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Teachers' Perspectives about Implementing ICT in Music Education

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Abstract: This article provides insights into the current state of Information and Communication Technologies (ICT) implementation in music classrooms throughout Queensland, Australia, through the perspectives of classroom music teachers with regard to organisational practices that influence the implementation of ICT in music education. Using explanatory sequential mixed methods, a quantitative survey gathered music teachers' perspectives regarding the availability of ICT resources, ICT support, teacher confidence, current teaching practices and professional development. Six qualitative semi-structured interviews were then conducted to investigate further the identified themes. This paper discusses the analysis of the quantitative survey results. Findings suggest that the F-10 Australian Curriculum needs to define the term ICT to provide greater clarity for teachers. Further, due to a lack of ICT resources and support, classroom music teachers limit their pedagogy to whole class activities which rely on a limited number of ICT resources due to availability, familiarity and reliability. Teacher confidence is directly affected by professional development opportunities. The benefits of professional development opportunities are perceived to be short-term when ICT resources are inadequate. Classroom music teachers identified that the most significant barrier to ICT implementation is the need for access to adequate quantities of ICT resources, ICT funding and ICT support.

Introduction

Over the past two decades, the global economy has experienced significant technological advancement. Information and Communication Technologies (ICT) skills have become a significant requirement of the Australian workforce. Responding to the ICT needs of the Australian economy, the Australian Federal Government has embedded ICT throughout the national curriculum from Foundation to Year 10 (F-10), so that ICT is now both an independent subject and a requirement of every subject in the Australian Curriculum (Australian Curriculum Assessment and Reporting Authority, 2010). This national initiative aims to ensure that every student will be equipped with “technical and cognitive proficiency...to use, develop, create and communicate using...technological tools” (Queensland Studies Authority, 2013, p. 7). This will contribute to ICT competence, creativity and confidence to assist in gaining future employment (Australian Treasury, 2015). The inclusion of ICT in the Australian Curriculum has moved education into the digital age, in an attempt to engage students who consider ICT to be the norm.

In order to explore the current implementation of ICT in Queensland schools and in particular the barriers affecting the implementation of ICT, this project employed the following research question:

What do classroom music teachers perceive to be the factors that influence the implementation of ICT in their music program?

The following sub-questions guided the project:

- What are teacher's perceptions of what ICT in music means?
- What resources do classroom music teachers currently have access to?
- How do classroom music teachers currently incorporate ICT into their music programs?
- Do classroom music teachers feel confident in using ICT in their music programs?
- What professional development do classroom music teachers feel will help them incorporate ICT into their music programs effectively?
- What practices may enhance the implementation of ICT in music education?

Literature Review

The Australian Curriculum features the subject area known as The Arts, which consists of five disciplines: *Dance, Drama, Media Arts, Music and Visual Arts*. This research project has focused on *Music*, which became mandatory in Queensland in 2016 and in particular, the implementation of ICT within music education.

The Federal Government's initiative to include ICT in the Australian Curriculum has required considerable government funding. The allocation of funds within local contexts (Australian Curriculum, 2013) has become the responsibility of school authorities and includes "the allocation of time and resources" (p. 10), support, skills and knowledge (Ministerial Council on Education, 2008, p. 7). This has given school leaders the power to dictate school priorities through financial allocations and has resulted in school leadership becoming a significant contributor to the integration of ICT in music education (Keane & Keane, 2008). The overall impact of leadership involvement in the allocation of funds devoted to music education has resulted in a lack of resources (Hallam et al., 2009), despite a significant amount of research identifying the "non-academic, academic" (Ewing, 2010, p. 13) and "intrinsic benefits of arts" (McCarthy et al., 2004, p. 27). Notably, the "low priority" (Hallam et al., 2009, p. 222) of music education has occurred simultaneously with the "preferential distribution of resources towards subjects outside the Arts discipline" (Crawford, 2009, p. 472) through the allocation of funds towards current initiatives, including Naplan (QCAA), MySchool (ACARA) and Science, Technology, Engineering and Maths (STEM) (DET). Furthermore, the Queensland College of Teachers (QCT) maintains that teachers remain accountable for upholding professional standards and the effective delivery of the Australian Curriculum (Queensland College of Teachers, 2011, p. 4), regardless of financial allocation towards resources and professional development opportunities offered to teachers. This reflects a silo-relationship identified by Alvesson and Willmott (2012), in which organisational controls do not communicate openly with employees, but instead manipulate employees to comply with professional standards, by stating "professional accountability...and categorizing employees determined by qualifications" (p. 113). Given this lack of communication, the aim of this research is to provide an opportunity for teachers to convey their lived experiences, so they may receive practical support to implement the Australian Curriculum effectively.

A review of the literature identified that a substantial quantity of research supports the inclusion of ICT within music education in the considerations of current teaching methods (Brown, 2012; Crawford, 2009; Mark & Madura, 2010; Merrick, 1997; Southcott & Crawford, 2011; Williams, 2007; Wise et al., 2011) and professional development (Bauer, 1999; Cuban, 2001; Hixon & Buckenmeyer, 2009; Norris et al., 2003; Reese & Rimington,

2000; Sandholtz et al., 1997; Schrum, 2001; Wise et al., 2011). However, within the current body of literary knowledge, significant gaps were found to exist when considering the certainty with which ICT is implemented in music, the ICT resources used within music classrooms and how ICT resources are being utilised in music education. In order to investigate these practical aspects of implementing ICT in music education, the perceptions of classroom music teachers were considered central to identifying how organisational practises may be altered to assist with the implementation of ICT in music. One important area of concern is the lack of a definition of the term ICT within the context of the F-10 music curriculum. A controversial definition has been provided in the Senior Years (years 11 and 12) music syllabus (Queensland Studies Authority, 2013), implemented in 2014, which defines ICT within the context of music education as “including traditional and electronic musical instruments, digital devices, protocols and applications” (Queensland Studies Authority, 2013, p. 7). Whilst this definition implies a hands-on approach to pedagogy involving ICT, the inclusion of traditional and electronic resources is contentious within research definitions due to its omission of digital communication (Southcott & Crawford, 2011) and programmability (Crawford, 2009). The ambiguity of this definition has resulted in confusion as to what constitutes ICT (Crawford, 2009), which directly influences the purchasing of resources and the delivery of the intended curriculum.

Concurrent with the need for a suitable definition of ICT is the provision of suitable ICT resources for the hands-on delivery of the Australian Curriculum (ACARA, 2012), that engages meaningful experiences that are “truly applicable to...society” (Williams, 2007, p. 22). This objective requires adequate and appropriate ICT resources that move beyond the traditional resources for music methodologies inspired by Kodaly and Orff methodologies (Ward, 2009; Williams, 2007). With the introduction of mandatory implementation of ICT, it is suggested that “music teachers need to question the relevance of their instruction to increasingly technological youth” (Mark & Madura, 2010, p. 140). This may be achieved by referencing the growing amount of research including Bauer et al. (2003), Field (2009), Hixon and Buckenmeyer (2009), Merrick (1997), Onwuegbuzie and Collins (2007), Prensky (2010), Statsoft (2015) and Wise et al. (2011), endorsing the need for pedagogical change, by addressing the effective integration of ICT in music education. Research has also found that whilst teachers understand the educational value of ICT and why they need to adjust their teaching style (Merrick, 1997, p. 94), the “majority of music teachers use technology for...administrative [purposes]” (Bauer et al., 2003, p. 290) and “few teachers are integrating ICT in a way that motivates students and stimulates higher-level thinking” (Onwuegbuzie & Collins, 2007, p. 156). In order to encourage teachers to implement ICT in music programs, Bauer (1999), Cuban (2001), Hixon and Buckenmeyer (2009), Reese and Rimington (2000) and Wise et al. (2011) suggest that there is an interdependent relationship between resource availability, professional development and teacher confidence.

Bauer et al. (2003) suggests that teachers benefit from professional development that addresses three intrinsic elements including: teacher knowledge, teacher confidence and frequency practise of skills. The latter element was found to contribute significantly to the effectiveness of professional development (Australian Treasury, 2015; Mackenzie & Knipe, 2006) and highlights the issue of accessibility of ICT resources for teachers and students to practise ICT skills (Hixon & Buckenmeyer, 2009; Norris et al., 2003). This also demonstrates that the interdependent relationship between accessibility and professional development, since schools identified as rich in ICT resources but unsupported by professional development, have failed to significantly impact teaching practices through the underutilization of resources (Field, 2009; Hixon & Buckenmeyer, 2009).

Methodology

The intention of this research was to identify the issues that classroom music teachers perceive to influence their ability to implement ICT in their music programs and to gather information aimed to provide insight into what organisational practices need to be reviewed within Queensland schools, to assist teachers in the implementation of ICT in music. This focus on “actions, situations and consequences” (Creswell, 2014b, p. 10) implied the philosophical perspective of pragmatism and the mixed methods methodology (Creswell, 2014a). Mixed Methods allowed the researcher to utilise both quantitative and qualitative methods and to construct a more complex understanding of the research problem (Morgan, 2007; Patton, 1990; Rossman & Wilson, 1985; Tashakkori & Teddlie, 2010). Phase One of the research consisted of a quantitative survey with Phase Two featuring semi-structured interviews with key informants who represent a purposeful sample (Onwuegbuzie & Collins, 2007) from within the total survey sample.

Ethics approval was obtained from Griffith University, Queensland and relevant educational authorities. An invitation to participate in the survey was sent to classroom music teachers electronically and data was collected via on-line “web-based electronic data collection” (Creswell, 2014a, p. 174) through Griffith University. This was deemed the most cost-effective and time-efficient method of data collection (Dillman, 1998) to accommodate the size of the participant group (Gay et al., 2014) and geographical distance of the State of Queensland. The survey was comprised of numerical data to construct an inventory of ICT resources, nominal variables to categorize participant information, categorical scale for attitudinal data measuring both positive and negative effects, as well as short responses (Creswell, 2014a). The survey was closed after six months and data analyzed using SPSS. An Analysis Of Variance (ANOVA) was used to assist with thematic analysis according to “patterns in the responses provided” (Gay et al., 2014, p. 202), to identify differences between groups and correlated themes and provide the basis for further in-depth qualitative investigations in Phase Two.

This paper focuses on Phase One of the research investigation. Classroom music teachers were targeted as exclusive participants due to their professional expertise and “human experiences” (Cohen & Manion, 1994, p. 36), to identify which organisational practices positively and negatively influence ICT implementation. In particular, it presented an opportunity to study the silo effect of policy verses practical reality when implementing policies. A “purposeful sample” (Creswell, 2014a, p. 228) involving all F-10 classroom music teachers in Queensland, from three educational providers – State, Catholic and Independent were provided with an equal opportunity to participate (Onwuegbuzie & Collins, 2007) in the online survey. The survey questions focused on teacher’s definitions of ICT, the availability of ICT in the music classroom, current teaching methods involving ICT, teacher’s confidence in using ICT in the music classroom and professional development. All classroom music teachers in Queensland were protected by anonymity and coded data was used for subgroup comparisons.

The survey included twenty-nine questions organised under the following four headings: teacher background information, school information, ICT in music education and professional development. The survey questions were comprised of researcher generated questions and questions from previous research surveys (Elston, 2013; Mwalongo, 2011; OECD, 2013). The survey was made available for six months. During this time 280 voluntary survey responses were collected from classroom music teachers throughout Queensland, Australia.

Results and Discussion

The survey responses are presented in relation to each research question (as listed in the introduction) which they informed.

Defining the Term ICT in the Context of Music

Survey respondents (n=280), were given a list of resources and asked to indicate those which they considered to be ICT and findings are presented in Fig. 1.

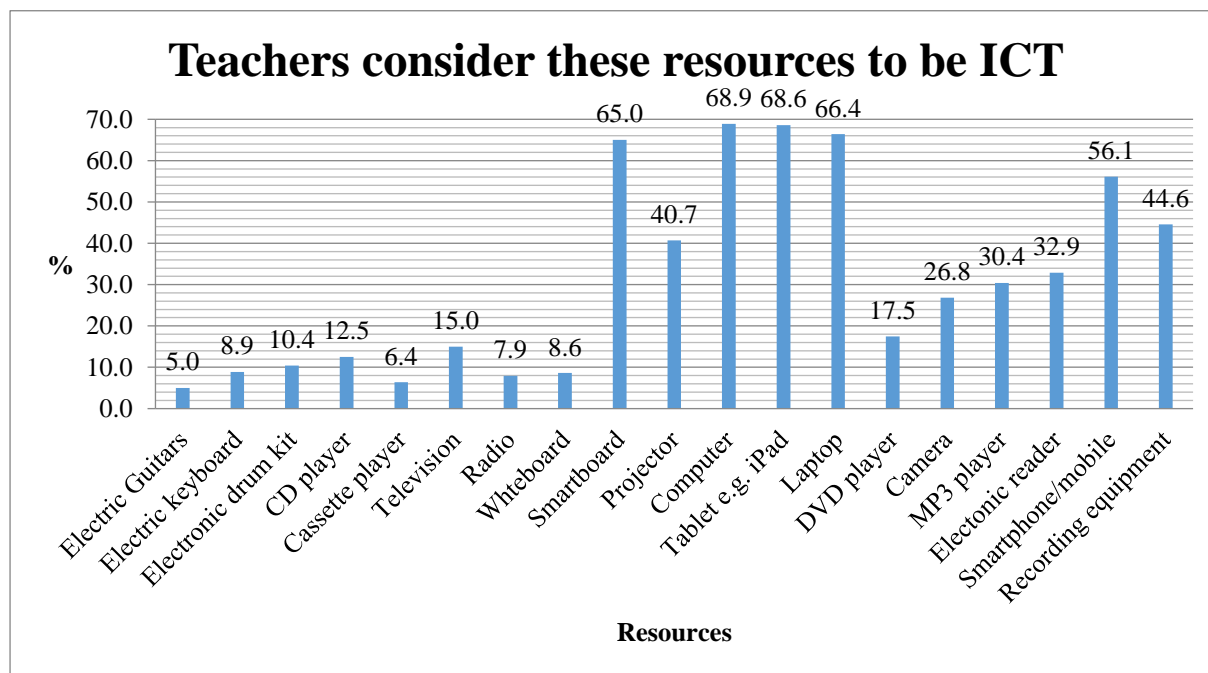


Figure 1. Teachers consider these items to be ICT in the context of classroom music.

The survey data showed that a majority of respondents considered computers, iPads, laptops and smartboards to be ICT. The data indicated that 68% of respondents consider computers to be ICT, but 31% of respondents did not consider computers to be ICT. Less than 15% respondents considered a radio and a cassette player to be ICT.

Resources Available in Classroom Music

An inventory of music resources was collated to create a snapshot of the resources currently available in music classrooms in Queensland. Percentage frequencies of resources are indicated in Fig. 2.

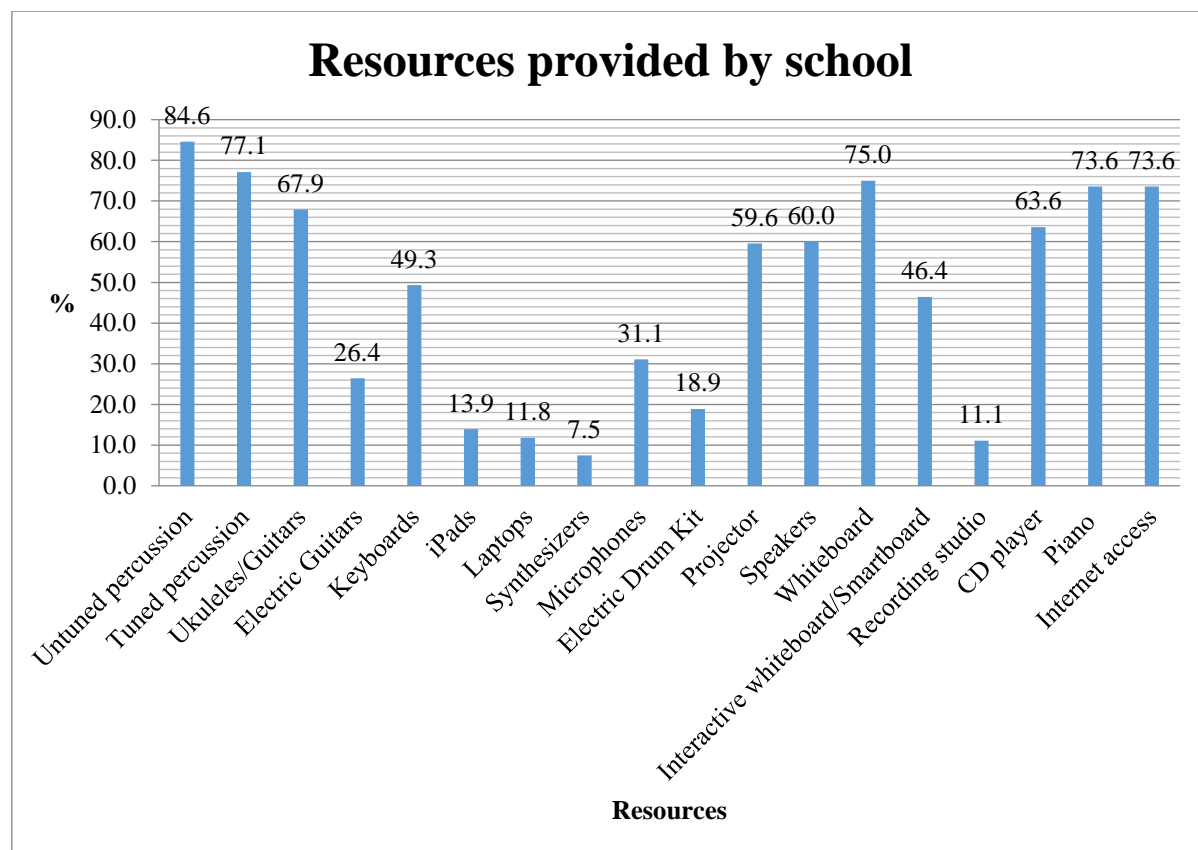


Figure 2. Resources provided by the school for the music classroom in Queensland schools.

The data identified untuned percussion, tuned percussion, whiteboard, piano and internet access to be the most common resources. The lowest frequency included ICT resources such as iPads, laptops, recording studio and synthesizers. 15% of respondents indicated the school provided no resources and participants provide their own. This perspective can also be seen in the provision of ICT resources where only 13% of schools provide iPads for the music classroom and 86% of music classrooms do not have iPads to complete hands-on music curriculum activities. Fig. 2 indicated that 73% of schools provide internet access to the music room but ICT internet enabled devices such as iPads are provided with significantly less frequency.

Further analysis was undertaken using ANOVA to identify correlations between educational providers and the resources they provided. No correlation was found with electric guitars, microphones, laptops, synthesizers, interactive whiteboards and recording studios. However, significant correlations emerged between educational providers and the provision of untuned percussion $F(2,277) = 4.026$, $p = .019$, tuned percussion $F(2,277) = 3.730$, $p = .025$, ukuleles $F(2,277) = 4.932$, $p = .008$, keyboards $F(2,277) = 4.181$, $p = .016$, electric drum kit $F(2,277) = 6.140$, $p = .002$, projector $F(2,277) = 3.272$, $p = .039$, speakers $F(2,277) = 3.750$, $p = .025$, whiteboard $F(2,277) = 4.843$, $p = .009$ and iPads $F(2,277) = 4.239$, $p = .015$. In this data the F value represents the variability between means (Field, 2009) and the correlation (p value) represents the level of confidence where p values less than .05 are significant and “the lower the p value, the greater the degree of confidence in the findings: a p value of .01...creates more confidence than a p value of .05” (Farlex & Partners, 2009).

Fig. 3 presents the correlation between educational provider and iPads, showing a 1.5% “chance that the results of the study occurred by chance” (Farlex & Partners, 2009) resulting in a high level of confidence in this correlation.

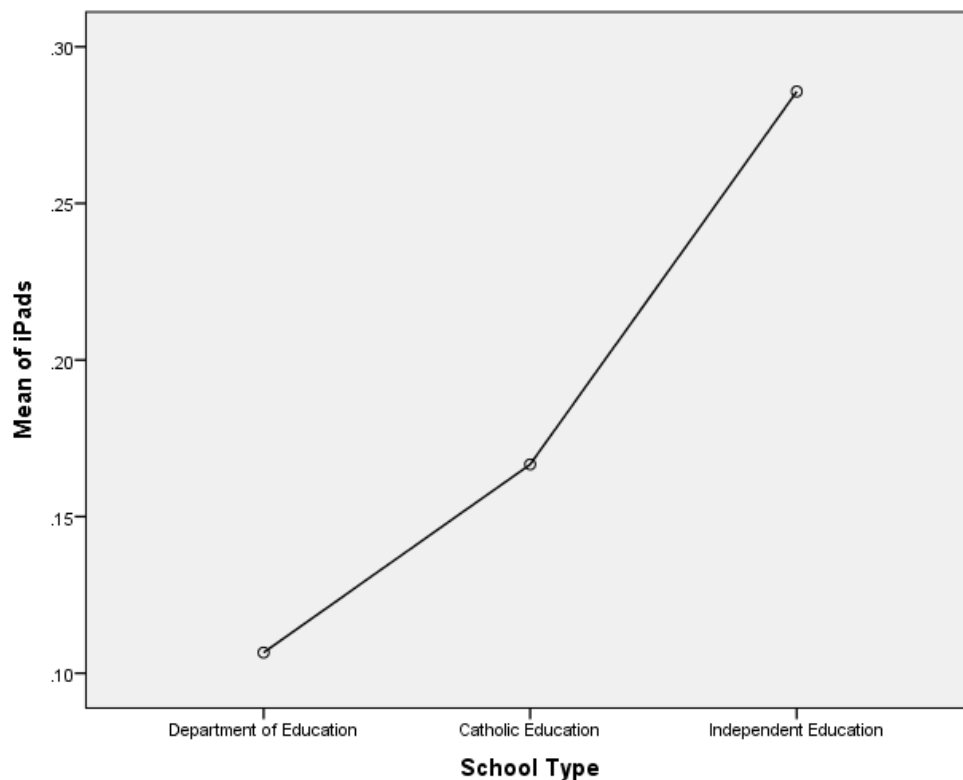


Figure 3. Correlation between the educational provider and iPad resources supplied for the music classroom.

Fig. 3 also reflects the graphic representation of all significant correlations indicated by the data between educational providers and music resources, in that, Independent Schools provided the highest quantity of resources, the Department of Education consistently provided the lowest and Catholic Education supplied resources adequate to retain their position between Independent Education and Education Queensland. Overall, Independent schools provide the most resources for the music classroom and Education Queensland provide the least number of resources for the music classroom.

ICT Schemes n Schools

Data was collected to determine the ICT scheme used by schools to provide laptops or iPads for students. Percentage frequencies of ICT schemes are indicated in Fig. 4.

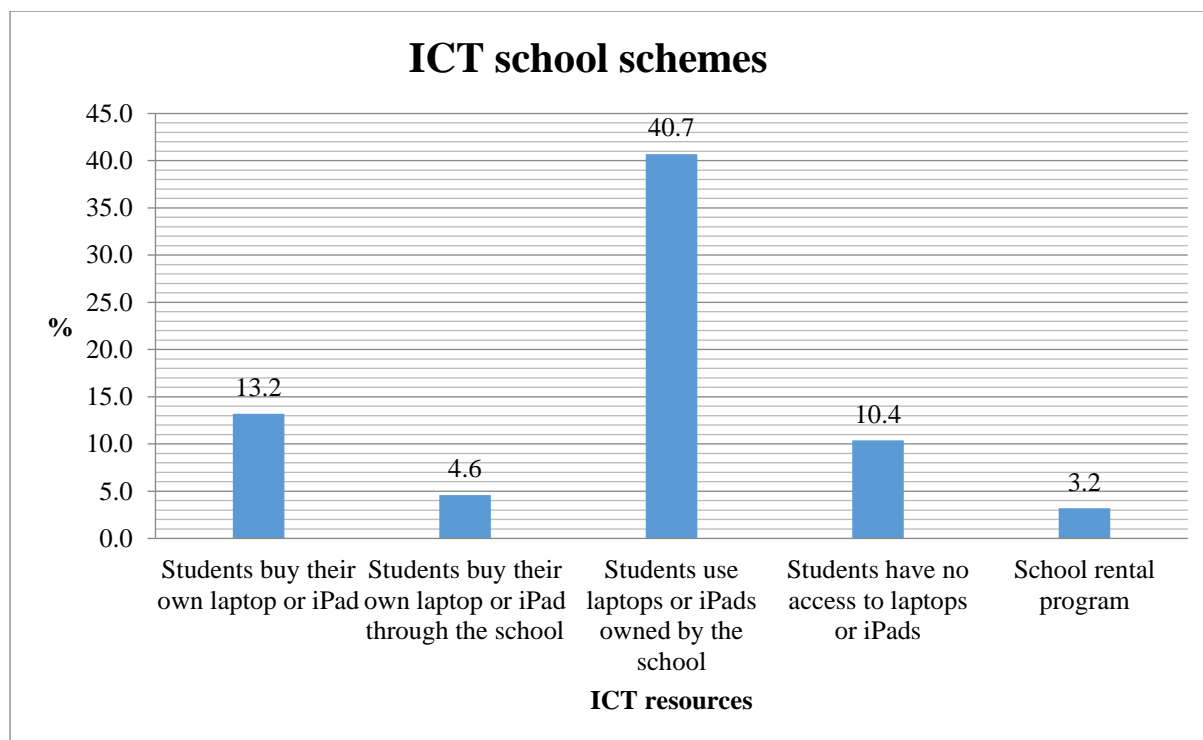


Figure 4. Data showing who provided laptops and iPads for students at respondent's schools.

The data identified 40% of students use ICT devices owned by the school, 13% of students buy their own ICT device, 10% of students have no access to an ICT device, 4% buy their own ICT device through the school and 3% rent an ICT device through the school.

An ANOVA was conducted to identify correlations between educational providers and ICT schemes and findings are presented in Fig. 5.

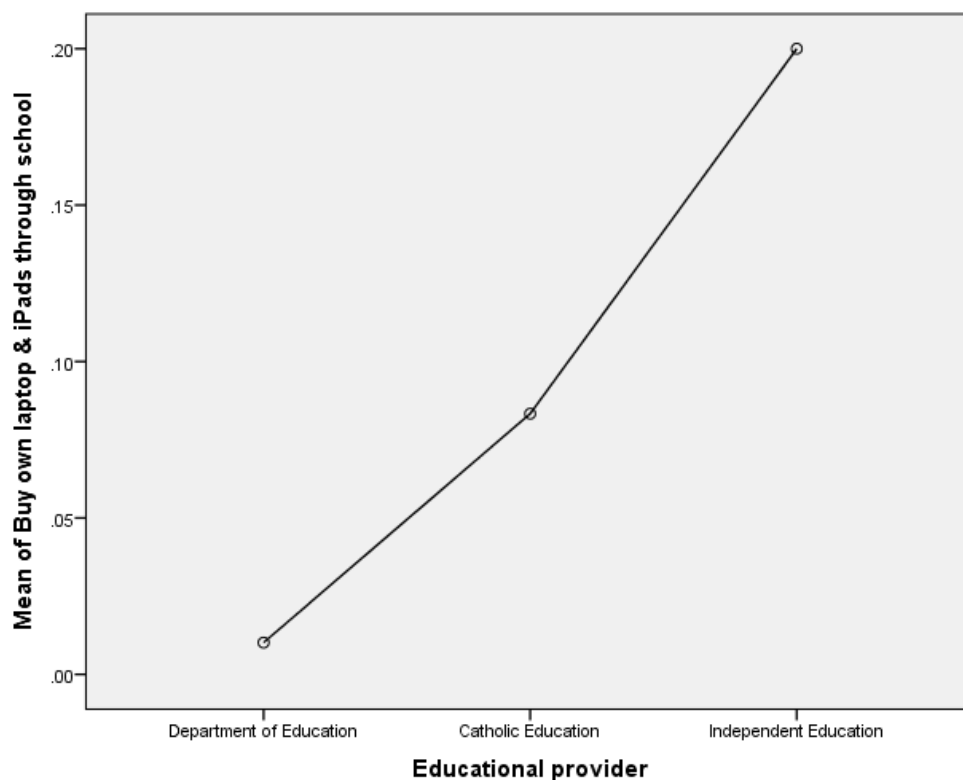


Figure 5. Correlation between the educational provider and ICT scheme.

No correlation was found in schools where students buy their own laptops or iPads $F(2,277) = 2.241, p = .108$ and where the school hosts an ICT rental program $F(2,277) = .456, p = .634$. However, as shown in Fig. 5, the data identified that significant correlations exist between educational providers and ICT schemes where students purchase ICT devices through the school. The data indicated 20% of students in Independent Education schools buy their own ICT device through the school, Catholic Education 8% and Education Queensland have the lowest percentage of 1% of students who purchase their own ICT device through the school $F(2,277) = 14.163, p = .000$.

Further examinations indicated the ICT scheme that provided the highest number of students with ICT devices was achieved by Catholic Education. As shown in Fig. 6, the data identified Catholic Education as the educational provider with the highest percentage of 50% of students with the use of laptops and iPads owned by the school, Independent Education had 44% and Education Queensland had the lowest percentage of 17% of students with the use of laptops or iPads owned by the school $F(2,277) = 4.876, p = .008$.

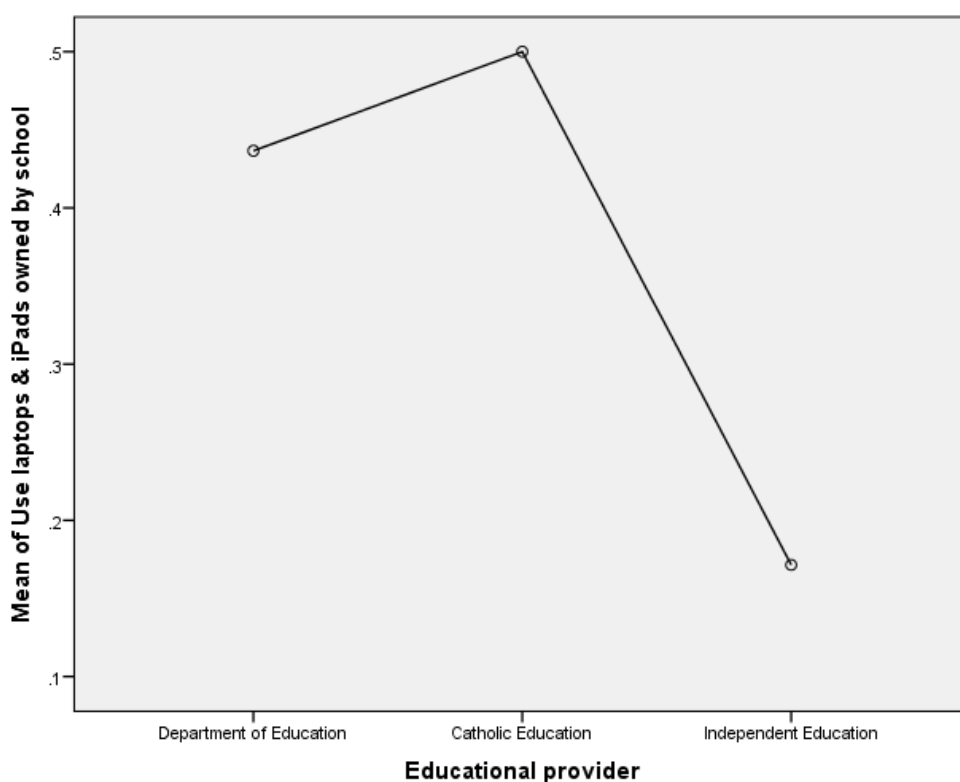


Figure 6. Correlation between the educational provider and ICT scheme.

Fig. 7 shows a correlation between educational provider and ICT scheme.

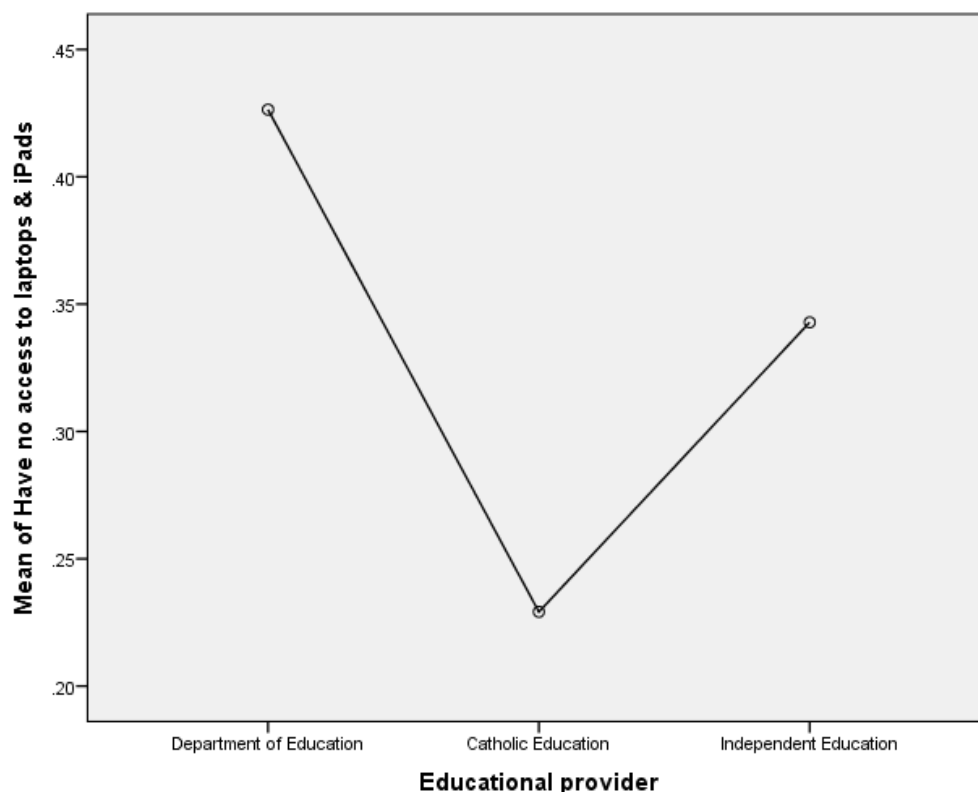


Figure 7. Correlation between the educational provider and ICT scheme.

Education Queensland had the highest percentage of 43% of students who had no access to laptops or iPads. Independent Education followed with 34% and Catholic Education had the lowest percentage of 23% of students with no access to laptops or iPads $F(2,277) = 3.354$, $p = .036$. According to the data, students attending Catholic schools in Queensland are more likely to have access to laptops or iPads due to the schools ICT scheme where the school provides ICT devices to students.

Access to ICT in the Music Classroom

Survey respondents were given a list of ways to access ICT in schools and asked to indicate the options they have used to gain access to ICT resources for the music program. Percentage frequencies are indicated in Fig. 8.

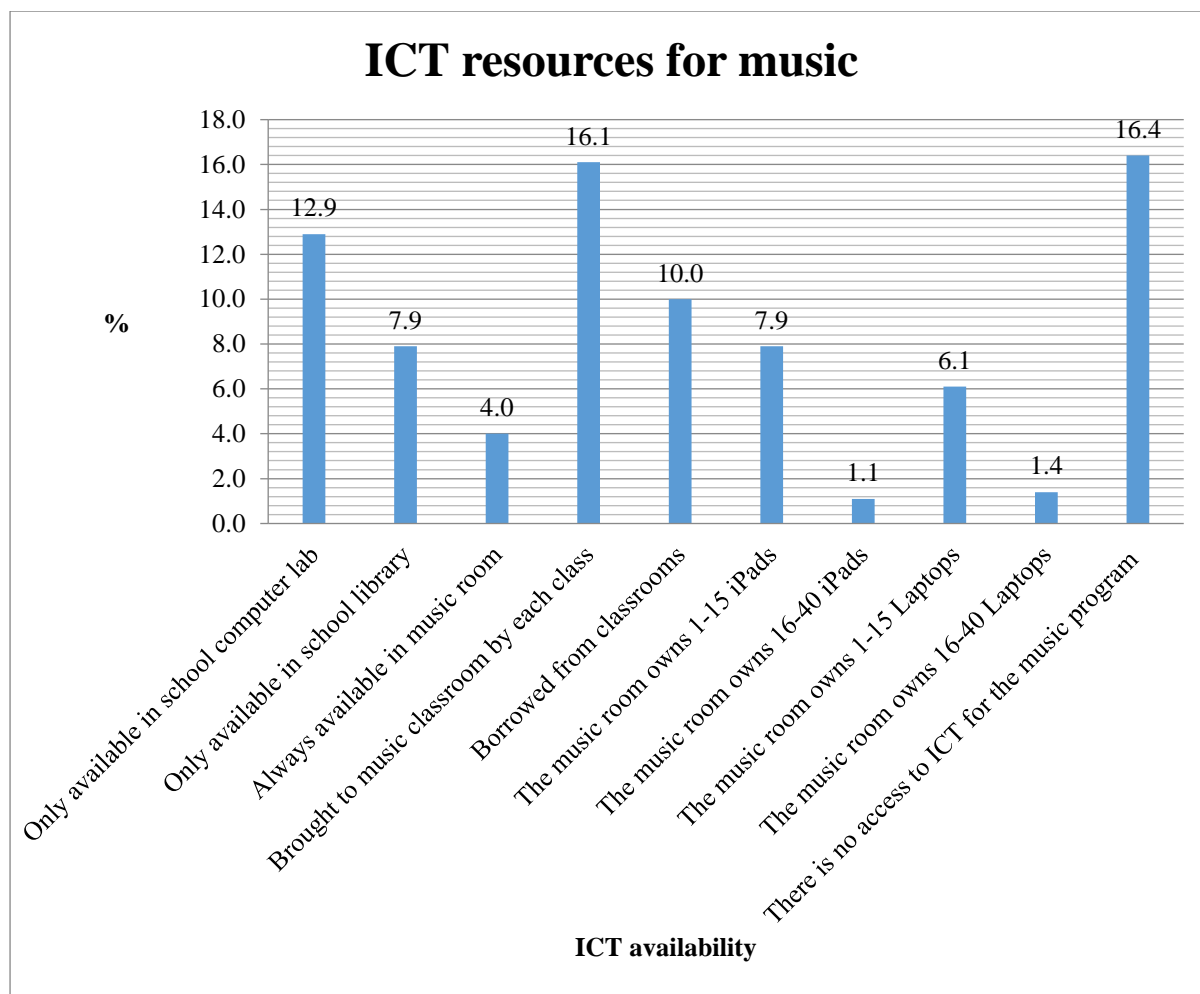


Figure 8. Data shows where respondents access ICT in their schools.

The highest percentage of 16% was obtained from respondents who indicated that they had no access to ICT for their music program. 12% were reliant on the school computer lab and 7% on the school library, while only 1% indicated they have 16-40 ICT devices in the music room.

An ANOVA was conducted to identify possible correlations between educational providers and how respondents locate and access ICT resources within schools and findings are presented in Fig. 9.

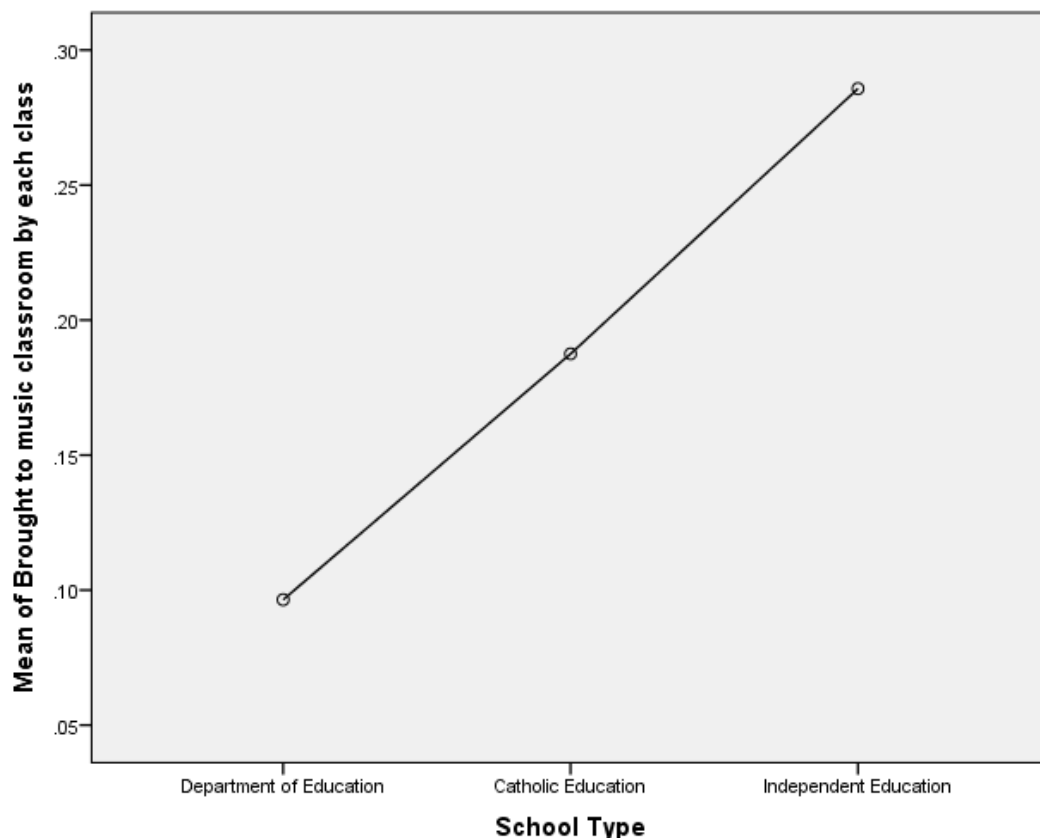


Figure 9. Correlation between educational provider and the location of ICT resources.

The data identified that significant correlations exist between educational provider and ICT resources being brought to the music classroom by each class $F(2,277) = 5.343$, $p = .005$. Findings indicated that 29% of Independent Education students bring their own ICT to the music classroom, 19% of Catholic Education students and only 10% of Education Queensland students bring their own ICT device to the music classroom.

The data identified a significant pattern regarding the provision of ICT resources for the music classroom. Compared with data previously presented in Fig. 4, which identified that 40% of students use laptops and iPads owned by the school, this number was significantly different against ICT owned by the music room, with 7% owning 1-15 iPads, 1% own 16-40 iPads, 5% own 1-15 laptops and 1% own 16-40 laptops, as seen in Fig. 8. Notably, 16% indicated 'no access to ICT' in the music classroom and only 12% had access via computer lab or 7% in the library. Even though ICT is mandatory in music, the data indicated that 4% of music teachers provide their own ICT.

The overall picture created by the data identified that schools prioritise supplying laptops and iPads to students for general classroom purposes and not for classroom music. Any ICT made available for shared utilisation is placed in common areas such as the computer lab or library. Only a small percentage of schools provide ICT specifically for the music classroom, namely iPads or laptops, so classroom music teachers depend on students bringing their iPad or laptop to the music lesson. The data indicated that 96% do not have ICT available in the music room and 92% of music rooms do not own iPads showing that the accessibility of ICT for music programs is low throughout Queensland.

ICT Support

Survey respondents were asked to indicate who provided ICT support for the music classroom. The aim of this question was to determine if ICT support positively or negatively assists teachers to implement ICT. Percentage frequencies are indicated in Fig. 10.

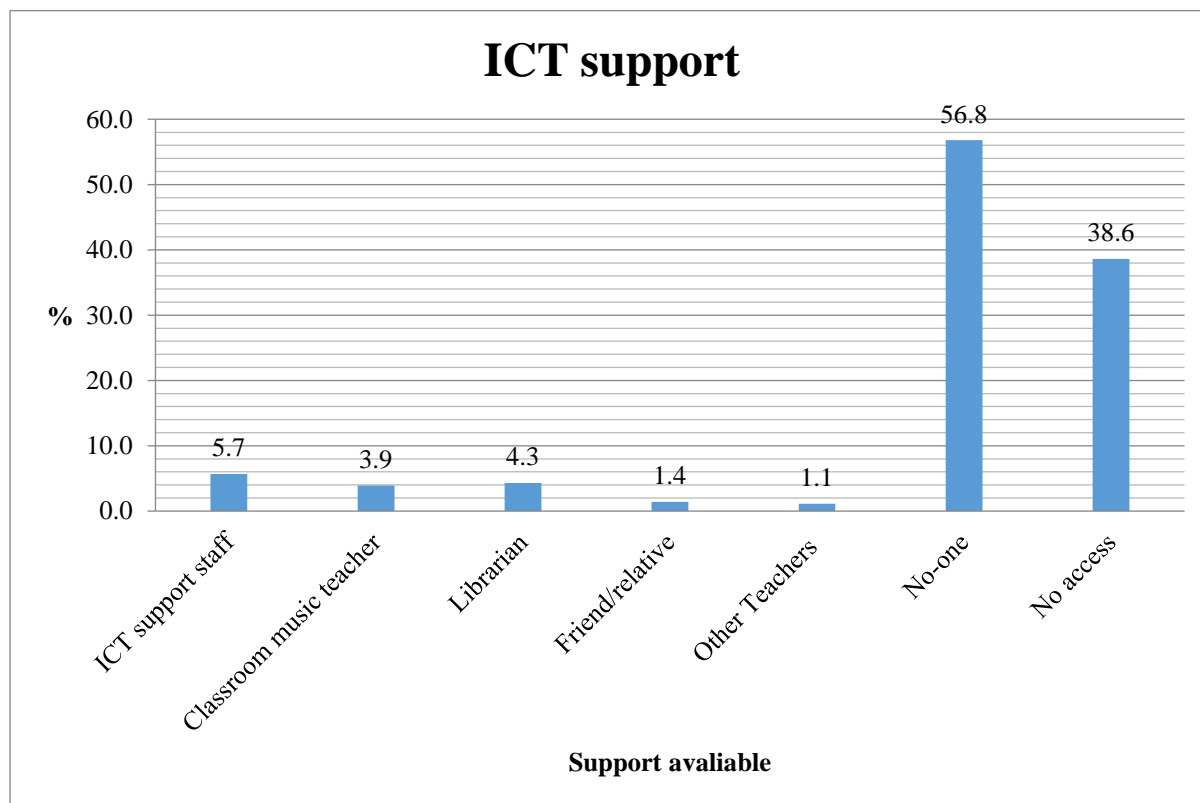


Figure 10. Technical support for ICT resources in the music program.

The data identified that 56% of respondents are not provided with ICT support and 38% indicated they had no access to ICT. A few respondents indicated they relied on other teachers and staff, spouses, their children and their own abilities.

Incorporating ICT in Classroom Music Programs

Following the mandatory implementation of ICT in music education, this section aimed to determine how classroom music teachers currently incorporate ICT. Respondents were asked to identify the ICT hardware they use in their music classroom. Percentage frequencies are indicated in Fig. 11.

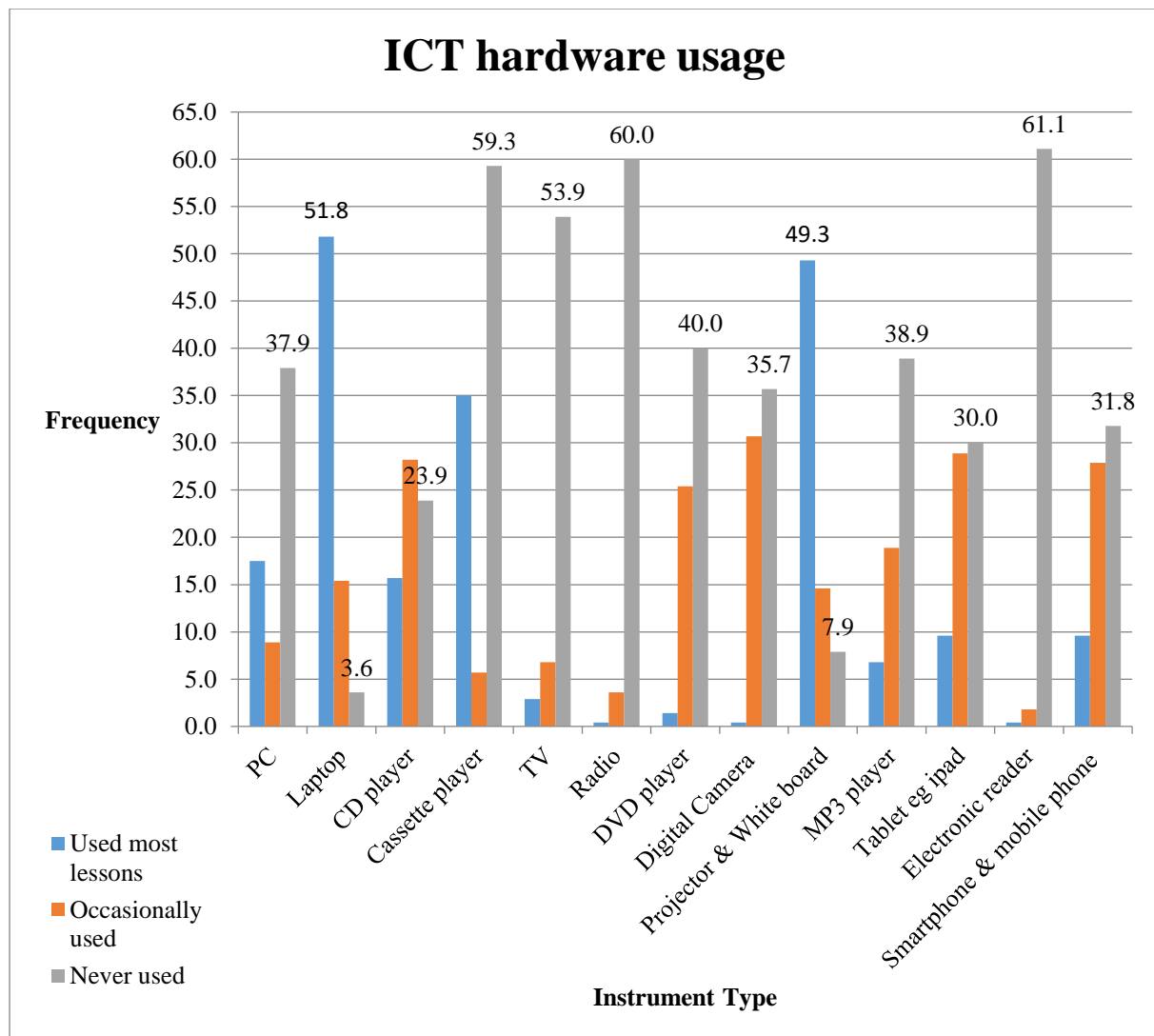


Figure 11. Frequency of ICT hardware usage in the music program.

Survey data showed that classroom music teachers use four resources in most lessons. Resources used with the highest frequency include laptops, projectors, white boards and cassette players. Those with the lowest frequency include the digital cameras, iPads, CD players and smartphones. Respondents indicated that those resources used with the highest frequency were reliable and less likely to fail. Data also indicated that a significant number of resources were never used in the music program, because they were not available.

Respondents were asked to identify the ICT software they use in their music classroom. Percentage frequencies are indicated in Fig. 12.

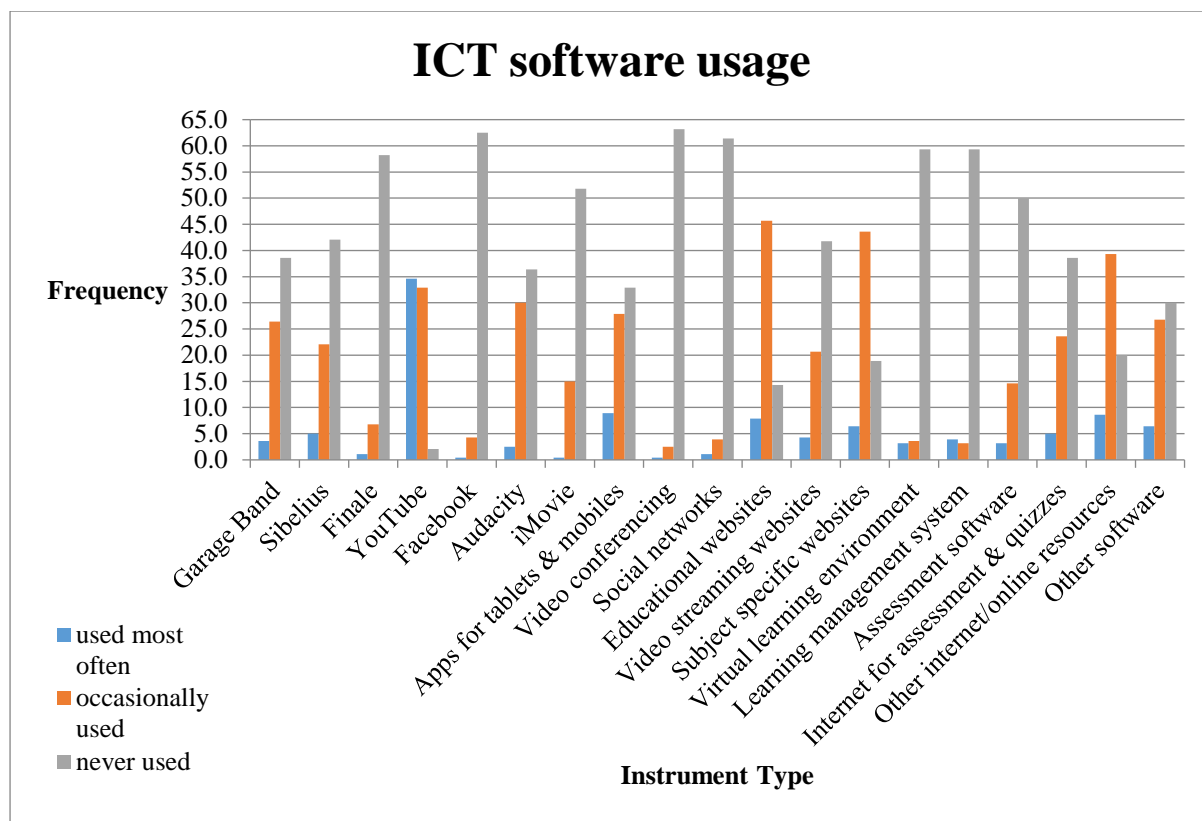


Figure 12. Frequency of ICT software usage in the music program.

34% of respondents reported using YouTube in most lessons, 45% use educational websites, 43% subject specific websites and 39% use other internet/online resources occasionally in the music classroom. All software resources that were used in most lessons and occasionally used in music lessons, were consistently indicated as being resources respondents were comfortable using. These resources share the common characteristic of being online resources. Data also revealed that a significant number of resources were never used because they were not available and teachers were unfamiliar with using them.

Overall, findings indicated that classroom music teachers use a limited number of hardware and software resources they are familiar with and competent with. Given significant deficiencies in ICT support provided for classroom music teachers, respondents use non-problematic and familiar ICT. Although a majority of classroom music teachers have internet access in the music classroom, they predominantly rely on a laptop, projector and whiteboard in most lessons to access online resources such as YouTube via the internet. The highest frequency of responses indicated that no other ICT was used in music classrooms due to lack of availability and familiarity. Software predominantly utilised included online sites reliant on internet access but 4% of teachers had to provide their own personal laptop. Other software programs are unused due to a lack of availability.

Respondents were asked to indicate how they use ICT in the music classroom and percentage frequencies are indicated in Fig. 13.

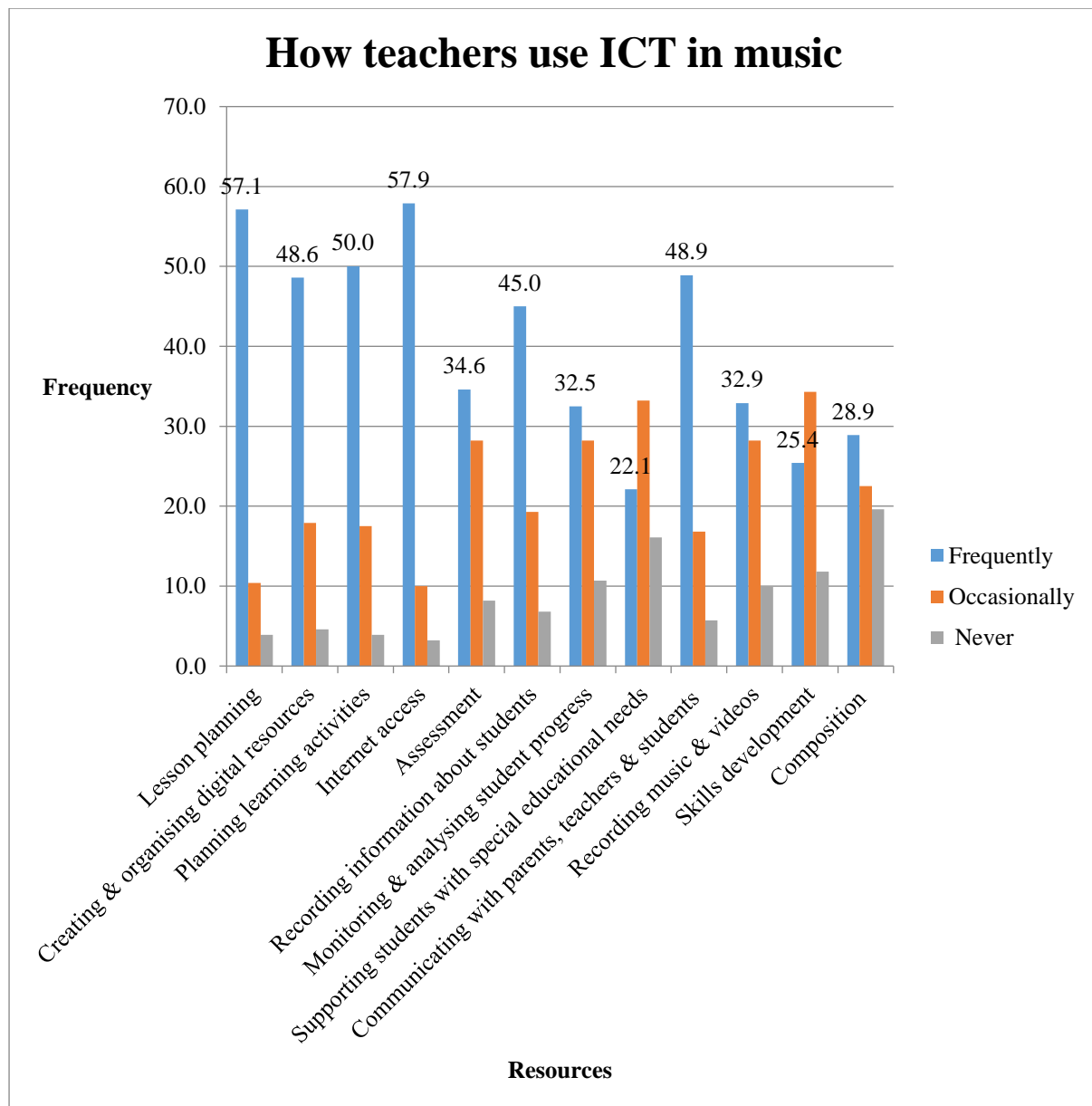


Figure 13. Frequency indicating how classroom music teachers use ICT in the music program.

Data indicated that the majority of respondents use ICT to provide the music classroom with online information resources, conduct lesson preparation and for administration purposes. The data revealed that those teachers with ICT access rely on pedagogies that use relatively few ICT resources, specifically, a laptop, whiteboard, projector and internet. While 75% of teachers use YouTube to provide the music classroom with online information resources, as well as to conduct the explicit teaching of music theory skills and model concepts to the whole class, 33% indicated they had no ICT access, 28% use ICT to record for assessment accountability and 20% use ICT to compose and perform with students. This data supports the indication that respondents predominantly use a laptop, whiteboard, projector and internet for whole class teaching.

Confidence Levels of Classroom Music Teachers when Implementing ICT

The mandatory implementation of ICT in music is the professional responsibility of classroom music teachers. To determine if classroom music teachers feel confident with their own ICT skills, the survey asked respondents to identify their level of confidence when implementing ICT in personal and professional tasks and findings are presented in Fig. 14.

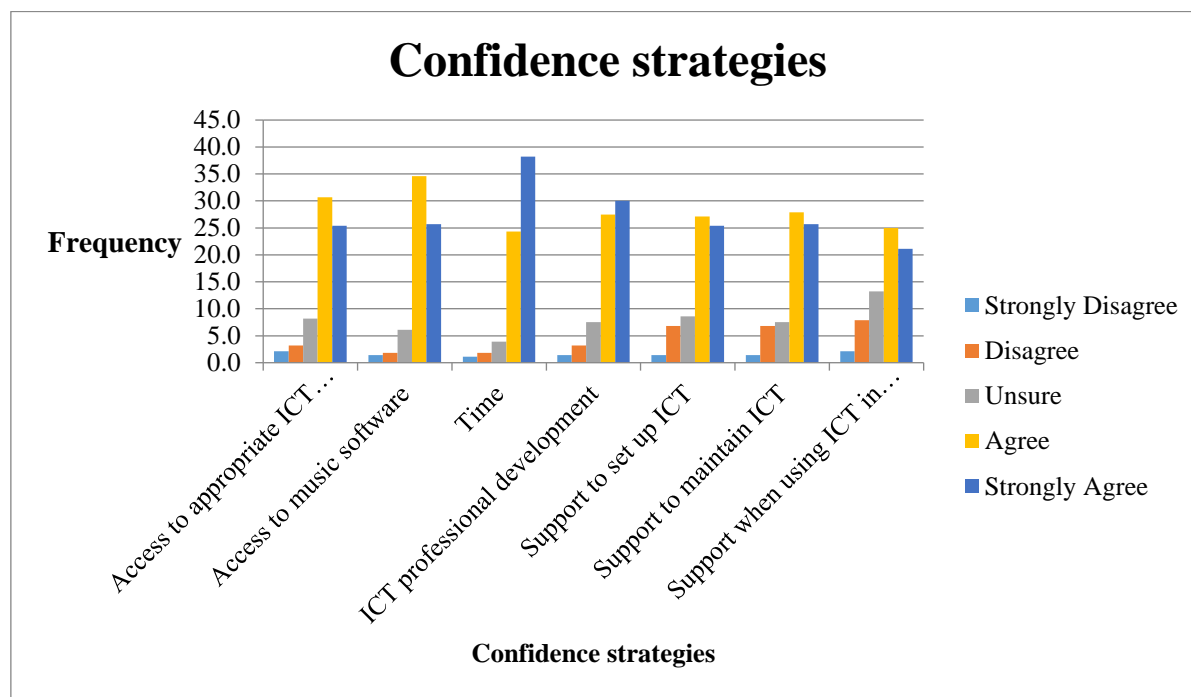


Figure 14. Strategies to increase confidence when implementing ICT in the music program.

Data identified 61% of respondents felt confident using ICT for personal use, 53% felt confident using ICT for administration purposes, 48% felt confident using ICT when teaching classroom music and 41% felt confident using ICT whilst doing Professional Development.

Even though 48% of respondents indicated that they felt confident using ICT in the classroom, levels of confidence may not be indicative of reality since the survey revealed classroom music teachers predominantly use familiar and comfortable ICT. Their reliance on a small number of hardware and software ICT devices may directly influence levels of confidence reported in relation to ICT use in the music classroom. It is reasonable to suggest that whilst teachers use a restricted number of familiar ICT, it does not support the idea that teachers are confident using a large range of ICT in the classroom as intended by the Australian Curriculum. This suggests that 51% of classroom music teachers throughout Queensland may not be confident using a wide variety of ICT resources.

Respondents were asked to choose which strategies would help increase their level of ICT confidence and findings are presented in Fig. 14. Findings show 62% of teachers indicated a need for time, 60% need access to music software, 57% need ICT for professional development, 56% need access to appropriate ICT resources to practise ICT skills, 53% need support to maintain ICT, 52% need support to set up ICT and 46% need support when using ICT in the classroom.

Professional Development

Respondents were asked to indicate whether they felt their tertiary qualification included ICT training relevant to the Australian Curriculum. The aim of this question was to look at teachers' perceptions regarding the contribution of tertiary education to developing ICT confidence. 9% of respondents indicated their tertiary qualification included ICT training relevant to implementing ICT in the music classroom according to the Australian Curriculum. The remaining 90% indicated their tertiary education did not adequately contribute to the development of ICT confidence suitable for implementing ICT in the music classroom. Of the total respondents (n=280), 25% of respondents had 0-5 years teaching experience, representing a large number of teachers recently completing tertiary study.

Respondents were also asked to indicate the number of professional development days they had attended in the previous 18 months. This question aimed to determine teacher engagement in professional development relevant to implementing ICT in music and to look at teachers' perceptions regarding the contribution of professional education to developing ICT confidence. 68% of respondents indicated they had attended no music specific ICT professional development in the last 18 months, 18% attended one day and the remainder had attended up to 5 days.

An analysis using ANOVA was conducted to identify possible correlations between teachers who agreed that their tertiary education contributed to preparing them for implementing ICT in the music classroom compared to the number of professional development days respondents attended. The data identified that significant correlations exist between teachers' perceptions of tertiary readiness and attending professional development relevant to implementing ICT $F(4,274) = 6.291, p = .000$. This analysis identified that even if a teacher's perceived that their tertiary education did not prepare them for implementing ICT in the music classroom, those teachers who attended professional development relevant to implementing ICT perceived that the tertiary education had helped them.

QCT requires teachers to attend a number of professional development hours per five year registration period as a condition of re-registration. Respondents were asked to indicate if they wanted to attend professional development relevant to implementing ICT in music. 87% expressed a desire to attend more professional development and 32% felt that the professional development on offer was unsuitable due to their lack of ICT resources to continue practicing skills to increase familiarization. This aligns with Fig. 8 which showed that 8% of classroom music teachers have 1-15 iPads and 1% has 16-40 iPads in the music classroom. This deficiency of resources renders much iPad professional development as irrelevant for those classroom music teachers who cannot practise iPad skills learnt in professional development.

Practices to Enhance the Implementation of ICT in the Music Education

Classroom music teachers were asked to indicate what they perceived to be the challenges or barriers associated with using ICT in their music program and findings are presented in Fig. 15.

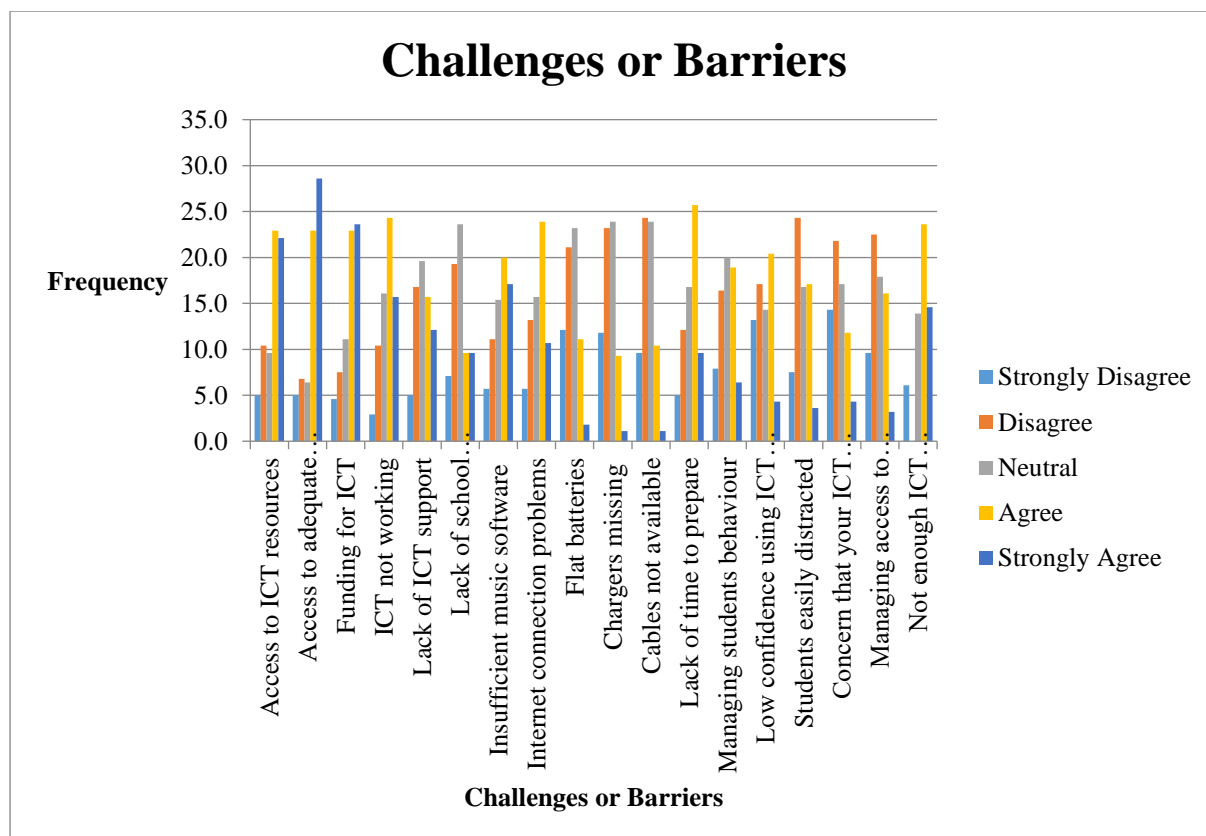


Figure 15. Challenges or barriers when implementing ICT in the music program.

Data showed barriers to include access to adequate numbers of ICT resources for classes, funding for ICT, access to ICT resources and ICT not working. According to this finding, teachers recognised the need for access to adequate ICT resources, ICT funding and ICT support, so they may be helped to implement ICT and encourage pedagogical change suited to hands-on experiences, but the barriers identified contributed significantly to inhibiting the implementation of ICT in the music classroom.

Conclusion

Organised under the headings of: teacher background information, school information, ICT in music education and professional development, the survey data results have provided the researcher with insights into classroom music teachers' perceptions surrounding ICT implementation.

Fundamental issues identified include the need for a clear definition of the term ICT within the F-10 curriculum to ensure purchases and resources used within the music program fulfil curriculum intentions, the problem that teachers limit their use of ICT resources due to availability, familiarity and reliability, the lack of ICT support for classroom music teachers and the finding that teacher confidence is directly affected by professional development opportunities and the availability of ICT resources. The benefits of professional development opportunities are short-term when ICT resources are unavailable and inadequate to practise skills and increase familiarity with ICT. Classroom music teachers identified that the most significant barrier to effective implementation of ICT is the need for access to adequate ICT resources, ICT funding and ICT support.

If it is the intention of the Australian Curriculum to provide an equitable opportunity for all students throughout Queensland to develop ICT proficiency for the future, then these

findings need to guide organisational change, so that professional needs are supplied and teachers are supported in their implementation of the curriculum.

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