

# Attitudes towards information technology in music learning among Hong Kong Chinese boys and girls

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*This article argues that changes of gendered attitudes towards IT among students may be related to recent educational reforms focusing on incorporating computers into the classroom. Data are drawn from an interview survey with 430 students attending 26 primary and secondary schools in Hong Kong. The results reveal no significant differences between females and males in three aspects: (1) their belief in the effectiveness of using technological facilities; (2) their confidence in handling technology when learning about music; and (3) their motivation towards learning about music with the help of information technology (IT). Primary boys and girls in this study reported obtaining a higher degree of motivation for learning about music with the help of IT than secondary students of both sexes. The potential implications of these findings for educational policy in Hong Kong are to find out how to motivate students' musical learning with the help of IT, and to make technology relevant to the content of the music programmes of primary and secondary schools.*

## Introduction

Computer technology offers a tool with which to change some educational methods and thereby provide a more stimulating learning environment. Information and Communication Technology offers new learning activities such as using CD-ROMS, word processing, and researching by means of the World Wide Web. The development of instructional technology has often been regarded as the path to educational quality (e.g. Fiske & Hammond, 1997; Mergendoller, 1996; Spanier, 2001), and there is widespread agreement among governments and educators in both the Western and non-Western worlds that all students in the 21st century should be technologically literate (e.g. Bayram, 1999; Chlopak, 2003; Education and Manpower Bureau, 1998a, 1998b; Eisenberg & Johnson, 2002; Hung & Chen, 2003; Hunt, 1997; Kuo & Low, 2001; Salpeter, 2003). The enhancement of students' performance through IT-assisted education has been demonstrated with respect to various subjects, such as language (Tsou *et al.*, 2002; Zhong & Shen, 2002), history (Lipscomb, 2002; Parush *et al.*, 2002; Scheidet, 2003), music (Byrne & MacDonald, 2002; Odam, 2000; Pitts & Kwami, 2002), and science (Baggott *et al.*, 2003; Troutner, 2001).

The most comprehensive statements of the Hong Kong Government's policy on IT were its *1997 Policy Speech* (Government of Hong Kong Special Administrative Region, 1997) and *Information Technology for Learning in a New Era* (Education and Manpower Bureau, 1998b). These set the tone for a five-year strategy plan, *Information Technology*

for *Quality Education* (Education and Manpower Bureau, 1998a), promoting the use of IT in all schools (see also Government of Hong Kong Special Administrative Region, 1998; Ho, 2004), which resulted in increasing demands on teachers and students to upgrade their technological skills and practices. Despite this promotion of IT in education in recent years, the gender gap in the Hong Kong community and in its schools and universities persists. According to the Hong Kong Census and Statistics Department figures for 1997, women accounted for only 26 per cent of the 12,464 people working in the 'data processing and tabulating services' (Scott, 1998). This figure has been correlated with the number of girls who choose to study IT at university. At City University, the Chinese University of Hong Kong, and the Hong Kong University of Science and Technology, females represented only 21 per cent of those enrolled for the Bachelor of Science and Master of Science degree courses during the 1997–8 academic year (Scott, 1998).

Despite the Hong Kong Government Sex Discrimination Ordinance of 1997, girls' access to technical subjects, such as Design and Technology, remains constrained (Leung & Bryant, 2000), as can be seen from the numbers participating in arts and sciences annual public examinations such as the Hong Kong Certificate of Education Examination (HKCEE) and the Hong Kong Advanced Level Examination (HKALE). For example, male day school first attempters in Computer Studies, Design and Technology, and Information Technology in the 2002 HKCEE outnumbered females, whereas female day school first attempters taking Art, Geography, Home Economics (Food, Home and Family) and Music outnumbered males (see Hong Kong Examinations and Assessment Authority, 2002a, 2002b, and Figure 1). Girls also outnumbered boys in the arts subjects of the 2002 HKALE, whilst boys outnumbered girls in sciences (see Figure 2 for the ratios between male and female day school first attempters at HKALE taking Art, Chinese Literature, English Literature, Geography, Music,

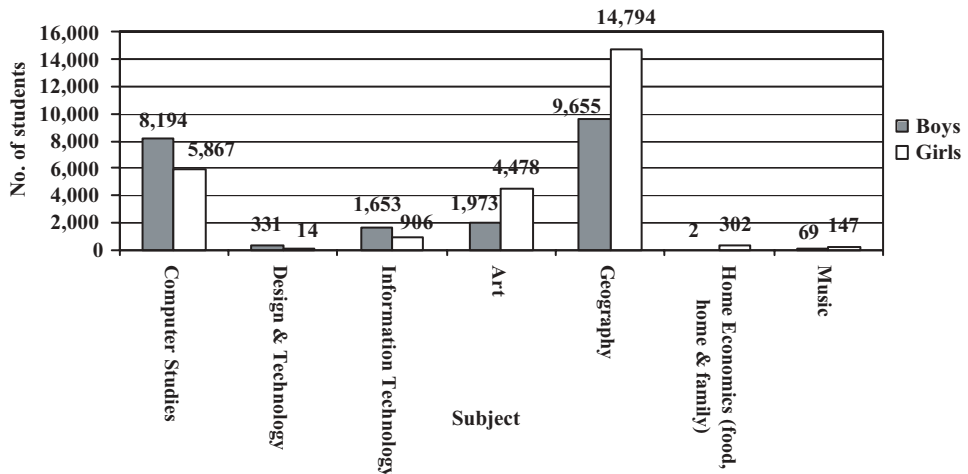


Fig. 1 Comparison by selected subjects and by gender of day school first attempters in the 2002 HKCEE

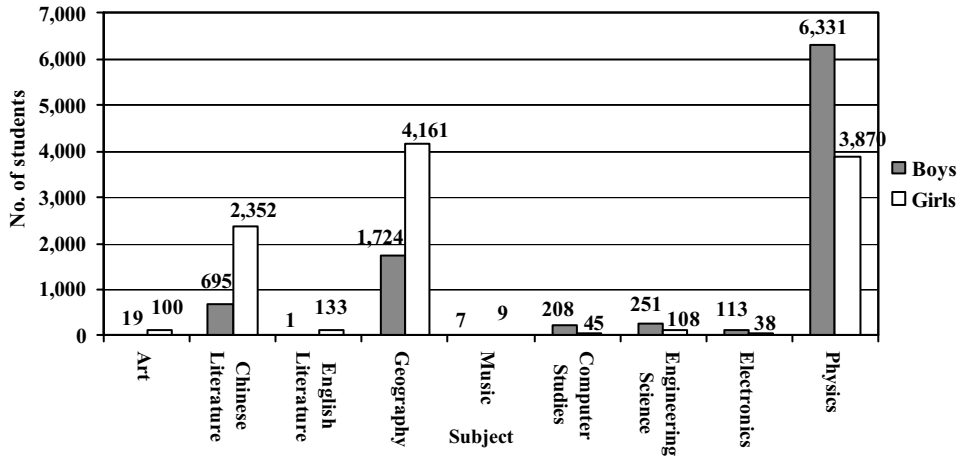


Fig. 2 Comparison by selected subjects and by gender of day school first attempters in the 2002 HKALE

Computer Studies, Engineering Science, Electronics, and Physics). Furthermore, girls exceed boys in both senior secondary and higher music education in Hong Kong (Ho, 2001).

Gender differences are found not only with respect to Hong Kong's public examination subjects, but also in classroom music activities. Ho (2001) demonstrates that whereas girls enjoy singing, listening, and instrumental playing, boys prefer singing, listening, and computer-based music. These results are similar to British boys' and girls' usage of and attitudes towards music lessons (see Green, 1993, 1997; Hanley, 1998), and the domination of computing and technology by boys (see, e.g., Colley *et al.*, 1997; Comber *et al.*, 1993; Wright, 2001). Ho's (2003) questionnaire survey in Shanghai, Hong Kong, and Taipei between June 2000 and January 2001 finds only slight gender differentiation, though the boys were more successful with computer music and composing. This study asks to what extent similar gender differences persist in IT-assisted music education in Hong Kong schools. Data from interviews with primary and secondary school students concerning music studies and IT are followed by a discussion, provoked initially by the question of what happens when 'feminine' music and 'masculine' IT are brought together.

## The study

### Purpose

This article is concerned with gender and IT in Hong Kong primary and secondary school music today, focusing on children's everyday perceptions rather than on their aptitude, achievement, or developing identity. It addresses the following questions:

1. To what extent do boys and girls think their music learning would be more effective with the help of technological facilities?

2. Do boys and girls believe that the use of music technology in their lessons will motivate them?
3. Do boys and girls have different attitudes towards the employment of IT in music activities?

#### *Method*

The semi-structured interviews, most of which were face to face, were conducted in Cantonese (a major dialect of the southern part of mainland China) between February and August 2002. They involved a series of 'prompt' questions about interviewees' attitudes to the use of IT in music learning, so as to include any unexpected issues that the participants felt to be important. Owing to difficulties of school administration and the inaccessibility of students during school hours, two secondary students were interviewed by telephone. Notes were taken during the course of the interviews and most were also recorded onto audio tape. The interview data were completed manually and with computer assistance using the software Excel. Participants' responses to 'yes/no/depends/not sure' prompts were collected in the interviews rather than being imposed later by the writer. All the interview data were anonymous. The following interview questions were used:

1. Do you feel confident about handling technological learning materials by yourself?
2. Have you learned music more effectively with the help of technology?
3. What are the advantages of technology for your music learning?
4. Do you think music technology assists high-quality learning?
5. Do you think music technology motivates you towards music lessons?
6. For which musical activities do you prefer to employ technology?
7. Which musical activities do you find unsuitable for technology?
8. What music activities or subjects do you feel are better taught, rather than learnt, with the aid of technology?
9. Do you think music technology motivates you towards more creative music making or composition?
10. Do you think your music lessons would benefit from using more technology? In what ways?

#### *Participants*

Having been invited to take part in the survey, one government secondary, two private primary and 23 government-aided primary and secondary schools (13 primary and 13 secondary in all) were involved. Tips for teaching and learning music with IT stipulate access to audio-visual projection, computers, and individual learning music (CAL) software (Creative Arts and Home Economic Section (Music), Advisory Inspectorate Division, Education Department, 1999). But six primary schools did not have computers in their music classrooms, and two primary schools only had compact disc players and did not have other technological equipment. Projectors, computers, digital videodisc and laser disc/video compact disc players, MIDI keyboards, synthesizers, amplifiers and some music software were common, particularly in secondary schools. The 430 students (217 girls

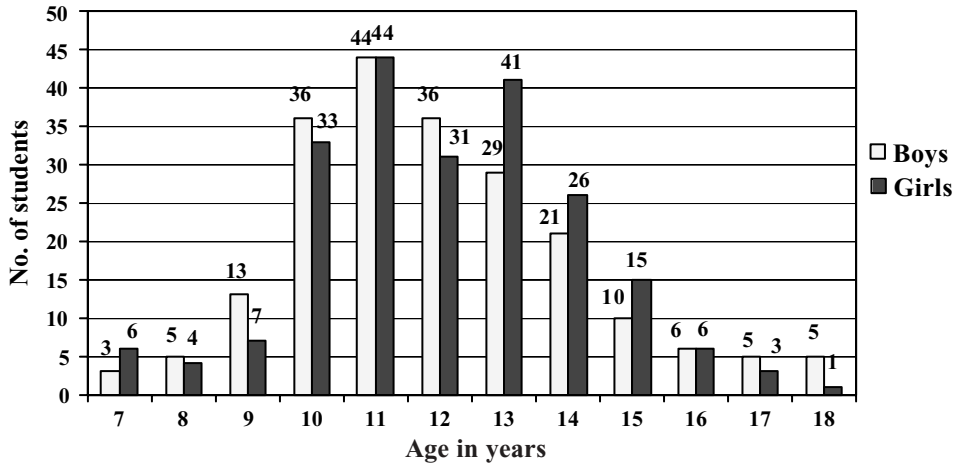


Fig. 3 Distribution of boys and girls between the ages of 7 and 18

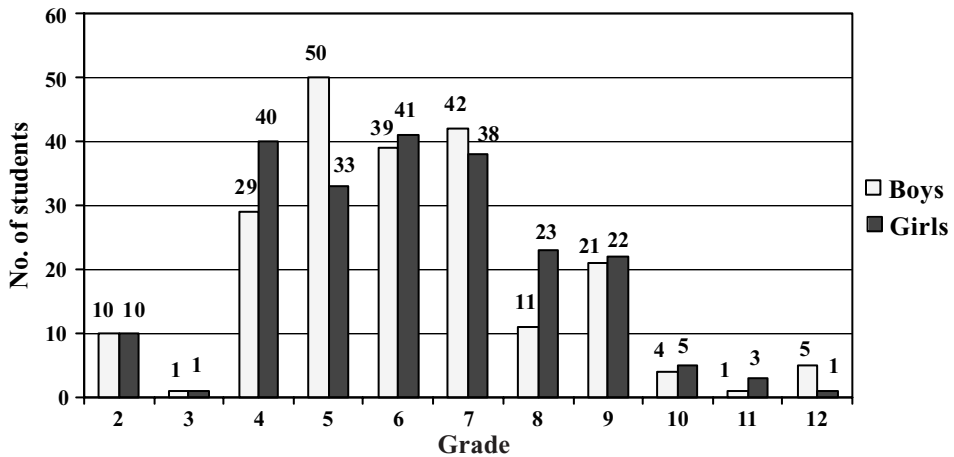


Fig. 4 Distribution of boys and girls between Grades 2 and 12

and 213 boys) who participated in the survey were selected by their music teachers and were interviewed during school recesses, lunch hours and after school. They attended primary two to secondary six (Grades 2 to 12), and were aged between 7 and 18 (see Figure 3). 254 students (129 boys and 125 girls) came from one boys' and 12 co-educational primary schools, and 176 (84 boys and 92 girls) came from one boys', three girls' and nine co-educational secondary schools (see Figure 4 for the distribution of boys and girls). For

the sake of convenience I use 'B' and 'G' below to represent the answers of boys and girls.

### Results

#### Confidence with handling the materials of technology

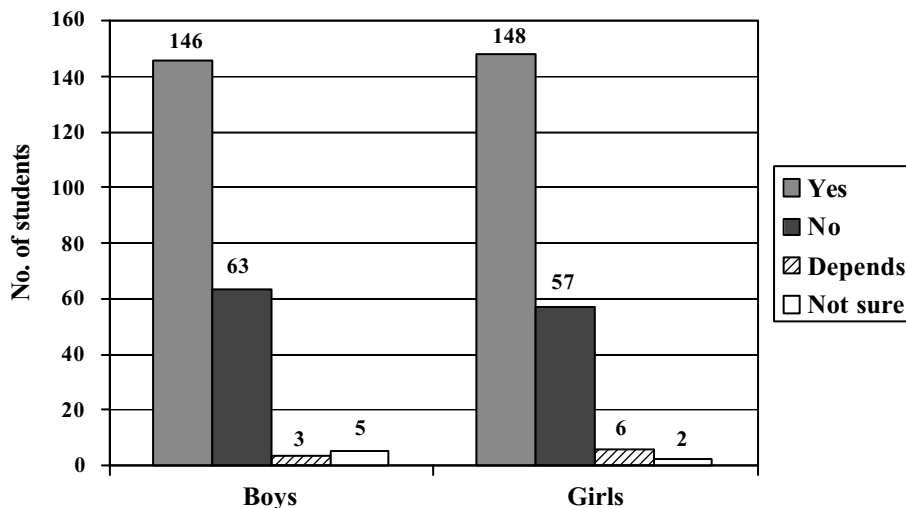


Fig. 5 Number of students who felt confident in handling music materials by themselves

Most students were confident in using a computer, synthesizer, and other software to compose, and to download music and musical information from the Internet. 146 boys (34% of the total and 67.3% of the boys) and 148 girls (34.3% of the total and 69.5% of the girls) out of a total of 430 felt confident handling the learning materials of technology by themselves (see Figure 5). One girl and two boys reported that their fathers' help with computer technology at home had given them confidence. Only 63 boys (14.7%) and 57 girls (13.3%) lacked confidence, whilst the other 8 girls and 8 boys either had no opinion or said that their confidence fluctuated depending on the task. 54.1% of primary girls and 58.8% of primary boys felt confident using IT for music, showing a fairly low rate of self-reported confidence for both sexes. Boys' and girls' incapacities were mainly due to their unfamiliarity with computer technology and/or music software:

B: 'I am not familiar with the score-making software.'

B: 'I usually go to the wrong place. I cannot erase the things that I do not want to keep. After I save the file, I don't know where the file is and I cannot find it again.'

B: 'The computer is very difficult to use.'

B: 'No one can tell me the answer. I have no computer background.'

B: 'I do not have good computer knowledge.'

- B: 'My computer knowledge is no good.'
- G: 'I am not familiar with the music software.'
- G: 'It is difficult to click the right notes on the computer.'
- G: 'I usually click the wrong notes and I need help from others.'
- G: 'I am not familiar with the synthesizer.'
- G: 'I am afraid of failure.'
- G: 'I have no computer background. I find it difficult to handle.'
- G: 'I don't know how to operate a computer.'

These interviewees did not believe that technology could help them understand music and did not experience the joy of music-making. Unfamiliarity with the music software and other technological facilities made students scared of handling them to learn music. Those with no confidence in IT for music learning also complained that no one could assist them with technical problems. However, those lacking confidence with IT music-learning materials had no problems with compact disc and mini-disc players.

Effectiveness of music learning with the help of technology

Boys and girls shared similar views on searching for information about music on the Web, believing that such facilities could aid their listening, music theory and composition, and could bring joy and relaxation. 363 students (182 boys and 181 girls) agreed that IT could help their music learning (see Figure 6). Those students who answered 'Depends'

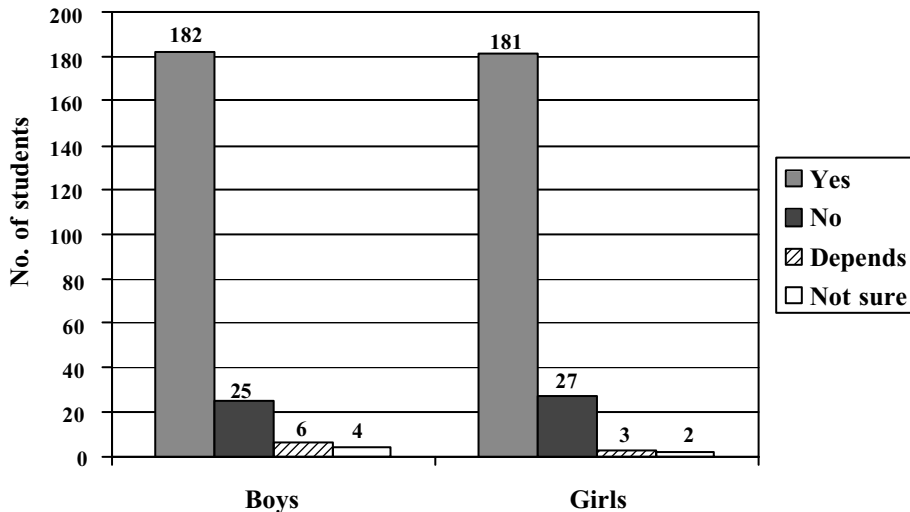


Fig. 6 Students' responses to the effectiveness of learning music with the help of IT

thought that the effectiveness of technology depended on the topic they were learning. For example, if the topic was singing, they preferred to have their music teachers' teaching. Again, primary school boys and girls were more convinced about the value of IT for music learning. 58.2% of primary school girls and 55.2% of primary boys expressed a positive attitude, compared with only 41.8% of secondary school girls and 44.8% of secondary boys. These students found music technology 'faster and better', 'more interesting', 'more fun', 'playful', 'more comfortable', 'not boring', 'convenient', 'relaxing'; they liked 'more visual and audio efforts' and appreciated technology as a source of information. Moreover, 165 boys and 172 girls thought that music technology was a good means to achieve quality of learning. 36 girls and 34 boys did not believe that music technology could help the quality of music learning, saying they preferred their teachers' guidance. A few boys felt that computers lead to disciplinary problems in the music class:

B: 'Classmates do not pay attention to the teacher's instructions when we use the computer in the lesson. We browse the irrelevant web . . .'

B: 'We are frightened by the teacher's eye contact. If we have to focus on the screen or other IT facilities, the classmates are very noisy and do not pay attention to the lesson.'

B: 'Classmates will only pay attention to the IT games.'

A few boys associated their negative attitudes with practical problems:

B: 'There is only one computer and that is occupied by the teacher. Therefore we can see the screen but we cannot directly be involved in music learning with the help of technology.'

B: 'Most IT aids adopt the English media. I do not understand the instructions of the music software. It usually takes a long time for the music teacher to do the interpretation.'

B: 'Teacher's voice is better than the sound of the technology . . .'

One boy noted that the interaction with teachers was better than that with computers and denied the value of music technology for music learning; and three said that teachers achieve a higher quality of music learning.

Most girls who felt negative towards IT blamed the teaching style used in music lessons. They thought that their teachers' explanations were clear and detailed, and that they were more skilled with tackling students' musical problems. For example:

G: 'The computer is just an aid. It can't replace the teacher.'

G: 'Experienced teachers are more skilful at making pupils understand.'

G: 'I enjoy teacher-centred learning, my teacher's teaching is very lively and interesting.'

G: 'Teacher will ask the class questions during the lesson, but IT will not ask us questions.'

G: 'Teacher uses her interesting method to teach us and I enjoy it very much . . .'

G: 'Teacher plans the lesson herself, the content will fit our learning style. However, IT learning may not fit all schools.'



G: 'I don't understand what the CD-ROM presents, teacher's explanation is better.'

G: 'Teacher's explanation is very clear and it's easy for me to memorise.'

Only one girl noted that the whole class would talk more and did not pay attention to the teacher's instruction when IT was adopted in the lesson. Another girl complained about the strange audio effects produced by technology.

Motivation to learn music and the employment of music technology in music lessons

The interview data in this section compare girls and boys, primary and secondary students, and relations between age and gender. Most students claimed that IT helped their motivation towards learning in music lessons, and girls and boys felt similarly about technology in music learning: 193 boys (88% of boys) and 189 girls (88.7% of girls) said 'Yes' to the question 'Do you think music technology motivates you towards music learning?' (see Figure 7). Of those who answered 'Depends', one girl said that if her music teacher was patient with the music technology used to teach them, they would be happy to learn music, and one girl said that it depended on whether the music videos were interesting and whether she liked the music. One boy said he felt motivated towards learning with music technology if the subject matter was classical music, but not other styles. When students were not motivated to learn about music with the use of music technology, they liked neither the music nor their lessons.

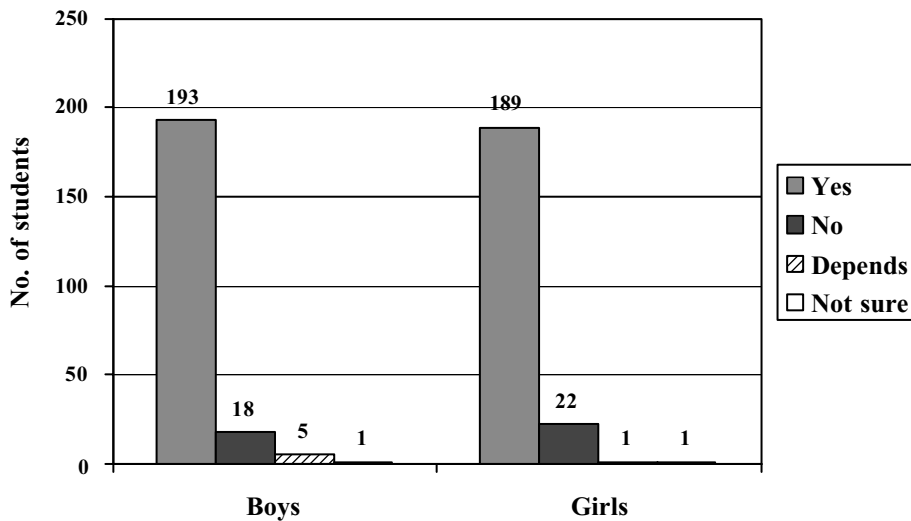


Fig. 7 Students' views on the use of IT as an aid to their learning motivation in music

Primary students were generally more motivated towards music as a school subject. 105 (55.6%) of the primary school boys and 115 (59.6%) of the primary girls interviewed, compared with 84 (44.4%) of the secondary school boys and 78 (40.4%) of the secondary girls, expressed their enthusiasm. When girls and boys agreed about the relationship

between the effectiveness of a learning method and their motivation towards music learning, they tended to find IT quicker and more efficient. And boys and girls agreed that they could learn more music and accrue more musical knowledge with the aid of technology. Nevertheless, three boys and one girl said that they did not like music and were not motivated to learn about it even if music technology was employed. One girl and one boy said that they did not like technology in any sense. One boy said that motivation towards

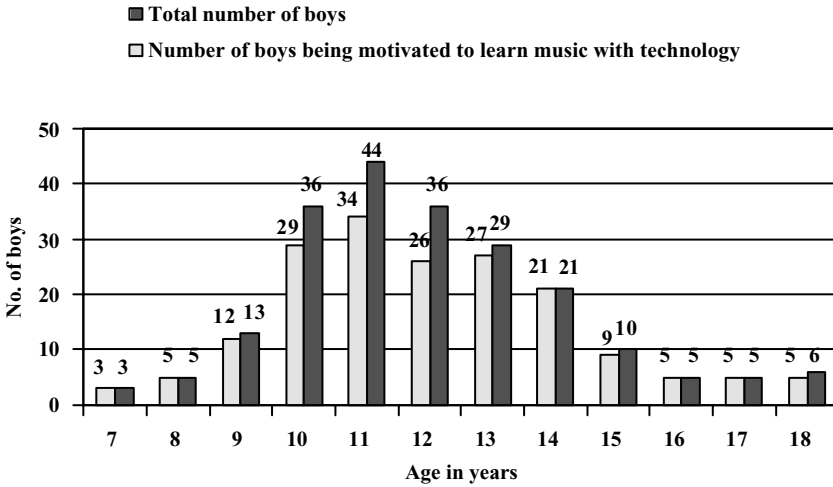


Fig. 8 A comparison of the total number of boys and the number of boys being motivated to learn music using music technology in music lessons

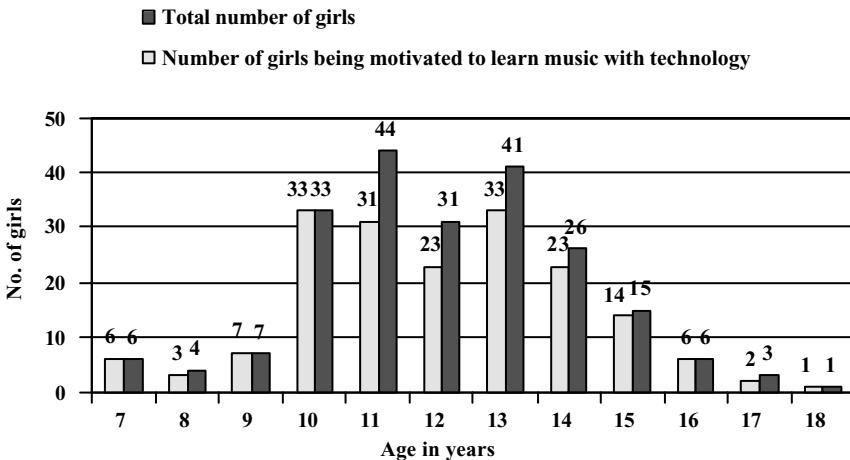


Fig. 9 A comparison of the total number of girls and the number of girls being motivated to learn music using music technology in music lessons

learning did not come from technology, and another girl maintained that she liked popular music which was different from the music she learned in music lessons, thus there was no relationship between music technology and her motivation to learn about music in school.

79.8% of the total number of students (169 boys and 174 girls) maintained positive attitudes about both the efficiency of music IT and its motivational tendencies. 76.3% of them (168 boys and 160 girls) believed that music technology helped to motivate them and enhanced the quality of their education; and 65.6% (149 boys and 133 girls) agreed that their motivation towards using IT increased with their confidence.

This study also found that boys aged 7–9 and girls aged 7–10 felt more motivated to learn about music when using technology (see Figures 8 and 9). The data show a drop of interest between the ages of 10 and 12 for boys and 11 and 13 for girls. However, the figures for the older children were much the same as those for the youngest.

**Music activities and the use of IT**

On the basis of students’ responses, music activities were divided into four main categories: appreciation, performance (singing and instrumental playing), composition, and knowledge, which included theory, characteristics of instruments, and musical history. Girls were more successful in listening and performance, whilst boys were more successful with composition and literacy (see Figure 10). Though the students thought that music technology could be used for listening, performing, composing and information, they felt that performance was taught better by their teachers, because music technology could not respond to particular individual problems with, for instance, breathing, dynamics, instrumental fingering and the clapping of rhythmic patterns. Most of the boys and girls were happy using computers for composition: 163 boys and 178 girls maintained great

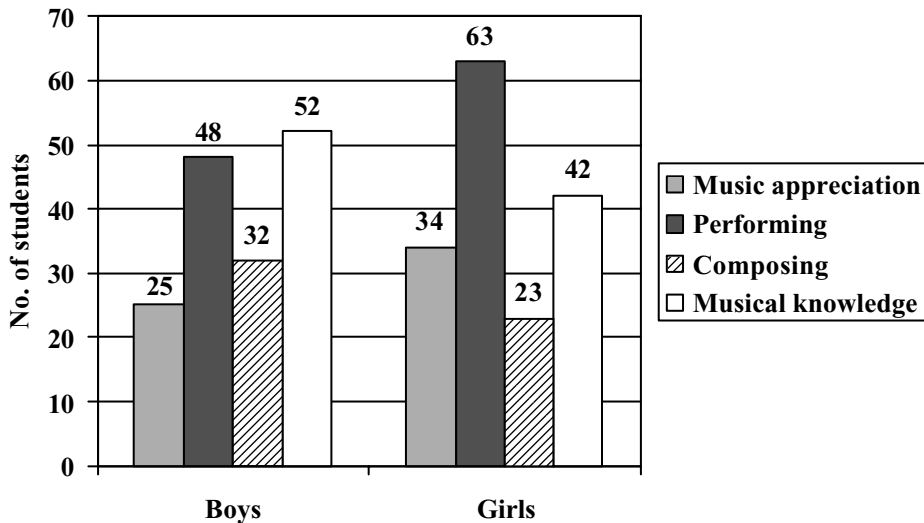


Fig. 10 The musical activities in which students preferred to employ music technology

interest, while 44 boys and 34 girls showed little. Among the former group, 114 out of the 163 boys (69.9%) were attending primary schools and 49 (30.1%) were at secondary, while 107 (60.1%) of the 178 positive female responders were at primary schools and 71 (39.9%) were at secondary. Examples of comments were:

B: 'Using the computer to compose is interesting.'

B: 'The music can be played easily and accurately.'

B: '... the software does help me to compose more music.'

B: 'I can listen to my composition right after composing.'

G: 'With the use of the computer, I can hear what I have composed easily.'

G: 'The computer is convenient.'

G: 'I can try different groupings on the computer and I can listen to my work instantly.'

G: 'IT has a great variety of instrumental selections, I can use different kinds of sound in my creation.'

164 girls (38.1%) and 151 (35.1%) boys believed that music technology could enhance their motivation towards learning about music and composition. 158 (36.7%) and 139 (32.3%) believed that music technology could also motivate their creation of music.

When students were asked about the music activities that they did not feel interested in using music technology for, 140 boys and 130 girls said 'none'. The 49 boys and 44 girls who felt negative about using the computer to create music had no interest in either technology or composition, or even in the music lessons. Among them, 6 boys and 12 girls said they found their teachers' explanations clearer, and that more interaction between students and teachers was necessary for music learning. Others in this group said that music theory, instrumental playing, choral training and singing could be better taught by teachers. A few also said that electronic sounds were no good for learning about music:

B: 'Dislike all music activities of having electronic sounds, particularly the singing activity.'

B: 'The quality of playing real piano and electronic piano is different. My teacher will scold me if I use the electronic piano for practice as this cannot reach the standard of a real piano.'

G: 'Orchestral should not be mixed up with electronic sound.'

G: 'I do not like the sound that is produced by the computer as I find it very ugly.'

G: 'The quality of sound of an electronic piano is not as good as a real piano.'

#### Views on having more integration of technology for learning music

159 boys (37% of the total and 74.6% of the boys) and 160 girls (37.2% of the total and 73.7% of the girls) were positive about integrating more technology for learning about music into their lessons (see Figure 11). Primary and secondary students felt differently about integrating more technology into their music lessons. Whilst 55% of the primary girls (88)

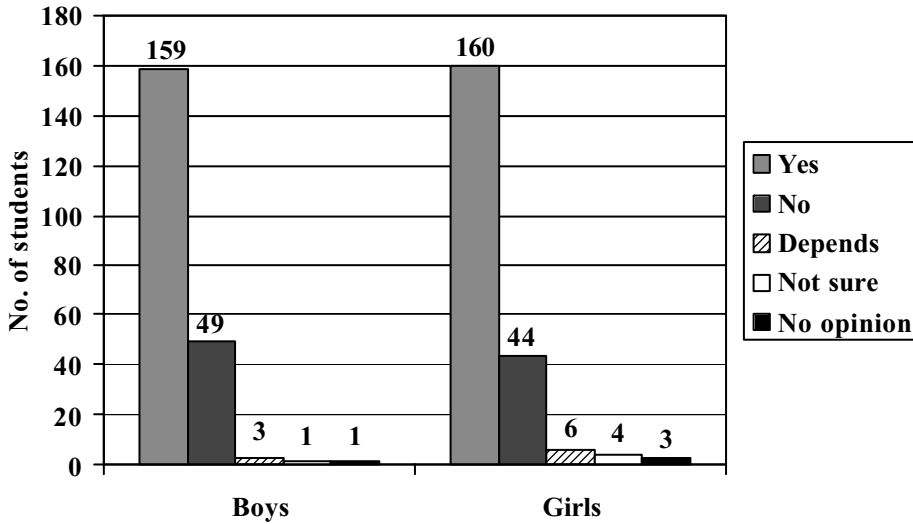


Fig. 11 Students' feelings about the integration of more IT into music lessons

answered positively, only 45% of the secondary girls (72) agreed. Primary male students also responded more positively in this respect: 57.2% (91) of primary and 42.8% (68) of secondary boys agreed with the incorporation of IT into their music lessons. Boys and girls shared similar views about having more computer technology for listening, composition, access to information and for watching visual images. Those who did not want more integration of technology thought their music teachers' teaching was sufficient:

- G: 'I don't like IT. I like teachers more.'
- G: 'Teacher's teaching is enough ...'
- G: 'Computer cannot play the piano.'
- G: 'I enjoy teacher's teaching rather than IT.'
- G: 'A waste of time. Teacher's explanation is already clear ...'
- B: 'Teacher's explanation is enough. There is no need to use music technology.'
- B: 'Teacher's teaching is enough.'
- B: 'Teacher's teaching is very good already.'
- B: 'I will feel dizzy if more computer technology is used.'
- B: 'Teacher's explanation is detailed.'

151 girls (35.1% of the total) and 148 boys (34.4%) were eager to integrate music technology into their music lessons and believed it was useful in motivating their learning; and 146 girls (34.0% of the total) and 149 boys (34.7%) agreed that more integration of music technology would enhance their learning.

### Summary of the results

1. 148 out of 213 girls (69.5%) and 146 out of 217 boys (67.3%) felt confident in using the internet, computers, synthesizers, and music software to learn and compose music.
2. Similar numbers of both sexes (182 boys and 181 girls) indicated that technological facilities were a fast, reliable and convenient means to successful learning about music. Most of those who did not believe in the effectiveness of IT for music learning lacked technological confidence, recognised its disadvantages with respect to classroom management and preferred teacher-centred music classes.
3. It was found that students of both sexes at junior grade levels of primary school felt more positive about using technological facilities for music learning, but that their interest diminished between the ages of 10 and 12 for boys and 11 and 13 for girls. The older secondary school students were found to have positive attitudes towards the use of IT for music learning.
4. Most students (193 boys and 189 girls) responded that IT could motivate their music learning, whilst denying its effectiveness because of their dislike for music or music lessons.
5. On the whole, boys preferred to employ IT for composing and musical literacy, whilst girls preferred to use IT for listening and performing.
6. 159 boys and 160 girls out of the total 430 wanted more IT for learning about music. Primary school girls were 10% more keen on IT than secondary girls, and primary school boys were 14.4% more enthusiastic about the integration of IT in music lessons than secondary boys.
7. Generally speaking, all the primary school children were more positive about the use of IT for music learning than the secondary children.

### Discussion

The present study has argued that IT is no longer a purely masculine domain. The discussion is devoted to three areas: (1) There are no significantly different attitudes towards technology-related learning in music lessons between boys and girls; (2) Primary school boys and girls were more confident and enthusiastic about using IT for music learning than junior secondary school children; (3) Boys and girls preferred using IT for different musical activities.

Most boys and girls felt confident with IT for music and believed in its affectivity. The single most important factor for increasing girls' opportunities with IT is education. From their early primary school education onwards, girls are provided with practical learning opportunities designed specifically to help develop their confidence and interest in IT and non-traditional roles. Through a myriad of musical activities, opportunities, encouragement, discouragement, and various forms of guidance, children become familiar with the use of IT for learning about music. Home computers, digital televisions and mobile phones increase the popularity of IT among young children, to the extent that even those boys and girls in this study who did not believe that IT would motivate their music learning still felt confident with compact disc, digital videodiscs and video compact disc players. As mentioned earlier, a few students in this study said that their fathers helped them

with IT, and such parental guidance could help other students in the future. Parental attitudes have a strong impact on children's developing sense of self and self-esteem in using computers and other technological facilities, with parental warmth and support being key factors. Moreover, the government of the Hong Kong Special Administrative Region has taken the initiative to build up the basic foundations to promote IT learning in school with a five-year strategy of education initiatives from 1998 to 2003. When confronting IT in the new millennium, teaching methods and presentation modes need to change. Music teachers' influence is strong and IT can enhance their interactions with students during music learning. Developing gender- and culturally inclusive teaching and learning environments for music technology is another significant step.

Primary boys and girls were found to feel more positive in all respects towards IT than secondary school children. For example, 69.9% of the boys and 60.1% of the girls who maintained positive attitudes towards the use of computers for composing activities were attending primary schools. More primary boys and girls expressed a positive attitude towards the incorporation of IT in their music lessons. This study suggests that more educational software (including music) could be developed to increase students' interest in computers at different levels so as to help increase their interest in learning music with the help of technology throughout their primary and secondary grades. Presently, Hong Kong primary and secondary schools obtain IT equipment at varying rates and degrees for their music teaching, in what are described as fast and slow tracks. Factors such as how the technology-enriched music classroom environment is structured, and what pedagogical practices are in place, are important when examining the impact of IT in music education. It seems to be important that technology should be fully implemented across the curriculum throughout primary and secondary education, and that students should perceive their use of it as part of the normal procedures of the classroom. There was some evidence to suggest that some higher grades of primary schools and junior forms of secondary boys and girls held the least positive attitudes towards the use of IT in music learning, and it is suggested that their approach to computers may be influenced by the cultural pressures of gender stereotyping. This may also be due to their interactions outside the school environment. It is also predicted that controlling for prior home or other extra-curricular experience with computers would reduce gender and grade differences in attitudes towards the use of music technology. Since the main experience of computing for most male and female students occurs within an educational framework, the role of schools and music teachers in fostering positive attitudes may be particularly relevant. Schools and music teachers can make informed policy decisions not only concerning gender and music technology, but also with respect to students' grade levels and the suitability of particular music software and computer technology for teaching specific aspects of music. Future studies should focus on how to design and use technology in an educational setting so that positive attitudes and motivation can be encouraged.

Most boys thought that the main disadvantage of IT was that it could lead to a breakdown in the discipline of music lessons, whilst the girls were more concerned about the unsuitability of IT for particular topics. But despite such differences, they agreed that teaching content was more effectively delivered by their music teachers. Though the educational system has attempted to move from a teacher-centred to a student-centred approach to learning and teaching and has encouraged music teachers to become coaches

and facilitators, some boys and girls still feel more comfortable learning performing skills from their teachers.

This study supports previous research conclusions concerning girls' preference for listening and performing, and boys' inclinations towards music history and theory, and the introduction of instruments (e.g. Green, 1993, 1997; Hanley, 1998; Ho, 2001, 2003). This raises questions concerning whether girls lack musical creativity and self-expression and whether boys are more interested in composition and theory. Certainly girls are keener than boys on performing activities, as can be seen by their participation in extra-curricular activities in schools; and boys seem less interested in singing (see Wright, 2001; Ho, 2003). Perhaps these preferences underlie gendered differences between preferred uses for IT.

Though Hong Kong higher music education (Ho, 2001) is mostly occupied by female students, the teaching profession in this sector is mainly dominated by males. There is also an apparent lack of women in most fields of contemporary music technology and electronic audio art, and in electronic composition and electronic sound technology in Hong Kong. The foundation of gender equity is cooperation and collaboration among students, educators/music educators, education organisations, families, and the community. We should consider what changes are needed to provide access for girls to the economic, educational and social opportunities that music technology will create in the 21st century. This study suggests that the reason for the gender gap in computing and technology lies not only in education or in music education but with society as a whole, and would be improved by broadening our understanding of how students develop knowledge and skills in primary and secondary education. Parents, teachers, the educational system, manufacturers and Internet providers, who may encourage or discourage students in the use of technology, all have the responsibility and ability to shape the self-images and futures of children as they approach computers and computer fields. Perhaps the social climate is changing more in some of these settings than it is in technology education. For instance, parents might encourage girls to explore hi-tech equipment at home, and music teachers could foster their confidence with music technology in school by, for instance, encouraging girls to compose with the help of MIDI sequencing. Similarly, teachers could encourage boys to use a wide variety of computer software for drill-and-practice instruction in ear training, performance and appreciation.

### **Conclusions**

Though more general age differences in use and attitudes were found with Year 7 students (i.e. those aged between 11 and 12), the figures for older students were much the same as those for the youngest. Action should be taken in response to the finding that junior primary school students of both sexes are more enthusiastic about the use of IT in music lessons than senior forms of primary and junior forms of secondary children. Girls need more exposure to music technology, particularly during the critical secondary school stage, when they often turn away from computers, technology, mathematics and science in droves. It is essential for children to be introduced to computers in a variety of capacities before they reach adolescence. Technology can help serve the goals of educational reform by contributing to student learning through challenging tasks, the professionalisation of music



teachers, and the creation of a culture that supports learning in and out of the classroom in both primary and secondary education. In order to meet the needs of older and younger students, further clarification of the different goals and experiences associated with using educational technology for music learning is necessary.

The Chinese students in this study display fewer gendered differences in attitude, except when asked to give opinions about their preference of musical activities with regard to computer technology. This article argues that, though boys and girls prefer using IT for performance, listening, composition and musical knowledge, there are no great gender differences in students' attitudes towards IT. 69.5% of girls and 67.3% of boys were confident with the Internet, computers, synthesizers and other music software. 88% of boys and 88.7% of girls were positive about their motivation towards music learning with IT, and similar numbers were keen to see more integration of IT into their music lessons. The relationship between IT and gender in music learning helps broaden our understanding of how girls might develop musical knowledge and skills in gendered locations. The educational reform movement in Hong Kong is not designed with gender in mind, but one might infer from this study that gender should be part of education reforms as early as the elementary stage.

The purpose of this study is to help us remember that all learners are individuals, and that boys and girls may have different perspectives on how they use and learn music with technology. I believe that this study will make us think and maybe help us to change instructional paradigms and practices to include gender, age and grade level considerations in music education, so as to make technology more relevant to the content of the music programmes of primary and secondary schools. Music teachers, IT professionals, and other music researchers might identify and develop methods for improving the learning environment for all individuals, whether they are interested or not in learning music using IT, or even for those students who may be interested in pursuing a career in music technology.

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