' of arts in children's lives with a deep and broad purpose and understanding of the arts.

In my work I strive to expand children's understanding of themselves and their connections to the world around them. I strive to engage them in active, meaningful ways that help them keep in touch with their feelings and their self worth. I endeavour to heighten their personal and intellectual courage. I hold a profound and unwavering belief in their capacity to grow, learn and be successful in their own unique ways.

In terms of abilities, many artists reported growth in communication skills. They also reported learning about age appropriateness and about responding to individual needs. Several artists spoke of new motivation to work more in the educative realm of art, and some talked about how the LTTA work inspired extensions to their own teaching. Skills the artists felt they had learned through their involvement with LTTA include flexibility, patience, the ability to work with large groups and, for most of the artists, communication skills.

I learned how to share my creative process and let the class participants lead the way instead of taking all the responsibility for the learning.

Early literature on artists in schools presented concerns about lack of pedagogical knowledge and program planning on the part of artists as well as the artists' lack of information about child development, classroom management, and curriculum. Other issues raised included the emphasis on product over process on the schools' parts and process over product on the artists' parts (Lopate, 1978; Szekely, 1978; Smith, 1980; Anderson, 1981; Ball, 1990; Smith, 1991). The LTTA artists did not raise any of these issues as problems, rather, they appreciated their own development in these areas. The professional development provided by LTTA seems to have been successful in helping the artists toward positive experiences in the classroom. A few artists commented about insufficient planning time, but all who completed the survey, with one exception, reported only positive aspects of their LTTA experience as artists in the classroom.

Artist Beliefs

In most cases, artists' perceptions of children were reinforced or strengthened. However, some of the strongest artist statements expressed a marked improvement in the artists' perceptions of teachers.

Grade 3 students have a lot of energy and I appreciate the patience and organisational skills of elementary school teachers.

Although none of the survey questions asked for artists' views of the importance of the arts in schools, more than a third of the artists volunteered that the LTTA experience had reinforced or planted a belief in the importance of the arts in schools, and a commitment to arts education.

My work with LTTA has confirmed my belief that students have a lot more to offer creatively than they are generally able to achieve within the regular curriculum and that the skills they can learn while working with creative process can cross over into other pursuits.

The LTTA experience was perceived by many of the artists who completed the survey as a positive learning experience and an inspiring venture.

Teachers

Three instruments were developed to assess program effects on teachers who had participated in LTTA for the full three years: an exit survey (62 teacher responses), telephone or in-person interviews (50 teachers), and ten teacher focus discussion groups (56 teachers). The three assessment procedures involved repeat participation on the part of many of the third year teachers. It was deemed prudent to use all three measures in order to triangulate results, as well as to add depth and detail to the data. Discussion in the focus groups often involved different issues than those included in the survey or interviews, as teachers took the opportunity to explore their shared experiences, or responded to issues raised by their colleagues.

In these pages concerning teacher experiences of the LTTA program, percentages of agreement are indicated for survey and interview responses. On some points, teachers indicated more than one response. Information concerning the focus groups is presented in terms of the proportion of focus groups in which there was general agreement on a particular issue.

Unlike the closed questions where respondents must choose from a limited set of alternatives, the open-ended nature of most of the questions posed to teachers in the assessment measures evoked a variety of responses, according to what individuals identified as their own most pressing needs and concerns, or those of their students. As a result, some of the percentages of agreement indicated will not seem high. However, the importance of the data lies in the nexus of overlapping responses from the three assessment measures.

Comparing Second and Third Year Teacher Data

Data indicating changes in teacher attitudes and practices had been inconclusive at the end of the second year of programming (Upitis & Smithrim, 2002). Survey and interview data were not congruent: teachers had expressed fewer positive changes on the surveys than in the interviews. The contradictory nature of these data were not viewed as cause for concern, but, rather, as an indication that teachers might still have been in a state of flux between old and new behaviours and attitudes concerning the arts in education. As anticipated, the Year 3 data reported here show a much higher level of consistency across assessment measures, indicating that teachers have developed clearer understandings of the workings and effects of LTTA. Indeed, in the surveys, interviews, and focus group discussions, teachers emphasised that it had taken the full three years in order for logistical and substantive issues to be resolved, and for the LTTA program to become an integral part of the school culture and, in many cases, of their teaching.

Teacher Assessments of the Effects of LTTA

Changes in Students

In all three assessment measures, teachers were asked to indicate the most obvious and pervasive effects of the LTTA program on their students. In 63% of the surveys, 56% of the interviews, and in all of the focus groups, teachers reported that involvement in the LTTA program led to increased student engagement, excitement, and productivity during artist visits and other arts activities. It was the view of 74% of interviewed teachers and all of the teachers participating in focus groups that the LTTA program had introduced students to new ways of thinking and learning that affected performance and engagement in other curriculum areas.

Generally improved student self-esteem and self-confidence were cited as further benefits of the program across all three assessment measures (surveys: 18%; interviews: 24%; focus groups: all).

Teachers indicated that students had increased their skills in the arts and achieved higher levels of creative expression (surveys: 26%; interviews: 18%; focus groups: over half). There were signs that student peer interactions had become more positive and supportive (surveys: 16%; interviews: 14%; focus groups: half). With regard to the increased sense of appreciation for individual differences, one teacher

commented that experiences in the arts had taught students and teachers alike that *“the road can be different, yet go to the same place.”*

Gender Differences

Teachers agreed across assessment measures that there were few observable differences between boys and girls regarding their engagement in the arts activities. However, they concurred that the visiting artists were usually more successful than the classroom teacher at ‘pitching’ the arts to boys and that, once involved, boys often excelled. Some teachers commented on the importance of having male artists in the schools so boys have role models in the arts. These comments are particularly important in light of the factor analyses that were presented in the previous section illuminating gender differences in attitudes towards the arts.

Students with Special Needs

In the surveys, 95% of teachers spoke of students who presented teaching challenges: children with ADHD, very shy children, children with behavioural problems, very quiet or non-verbal children, very bright children, non-academically inclined children, and children who speak English as a second language (ESL). In the interviews and focus groups, teachers said that, almost without exception, these students had been able to focus better on the arts-infused lessons and had been successful in their learning, resulting in increased self-esteem (interviews: 90%; focus groups: all).

Students with special needs were also more likely than usual to be included or to choose to participate in LTTA activities (interviews: 52%; focus groups: three quarters). Many of these students gained positive peer recognition and acceptance for their efforts (interviews: 14%; focus groups: one quarter). One teacher described the experience of an autistic child, saying, *“She feels she’s an artist now and has more confidence. She’s become much more willing to participate.”*

Absenteeism

While they had not paid particular attention to the effects of LTTA on student absenteeism, 26% percent of the surveyed teachers and 28% of those interviewed said they believed that their students were generally less likely to be absent on the days when the artists were in the schools. In some cases, teachers reported that ill students, who would normally have stayed at home, insisted upon coming to school on ‘artist days’, while others planned doctors’ appointments so that they would not coincide with artists’ visits.

How Learning through the Arts Differs from Other Learning

In the surveys, teachers were asked to describe how learning in the arts differs from learning in other subject areas. The following responses indicate a number of features of the arts that teachers felt enhanced student learning.

Teachers claimed that the arts:

- ♦ Engage students and motivate them to learn (31%);
- ♦ Add a welcome dimension of hands-on learning (16%);
- ♦ Allow for a variety of end results, fostering feelings of success in most students (15%);
- ♦ Accommodate a variety of learning styles (15%);
- ♦ Allow for individual expression (15%);
- ♦ Involve the whole being of the learner (10%).

Teacher Assessments of the Effects of LTTA on their Schools

When asked about the effects of the LTTA program on their schools as a whole, teachers reported an increase in the number and quality of arts activities in their schools, within and outside the LTTA program (surveys: 21%; interviews: 28%; focus groups: a third). Teachers also referred to increased levels of awareness and discussions about the arts taking place in their schools (surveys: 29%; interviews: 16%). Interviewed teachers also commented on the increased number, variety, and quality of artifacts on display in their schools (16%).

In the interviews, some teachers indicated that their schools had become more cohesive, energized communities (16%). As one teacher put it, *“The LTTA program has awakened teachers and students ... there’s building at the community level.”*

Teacher Assessments of the Effects of LTTA on Parents

In 87% of the surveys, teachers reported that the presence of the LTTA program had increased parental involvement in their schools. Parents often provided help gathering arts materials, assisting with classroom art, and, sometimes, raising funds for arts activities. In addition, more parents attended performances or visited the schools to see the artists at work. Teachers also reported that parents and their children were having more conversations about the arts and that parents frequently expressed amazement at the high quality of art work produced by the students.

The only cases where these changes did not take place were in those schools where there already existed a high level of parental involvement or where the majority of a school’s population was comprised of First Nations children. In the case of the latter, teachers said that, while parents might express interest in the arts activities, they appeared to feel alienated from mainstream and school culture. However, where attempts were made to provide arts activities based in First Nations traditions and teachings, these students and parents were more engaged.

The Effects of LTTA on Teachers

Teachers were asked to describe changes in their own beliefs, attitudes, and practices that they attributed to their participation in the LTTA program. Questions posed in the surveys, focus groups, and interviews sometimes differed in emphasis, highlighting different aspects of teacher change.

Teachers’ Professional Learning

Teachers reported that they had come to a fuller appreciation both of how students could learn non-arts subjects through arts-infused activities and express non-arts-related learning through artistic work (surveys: 98.5%). In particular, 95.3% percent of surveyed teachers said that they believed that the arts could effectively be used in the teaching of math, science, and language. In response to a closed question, 98% of surveyed teachers indicated that they believed the arts to be fundamental to quality education. Still, some teachers said that their belief that students benefit greatly by having the arts as an integral part of their education had been further reinforced by their LTTA experience (surveys: 52%). Many indicated that they had also learned more about the abilities and needs of individual students.

At the end of the three years of LTTA programming, 90% of the surveyed teachers, 84% of interviewed teachers, and all of the teachers in the focus groups, said that they had acquired new arts skills and knowledge that they were using in their teaching of non-arts curricula. Many teachers provided specific examples of new ways in which they were using the arts in their teaching (interviews: 62%).

Teachers indicated that one of their greatest gains was the confidence to risk using what they self-assessed as their limited artistic abilities. Some teachers made direct reference to increased confidence to teach through the arts (surveys: 45%; focus groups: all). One teacher expressed her new-found courage when she said, *“Now I grasp the teachable moment when the kids suggest things, for example, taking a story and making it into a play.”*

Growth in teacher confidence to use the arts appeared to be connected not only with acquiring more skills and knowledge, but also with teachers’ conviction that it is in the process of art-making, rather than the arrival at a finished product, where the most important learning takes place (surveys: 92%; interviews: 94%). Furthermore, learning associated with the arts was usually viewed as transferable to other areas of life and schooling. However, many of these same teachers also expressed the belief that feeling satisfied with a finished product was very important to their students and that the completed artwork reflects the struggles and learning of the individual (surveys: 63%; interviews: 60%).

Less frequently cited, but nevertheless a notable area of teacher growth, was a new-found sense of community among the teachers in several schools. It was the impression of the researchers that teachers taking part in same-school focus groups displayed a high level of collegiality.

In the surveys and interviews, teachers were asked to recall their images of an artist prior to participating in the LTTA program. Many teachers said they had never considered artists to be different from other individuals who were dedicated to their professions. However, 10% of surveyed teachers and 40% of interviewed teachers admitted that they had originally romanticised artists or thought of them as eccentric individuals. By the end of the LTTA program, 32% of surveyed teachers and 36% of those interviewed said that they had changed perceptions of artists, having gained respect and admiration, balanced with a realisation that artists are not particularly unusual or odd people.

Many teachers commented on the growth that they had witnessed over the three years in the abilities of artists to deliver age-appropriate arts activities to the students. There were many comments similar to the following, all indicating a growing sense of partnership between teachers and artists and a shared appreciation of one another's strengths: *"Now I feel that we [teachers and artists] are definitely partners. Meeting them is like coming back to a familiar person. We feel more comfortable helping them revise. They help promote the curriculum."*

Teachers' Personal Learning

In the surveys and interviews, teachers were asked if their participation in LTTA had precipitated changes in their private lives. Some reported that they understood, enjoyed, and valued the arts and artists more (surveys: 21%; interviews: 34%), while others said that they were attending more community arts events (surveys: 7%). A few teachers indicated that they had become involved in personal art projects or were taking lessons in one or more areas of the arts (surveys: 7%).

Some teachers volunteered that they had become more open-minded, accepting, and tolerant because of their involvement in the program (surveys: 9%; interviews: 18%). As one teacher expressed it, *"I think I have embraced variety and individual differences in people more easily"*. Another teacher said, *"[Involvement in the LTTA program] has enhanced my life. I'm a better person/teacher because of it."* Some teachers referred specifically to the fact that they felt generally more confident and/or freed of personal inhibitions (surveys: 11%).

Impetus to Teacher Change

In response to survey and interview questions regarding the most important program factors affecting their personal and professional growth, teachers identified the following: the guidance, encouragement, and example of the LTTA artists (surveys: 50%; interviews: 46%); the development of personal skills and knowledge in the arts (surveys: 23%; interviews: 38%); sharing with colleagues (surveys: 7%; interviews: 4%); and administrative support (surveys: 3%).

What Teachers Need to Sustain Positive Changes

Teachers identified the following as essential to sustaining and promoting their growth in the arts and their abilities to deliver arts-infused curricula:

- Further contact with and guidance from the artists, including individual or small group art-making experiences (surveys: 52%; interviews: 66%; focus groups: three quarters);
- Resources in the form of ideas and lesson plans (surveys: 21%; interviews: 26%; focus groups: a fifth);
- More planning time and more time in the curriculum for teaching through the arts (surveys: 15%; interviews: 26%; focus groups: a third);
- Funding (surveys: 10%; interviews: 18%; focus groups: half);
- Easy access to art materials (surveys: 10%; interviews: 16%; focus groups: a quarter);
- Principal, colleague, and/or school board support (surveys: 13%; interviews: 8%; focus groups: a third);
- Spaces and facilities suitable for arts activities (surveys: 5%; interviews: 6%; focus groups: a tenth);
- Continued teacher commitment to their own growth in the arts (surveys: 8%; interviews: 4%).

Teacher Assessments of the Challenges of the LTTA Program

In the interviews, teachers cited the following as the challenges and difficulties they had faced during the LTTA program:

- Demands placed on teachers' time in terms of preparation and follow up of artist visits (38%);
- Problems with scheduling artist visits so that they fit with curriculum and school activities (34%);
- Artists' original lack of teaching skills (24%);
- Lack of adequate facilities to accommodate arts activities for large numbers of students (10%);
- Finding adequate arts materials (8%);
- Teachers' own resistance or that of colleagues to the program (4%).

Almost all teachers said that, despite the difficulties encountered, the benefits of the LTTA program far outweighed the difficulties. They indicated that the program had run progressively more smoothly over the three years.

Administrators

Principals

Comparing Baseline and Exit Data

The following tables present several comparisons between data gathered in the fall of 1999, at the beginning of the LTTA program, and data gathered in the spring of 2002, at the end of the program.

The first table summarizes curricular offerings in LTTA schools in four arts forms: visual arts, music, dance, and drama. It can be seen that there were no changes in dance and drama offerings over the three-year period, but that the few schools that did not offer visual arts and music programs at the beginning of the study had added those programs to the regular curricular offerings by the end of the three-year study.

	% LTTA Schools at baseline	% LTTA Schools at end of Year 3
Visual Arts	96%	100%
Music	91%	100%
Dance	69%	68%
Drama	72%	70%

Table 13. Art forms offered in the LTTA schools

The next table indicates the issues that LTTA principals identified as barriers to adding more arts offerings and initiatives to their schools. At the beginning of the study, the greatest perceived barrier was that of funding; however, by the end of the study, while funding was still seen as important, it was less of a perceived barrier than that of the leadership of principals and teacher support of the arts.

	1 st Barrier	2 nd Barrier	3 rd Barrier	4 th Barrier
Baseline	lack of funding	availability of skilled teachers	teacher support for the arts	leadership of principal
End of Year 3	leadership of principal	teacher support for the arts	availability of skilled teachers	lack of funding

Table 14. Principals' rankings of barriers to arts offerings in schools

Principal Assessments of the Importance of Arts in Education

Fifteen principals from LTTA schools in sites across Canada were interviewed in the spring of 2002. Nine of these principals assessed the arts as 'critical' to the education of children, while two others said that the presence of the arts in schools was somewhere 'between critical and very important.' Three principals said that they thought that the arts were 'very important.' As a group, the principals said that school arts experiences do the following for children:

- Accommodate a variety of learning styles (83%);
- Enhance learning by increasing student engagement and excitement (67%);
- Promote a sense of community and understanding of others (47%);
- Boost self-esteem and confidence (27%);
- Provide exposure to the arts for children of all socioeconomic backgrounds (27%);
- Promote new ways of seeing the world (27%).

Only one or two principals identified the following effects of the arts for children:

- Reach and enhance the learning of students with special learning needs;
- Reduce behaviour problems;
- Provide opportunities for structured physical involvement;
- Encourage risk-taking;
- Promote creativity;
- Foster a positive attitude toward the arts;
- Provide opportunities for lifelong learning.

Principal Assessments of the Effects of the LTTA Program on Teachers

The interviewed principals said that involvement in the LTTA program had resulted in the following effects for teachers:

- Increased confidence in their own abilities to use the arts in their teaching (33%);
- Willingness to enter into learning opportunities in the arts along with their students (33%);
- Insight from the artists about alternative ways of relating to students (27%);
- Greater collaboration among teachers and a stronger sense of community among the teachers in the school (20%).

The following changes in teachers were noted by one or two principals:

- Participation in arts activities in teachers' personal time;
- Fruitful teacher/artist collaboration;
- Awareness of how the arts can be integrated into the curriculum.

As far as the teachers go, I think it's been a real growth experience for them. It's helped them realise that they don't have to leave all of the arts education to an arts specialist. They can take some command of that as well.

Principal Assessments of the Effects of the LTTA Program on Parents

Principals reported that positive parental reactions to the LTTA program were shown through a number of indicators, including positive reaction to students' art, fund-raising efforts to support the program, and positive comments about the LTTA program. One principal indicated that children and parents were sharing discussions about LTTA and about the arts in general.

Parents have particularly commented on the visual arts that are on display around the school, but they're just shocked when they see some. It was just amazingly well done.

Nurturing the Arts in Schools

Principals were asked about whether or not they would support the idea of providing an hour a day of arts activities to each student. Six of the principals said that they preferred an integrated arts approach where other subject areas were infused with the arts. Two principals said that there was not enough time in the day to accommodate the arts to the extent of apportioning an hour a day for arts instruction. One principal cited lack of funds as the main barrier to providing an hour of the arts, while another said that he/she and the school staff would need continual guidance from artists to reach a state where the arts could be offered for an hour each day.

Principal-Identified Problems with LTTA

The principals identified the following as being the main difficulties encountered in the LTTA program:

- Difficulties in meshing artists' and teachers' schedules (27%);
- Poor teaching abilities on the part of some artists (27%);
- Extra work required of teachers prior to and between artist visits (20%);
- Time the program took away from other curriculum areas (20%).

One or two principals also commented that the lack of sufficient school space and facilities for some activities, teachers' inhibitions, and a lack of sufficient collaboration between teachers and artists were difficulties encountered in their settings.

Most of the principals said that, aside from the perennial difficulties of finding adequate teaching spaces, the problems diminished as the teachers, artists, and principal became more familiar with one another and developed a team approach to the program.

Site Coordinators

Site coordinators have on-going contact with principals, teachers, students, and artists in LTTA schools. The following information was conveyed during interviews with five site coordinators from across Canada.

Principals' Reactions to the LTTA Program

All of the coordinators reported that their site principals felt very positively about the LTTA program and wished to have it continue in their schools. Principals told the coordinators that the most problematic aspects of the program had to do with:

- Scheduling arts activities to suit the artists, teachers, and the school;
- Completing the paperwork required by the research component of the program;
- Finding adequate available spaces for the arts activities.

The principals have nominated the LTTA program for the mayor's award in our city!

Teachers' Reactions to the LTTA Program

Site coordinators said that they believed that LTTA teachers had gained the following from their participation in the program:

- Increased skills and understanding in the arts;
- New ways to teach curriculum subjects using the arts;
- More knowledge of how to assess and recognise student learning through the arts;
- A greater degree of engagement in their own learning in the arts, alongside their students;
- New and meaningful relationships with the artistic community;
- Great respect for the work, talent, and commitment of artists.

A small minority of teachers complained about the lack of teaching skills some artists possessed. On the whole, however, teachers' relationships with the LTTA artists deepened over the three years, with teachers and artists together developing increasingly effective learning opportunities for students.

Students' Reactions to the LTTA Program

All the site coordinators observed increased levels of participation and engagement on the part of students during the LTTA lessons and in the arts in general.

Students are signing up for more arts classes and programs in the community. When I'm in the class I see them smiling, focused, engaged and excited. Students who [normally would] act up, don't . . . New elements of students are emerging.

Coordinators cited examples of how the artists were able to draw out children with special needs, to the extent that those needs were not evident to the artists who were leading the activities. The coordinators also commented on the special relationship that seemed to exist between the artists and almost all of the students. All of the coordinators said that they observed no differences between boys and girls with regard to their enthusiasm for arts activities.

Parents' Reactions to the LTTA Program and Changes in the Schools

Coordinators expressed the belief that LTTA schools were becoming more vibrant and unified communities and that schools were forging links with the community at large. Site coordinators commented that they had heard only positive comments about the LTTA program from parents.

Several schools have made big changes. Display cabinets are always full and always changing with the arts and curricular links. The whole school is buzzing. The arts are now really valued and respected. Real changes were evident. . . There are new opportunities for students and teachers as they are taking more field trips to do with the arts, for example, to see plays and other performances.

Coordinator Growth

All the site coordinators said that they had learned to balance a multitude of tasks, the most important being that of keeping the channels of communication open among the various program participants. They were unanimous in saying that their respect for teachers and artists alike had deepened, and that they were even more convinced of the importance of the arts in education as a result of having been involved in the LTTA program.

Superintendents

Superintendent Assessments of the Arts and the Effects of LTTA Programming

All of the superintendents expressed the view that the arts are critical to elementary education. In terms of LTTA in particular, the superintendents reported that LTTA schools had become more dynamic, cohesive, and visually attractive. Each school was seen to have developed a stronger sense of community identity and pride. The superintendents said that LTTA students appeared to be joyfully engaged, to the extent that parents commented on their children's increased enjoyment of school. Teachers were acquiring new teaching strategies. Indeed, one superintendent commented on the "revitalizing" effects of the program on teachers. The superintendents said that, although principals spoke openly about the challenges of scheduling, program costs, and, in a few cases, ill-prepared artists, all of the principals were enthusiastic about having the LTTA program continue at their schools.

Funding the Arts in Education

All of the superintendents reported that by far the smallest proportion of their school boards' budgets was ear-marked for "the arts and other special projects." While all school districts had at least one designated Arts Consultant, the energies and expertise of those individuals had to be spread thinly across school

Yes, funding is an issue, but we must overcome all this and introduce all children to the arts so that they know what to ask for. We will meet the needs and find the money as required. Look how much money is spent on technology and science: it costs more than most arts programs. Nobody bats an eye when we spend money on math and science. We need to change this for the arts.

districts. Superintendents were unanimous in saying that the presence of the arts in education was, at base, a philosophical issue: when educational leaders at the school board and provincial levels were convinced of the importance of the arts in education, the funds and resources would surely be forth-coming. Some of the superintendents reported that the success of the LTTA program was beginning to have a positive impact at various political and administrative levels in their areas. All of the superintendents said that, even as more funding became available, other ingredients essential to the prospering of the arts in education were the commitment of classroom teachers and school principals.

Conclusions and Further Research

The purpose of art is not the release of a momentary ejection of adrenaline but rather the gradual, lifelong construction of a state of wonder and serenity.

—Glenn Gould

Discussion of the Findings

One of the most important findings was that involvement in the arts for the students in the LTTA schools did not come at the expense of achievement in mathematics and language. Further, the results indicated that the LTTA program had a modest, but statistically significant positive effect on student achievement on the math test dealing with computation and estimation. Equally important was the fact that this difference did not occur until three years of programming had taken place. These kinds of effects are not sudden, but gradual.

Why did the changes occur in mathematics scores? The survey and interview data provided strong evidence that students in the LTTA schools were highly engaged at school. Indeed, we have speculated that the differences in computation scores were due to the students being more engaged, generally, in the LTTA schools than in the comparison schools. It is not altogether surprising that there would only be a change in one of the achievement scores; computation is the kind of task that can be improved by paying closer attention to the material at hand—it is much easier to improve a computation score than, for example, a reading score where much more language knowledge and comprehension is needed to make a significant change. But it may be that by being more engaged in school, changes in other scores will emerge over time, as students who are more engaged may learn more in all subject areas.

The trends that were revealed regarding students' views of school subjects, of schooling, and of the arts both within and outside of school, indicated that subject preferences are present as early as Grade 1 and remain stable through the elementary grades. When considering school and school subjects, three factors emerged. The first related to the enjoyment of school and the 'core' subjects, the second related to enjoyment of the arts, and the third related to enjoyment of gym, computers, visual arts, and group activities. Using Gardner's (1993) theory of multiple intelligences, this third factor embodies visual-spatial, interpersonal, and bodily-kinesthetic knowledge. Schools tend to emphasize other forms of knowledge, most notably, linguistic and logical-mathematical knowledge.

While the first school-based factor (enjoyment of school and 'core' subjects) was largely gender neutral, more girls were associated with the arts factor, and more boys were associated with the visual-spatial, interpersonal, and bodily-kinesthetic factor (Gardner, 1993). Consideration of the students' out-of-school activities produced similar patterns: girls were more likely to engage in arts activities while boys were more likely to engage in sports and solitary or screen-related activities. Students' views of the arts, both in and out of school, add another dimension to the profiles arising from an examination of the arts as part of the school experience. With the exception of music, those students who enjoyed school arts were not involved in arts activities outside of school, and those who were engaged in the arts outside of school indicated no desire for more school arts instruction. A deeper understanding of these factors or profiles is essential in terms of modifying arts experiences in schools so that all children are engaged by some form of the arts at school.

The responses of teachers in the surveys, interviews, and focus groups reinforced the impression that one of the greatest program effects has been to increase student engagement in learning, in both arts and non-arts areas of the curriculum. Teachers also reported that the arts had become an integral part of their

schools and that teachers and students alike felt a greater sense of community because of the LTTA program. In terms of their own experiences, teachers reported growth in the areas of arts skills, knowledge, and confidence to use the arts. By the end of Year 3 of LTTA programming, most teachers were using the arts in their teaching of non-arts subjects. It is clear that teachers wished to continue their own development in the arts through prolongation of the LTTA program or professional development experiences involving art-making and the exploration of curricular applications. Teachers presented a realistic portrait of the growing pains involved in instigating a program such as LTTA in schools. Their observations continue to help guide program revision and refinement.

LTTA artists expressed gratitude for the opportunities to help children develop their skills in various art forms, to explore a variety of curriculum topics through the arts, and to lay the foundation for a lifelong love of the arts. In terms of their own growth, artists said that they had become more patient and flexible, developed their communication skills, and learned much about teaching children in an developmentally appropriate manner. Many artists expressed a new-found commitment to helping solidify the role of the arts in education.

All of the school district administrators expressed the belief that the arts are essential to the education of children. They cited many positive effects of the LTTA program on schools, teachers, children, and parents. The administrators referred to budget constraints and lack of expertise as chronic barriers to the presence of more arts in schools. They commented that the success of the program was beginning to influence other administrators and politicians to take a proactive and public stance in favour of the arts in education.

Implications for Further Research

An issue worthy of immediate investigation is whether the Grade 6 gains in mathematics achievement will be robust over time: further longitudinal research will determine whether the change in mathematics scores was momentary or long lasting. One way of addressing the robustness of the finding would be to determine if the same cohort of Grade 6 students still perform significantly higher on tests of computation than their peers when all of the students are in Grade 8. In a similar vein, while there were no statistical differences in language measures (reading and writing), such differences might emerge over time. Thus, another issue worthy of further study is whether the original Grade 4 cohort will exhibit language gains after four, five, or even six years in the LTTA program.

Replication of the present study is also desirable. While the present study adds substance to the growing body of literature which provides correlational and causal evidence regarding the association between arts and achievement in other subjects, any study of this type and scope needs to be replicated in a variety of situations before any further conclusions can be drawn.

Further investigations should also explore the reasons why girls appear more likely to engage in and enjoy the arts. An area for future investigation might involve determining if school cultures and existing teaching practices contribute to these gender trends, and how arts programs might consequently be modified to engage students more deeply in arts experience.

The issue of engagement is an important one and requires further elaboration. By engagement, we mean the sense of being wholly involved. This word comes from the French term *engagé*, which, when used to describe a writer or artist, means morally committed. It is this commitment—the physical, emotional, intellectual and social commitment—which emerged again and again in written and oral reports of the LTTA experience by students, teachers, administrators, parents, and artists. There were thousands of comments about such things as joy, attentiveness, and motivation. The eloquence of one Grade 6 student's comment may reflect the essence of the relationship between involvement in the arts and learning:

Music brightens up the mind. When you learn something new, you feel good and that makes you feel good in other subjects like math.

Given the compelling evidence about engagement collected thus far, it is important to delve more deeply into how engagement might explain any gains in academic achievement, relating such gains to the particular contributions of the arts, and how such contributions might affect transfer and/or engagement. This could be done in a number of ways. One way would be to focus on the students who have exhibited the greatest changes. Another approach would be to design a new research study to test the engagement hypothesis, that is, to see if students are actually more engaged during arts activities than during other school activities and whether there are higher levels of overall engagement, independent of subject and activity, in arts-rich schools. This hypothesis could be tested by using an experience sampling method, such as the one employed by Csikszentmihalyi (1982, 1990, 1993).

There may be other general factors—beyond *engagement*—that the arts nurture. Comments by research participants regarding the importance of the arts as a form of *motivation* for taking other academic work more seriously, and the importance of the *discipline* required in pursuing the arts (both within and outside school) would suggest that there are a number of general benefits to arts study that can have positive influences on other pursuits. These factors are worthy of future research. Further, the research literature, along with our findings, suggest that there may be *domain specific links*—such as those between mathematics and music, or movement and reading—that bear further exploration.

Despite the limitations inherent in any single research study—even one of this scope—it is abundantly clear that the students in the LTTA program benefited from the experience in myriad ways. Some of these benefits lent themselves to measurement, such as gains in computation test scores. Others were more ephemeral, but perhaps even more important in the long term. It is our hope that the students, artists, and teachers involved in this project will, as Glenn Gould so eloquently put it, be involved in the lifelong construction of a state of wonder and serenity.

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Researcher Biographies

Dr. Rena Upitis

Dr. Rena Upitis <upitir@educ.queensu.ca> is the former Dean of Education at Queen's University, and currently a Professor of Education at the Faculty of Education at Queen's University, Kingston. She has taught courses on music and mathematics curriculum in the preservice teacher education program, and courses on research methods in the graduate program. A musician and composer, Dr. Upitis has diplomas in both Piano and Vocal Performance from The Royal Conservatory of Music (Toronto), and degrees in Education, Psychology, and Law from Queen's (BA, LLB, MEd) and Harvard (EdD). She worked as a music teacher in inner-city schools in Canada and the United States and her two books on music teaching, published by Heinemann, explore possibilities for teaching music through children's improvisation and composition in regular classroom settings. She is co-author of *Creative Mathematics: Exploring Children's Understanding* (1997, Routledge). Her various research projects, funded by SSHRC, NSERC, and government and industry, have explored teacher transformation through the arts and the use of electronic games in mathematics and science education.

Dr. Katharine Smithrim

Dr. Katharine Smithrim <smithrik@educ.queensu.ca> is an Associate Professor of Education at the Faculty of Education at Queen's University, Kingston, where she teaches music in the preservice program and courses in arts education at the graduate level. Dr. Smithrim has an artist diploma in singing performance from the University of Toronto, and degrees in music education (BMus, Toronto), teacher education (BEd, Queen's) and a doctorate in music education from Eastman (PhD). Her current research interests are music in early childhood, teacher transformation through the arts and the spiritual dimension in teaching and learning. She continues to perform as a singer and to teach music to students in schools and other educational settings, from preschoolers through to intermediate students. She is co-author of *The Arts as Meaning Makers* (2001, Pearson). Along with Bob McGrath of *Sesame Street*, she has made two commercial recordings: *The Baby Record* and *Songs and Games for Toddlers*, the latter a Juno nominee and now a Golden Book Video.