Mobile Applications in Chinese Tertiary Music Classes: Experiences with Piascore and Earmaster

Zhu Yuwei*., Pramela Krish., Thivilojana Perinpasingam

School of Education, Taylor's University, Selangor, Malaysia

*** Corresponding Author**

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ABSTRACT

Mobile applications are increasingly used to support learning beyond formal teaching. However, their value in tertiary music education depends on how students use them during independent practice and how effectively they can respond to the feedback provided. It also remains unclear how students' experiences with these applications develop over time, particularly when they encounter difficulties or need support during practice. This paper reports on the experiences of Chinese tertiary music students using mobile applications like Piascore and EarMaster in their learning. An interpretivist qualitative case study was conducted at a private university in Zhengzhou, China, involving 18 students and four teachers over a duration of 16 weeks. Data was collected through interviews and classroom observations and it was analysed thematically. The study was informed by the Technology Acceptance Model, Self-Determination Theory, and Constructivist Theory, which were used to understand students' responses to the applications, their motivation, and their learning experience. The findings showed that students became more familiar with the applications and gradually used them more selectively. Piascore supported score organisation and practice management, while EarMaster was used for ear training, rhythm, sight-singing, and music theory. Students became more active in planning practice and responding to feedback. However, these changes were not consistent across the sample. Students' experiences also showed that becoming familiar with the applications did not always lead to greater independence in practice. Teacher guidance, peer support, and technical conditions also influenced students' experiences. Overall, the findings suggest that mobile applications can support tertiary music learning when they are integrated with existing teaching and students' individual learning needs. Rather than replacing teacher support, the mobile applications were most useful when they extended learning beyond formal lessons by giving students innovative ways to practice, receive feedback, and work actively between lessons and beyond classroom time.

Keywords: Music education, mobile applications, Piascore and EarMaster, tertiary students, China

INTRODUCTION

Tertiary music students spend a considerable amount of their learning time outside formal lessons. Performance students need regular individual practice, while students in other areas also work independently on aural skills, theoretical knowledge, and preparation for assessments or performances. Teachers can explain and correct problems during lessons, but this support is not always available when students practise alone. A student may understand an explanation in class and still struggle to recognise the same problem later or decide how to correct it. In Chinese tertiary music programmes, students are expected to complete substantial work outside class, yet immediate feedback and practice support may be limited once the lesson has ended (Gorgoretti, 2019; Ning & Luo, 2021). Students therefore must make many practice decisions, especially when they are working outside class.

Mobile applications can extend learning support beyond formal lessons. Students may use them to monitor their scores, complete exercises, record their work, or receive feedback during practice. Previous research has examined mobile and digital tools for listening, composition, score use, aural training, and individual practice (Birch, 2017; Debevc et al., 2020; Macrides & Angeli, 2020; Ouyang, 2023; Liu et al., 2023) and found that

learning motivation, student perceptions, and teaching strategies were among the main areas of interest. Ouyang (2023) examined ChordIQ in solfeggio learning, while Chen (2015) discussed Auralbook for aural skills. Birch (2017) explored the use of SoundCloud in mobile music learning, and Debevc et al. (2020) examined mobile-supported solfeggio training. These studies show that mobile technology can support different parts of music learning. But the value of an application depends on the task it is designed to support. At the same time, these studies tended to concentrate on one application or one area of music learning. Less is known about how students use different kinds of mobile support across their wider music learning. This study focuses on Piascore and EarMaster because they address different but complementary areas of tertiary music learning. Piascore supports digital score management through functions such as annotation, recording, metronome use, and score organisation. EarMaster provides structured work in ear training, rhythm, sight-singing, and music theory, with immediate feedback after exercises. In addition, Piascore supported score-based work and practice organisation, while EarMaster supported aural and theoretical skill development. Using both applications therefore allowed the study to look at different parts of students' music learning rather than a single type of task.

Access to an application does not mean that students are in the know of how to use it meaningfully. Some need time to become familiar with its functions, while others may find that digital feedback identifies a mistake without explaining how to correct it. On the other hand, although research on mobile technology in music education has grown, much of it still focuses on individual applications or specific musical skills. Ear-training tools are usually studied in relation to aural or theoretical development, while digital score tools are discussed in terms of notation, annotation, or score management. In practice, tertiary music students move between these activities.

It is also important to understand how students use applications over time. Initial reactions may change as students become familiar with a tool, recognise its value, or encounter limitations. The Chinese tertiary context has received less attention in this respect, and evidence concerning the combined use of Piascore and EarMaster remains limited. This study therefore examines their continued use in everyday music learning, including the role of feedback, teacher guidance, peer support, and practical conditions.

This study reports on how Chinese tertiary music students used Piascore and EarMaster over time, and what influenced their experiences. It focuses on how students understood and used the applications in their learning, rather than on whether the applications improved learning outcomes. Specifically, it explores how Chinese tertiary music students experienced Piascore and EarMaster and the factors that shaped those experiences. The emphasis is on participants' understanding of mobile-supported learning rather than on testing the effectiveness of the application use.

The study is guided by the following research questions:

RQ1: How did Chinese tertiary music students experience the use of selected mobile applications (Piascore and EarMaster) in supporting their music learning?

RQ2: What factors shaped participants' experiences of using selected mobile applications (Piascore and EarMaster) to support tertiary music learning?

Mobile applications in music education

Mobile technology is now used across many areas of music learning. For tertiary students, its value is closely connected with the work completed outside scheduled lessons, including repeated practice, score review, listening work, and theoretical exercises. Mobile applications make some of these activities available when students are practising. This can be particularly useful in music learning, where students often need to repeat the same task several times before they can recognise and correct a problem on their own.

Applications differ in purpose, as explained in the studies discussed earlier. Together, this work suggests that mobile applications can support a range of musical tasks, but they are not interchangeable. For this reason, the usefulness of an application needs to be considered in relation to the learning activity it supports.

Piascore relates to digital score use and practice organisation. It allows students to store and annotate scores, use a metronome, make recordings, and manage materials. EarMaster focuses on ear training, rhythm, sight-singing, and music theory, with feedback provided during exercises. Their different functions allowed the present study to examine mobile support across both score-based practice and aural or theoretical work. Piascore was used when students worked with scores, while EarMaster was more suited to shorter activities such as working on pitch, rhythm, and sight-singing practice.

Engagement, self-learning and learning support

Music practice requires more than access to materials. Students need to decide what deserves attention, remain engaged when progress is slow, and judge whether their practice is helping. Motivation affects whether students begin a task and continue when it becomes difficult (Ferrer-Caja & Weiss, 2000). In music learning, this can become especially noticeable during repeated practice, when progress may not be immediately clear to the student. Self-learning concerns students taking some responsibility for organising their work, setting goals, checking progress, and changing strategies when necessary (Ng, 2016). A student may want to improve but have no clear practice plan, while another may know what to do but struggle to sustain regular effort. These issues matter in tertiary music education because much development takes place between lessons. Wan et al. (2023) examined how digital listening tools supported children's instrumental practice between lessons. Their study found that these tools could help students work more independently, although continued teacher support cannot be denied.

Piascore annotations and recordings can be reviewed after practice, while EarMaster results can draw attention to repeated problems in pitch or rhythm. Yet information from an application must be understood before it can help. A low score may show that something went wrong without explaining why. Students still need to interpret feedback and decide what to do next. The applications therefore create opportunities for more active learning.

Teacher guidance and the learning context

Mobile applications do not make teacher guidance unnecessary. Music teachers can recognise problems that applications may not explain, particularly when the issue concerns technique, interpretation, or the way a student approaches a task. Digital feedback may identify an error, while a teacher can help explain its cause and suggest another way of working.

Carless and Boud (2018) argue that receiving feedback is not enough; learners must be able to understand and use it. The same applies to mobile-supported music practice. Research by de Bruin (2023) also showed the importance of feedback in instrumental teaching, particularly how teachers and students work together to understand and respond to it. Classmates can also provide support by explaining functions, comparing approaches, or helping when a student is unsure how to continue. Independent learning should therefore not be understood as learning without other people.

Practical conditions also matter. Devices, internet access, technical familiarity, and the practice environment can affect whether an application fits smoothly into a session. Fatigue and frustration may also influence how students respond to difficulties.

Theoretical perspectives

Three perspectives were used to interpret students' experiences. The Technology Acceptance Model (TAM) helped explain whether functions appeared useful and easy to manage (Davis, 1989). It was used as an interpretive framework rather than as a predictive model. This was useful because students' responses often depended on whether a function was easy to use and whether they felt it helped with the task they were doing.

Self-Determination Theory (SDT) was used to consider motivation. Autonomy, competence, and relatedness helped explain why students might continue practising when they felt some control over learning, noticed progress, or received support from teachers and classmates (Ryan & Deci, 2023).

Constructivist Theory was useful for understanding learning through experience, feedback, adjustment, and reflection (Palincsar, 1998). This was especially relevant when students had to understand feedback, try something different, and gradually change the way they practised. In this study, TAM was used to understand how students viewed the usefulness and ease of use of Piascore and EarMaster. SDT helped explain why some students remained motivated to practise, while Constructivist Theory helped interpret how students learned from feedback and changed their practice through experience. Together, these theories provided different ways of understanding students' experiences with the two applications.

METHODOLOGY

Research design and context

The study used an interpretivist qualitative case study to examine how students used the applications, namely Piascore and EarMaster, in their music lessons. The study did not test whether the applications produced measurable improvement. Therefore, the design was suitable because the study was concerned with students' own experiences of using the applications rather than with measuring changes in performance.

The research was conducted at a private university in Zhengzhou, China. The music programmes in this university included vocal performance, piano, violin, and music theory. Teachers taught practical lessons individually, while theory courses were taught in groups. Students also spent considerable time practising outside class time, making the setting suitable for examining how mobile applications could be fitted alongside formal teaching and independent practice.

Participants

Participants for the study were selected purposively as they had prior tertiary music learning experience and the ability to remain in the study throughout the 16-week study. The sample included 18 second- and third-year students (Student A to Student R) from vocal, piano, violin, and music theory specialisations. First-year students were excluded because they had less exposure to university-level experience, while fourth-year students had graduation recitals, internships, and other commitments that could affect participation.

In addition to the students, four music teachers also took part. Teachers A and B were involved in teaching and supported students when needed. Teachers C and D did not teach the participants; they observed classroom activity. Separating teaching and observation roles provided an additional perspective on students' behaviour.

Use of the applications - Piascore and EarMaster

Both applications were introduced in Week 1. Teachers A and B conducted one introductory session for each application and demonstrated the main functions. Piascore was used for score management, annotation, metronome use, recording, and organisation. EarMaster supported ear training, rhythm, sight-singing, and music theory exercises. The introductory sessions were intended to give students enough familiarity with the basic functions before the applications were used more regularly in lessons and practice.

From Week 2, regular teaching resumed, and students continued using the applications during lessons and independent practice. The applications were intended to support existing learning rather than replace normal instruction. The remaining 15 weeks were divided into three five-week periods: Weeks 2 to 6, Weeks 7 to11, and Weeks12 to16.

Data collection and analysis

Semi-structured interviews and classroom observations were carried out to obtain the data for the study. These instruments were piloted with a different group of participants to ensure reliability. The 18 students were interviewed in nine pairs, with each student asked to describe their own experience. The students were paired to encourage them to share their experiences and help them recall their use of the applications. The same 18 students took part in all three interview rounds, which were held at the end of Weeks 6, 11, and 16. The four teachers were also interviewed in two pairs, with one teaching teacher and one non-teaching teacher. All four teachers

participated in each round, although the pairings changed between rounds to allow different combinations of teachers to share their views and experiences. Each interview lasted 20–30 minutes. Before the interviews, participants were informed that they could express their views freely and that their identities would remain anonymous in the reporting of the findings. They were also asked not to share what had been discussed during the interviews with others. Although the paired format encouraged discussion, having another participant present may have influenced how openly some students expressed their views (Szulc & King, 2022).

Two classroom observations were conducted every five weeks, making it six sessions in total. The researcher and Teachers C and D recorded how students used the applications, responded to feedback, asked for help, interacted with classmates, and dealt with difficulties. Teachers A and B continued teaching but did not complete observation records. The interviews discussed students' private practice outside class rather than directly observing it.

Interviews were conducted and transcribed in Chinese, then had a qualified bilingual professional translate them into English and back-translate them for accuracy checking. Before the main study, the interview protocol and observation checklist were piloted with four students and one teacher over two weeks. These participants were not included in the main sample. The pilot findings were used to check whether the interview questions and observation items were clear and workable before the main data collection began.

Interview transcripts and observation records were analysed using Braun and Clarke's (2006) six-phase thematic analysis. After repeated reading, initial codes were developed and grouped into provisional themes, which were checked and refined against the complete dataset. The analysis remained close to the participants' accounts, while also allowing patterns across the three stages of the study to be identified.

For example, Student A mentioned setting a daily goal of completing one EarMaster module. This was initially coded as "setting short-term practice goals" and later included in the theme "Bringing more structure to practic". However, not all students approached their practice in the same way. Student F, for instance, explained that they usually followed the application's recommendations without making their own plans. This was coded as "reliance on application-guided practice" and considered under the theme "Uneven learning behaviour". During the analysis, accounts that differed from those of other participants were also kept and examined alongside the other data. This helped ensure that different experiences were represented rather than focusing only on patterns shared by most participants.

The three rounds were compared so that changes across Weeks 6, 11, and 16 could be recorded. The data collected from each interview round were first reviewed separately and then compared across the three stages. This made it possible to identify changes in students' experiences over time, as well as similarities in their accounts. Student interviews, teacher interviews, and observation records were first considered separately and then together. Differences across sources were retained rather than removed to create artificial consistency. NVivo was used to organise the material and codes, but not to generate themes automatically. TAM, SDT, and Constructivist Theory informed interpretation without being used as a fixed coding structure. This allowed emerging themes to develop from the data while theoretical perspectives were used later to help interpret the patterns.

FINDINGS

Four related patterns were identified. Students' experiences changed over the 16 weeks, although not in the same way for everyone. Early uncertainty often gave way to greater familiarity, clearer choices about useful functions, and changes in practice organisation. These developments were also shaped by teachers, classmates, and practical conditions.

The numbers used in the findings refer to the students who reported these experiences, rather than the number of times a particular code appeared in the analysis. Some students described more than one experience, so they may be included in different categories. The numbers therefore do not represent separate groups of students.

Moving from uncertainty to familiarity

Initially, the students had mixed feelings. Five described feeling overwhelmed, hesitant, or unfamiliar with the applications, while four expressed negative views during the early stage. Later, 11 others reported greater interest or enjoyment.

Much of the early uncertainty involved basic operation. Student B explained:

"I found both Piascore and EarMaster to be quite challenging... I had difficulty navigating it. Initially, I found Piascore's interface confusing."

Early observations showed similar behaviour. Some students paused before starting, looked at classmates' screens, or waited for further instructions. EarMaster required more explanation, while Piascore felt more familiar because students already worked with PDF scores. By the middle of the study, students asked fewer questions about navigation and were more willing to open functions or exercises without waiting for instructions.

Greater familiarity did not lead students to use every feature. Instead, they became more selective. Piascore was valued for keeping scores together, making annotations, and organising materials. EarMaster was used for structured work in pitch, rhythm, sight-singing, and theory. Over time, students began to connect functions with learning needs, while less useful features were used only occasionally.

Bringing more structure to practice

In the interviews, several students said the applications helped them begin practice with more specific tasks rather than only a general intention to practise. Ten reported greater self-initiative in planning their work, although this was not shared by the whole group. Student A described setting smaller goals:

"I've started creating short-term objectives for myself... One effective strategy has been to aim to complete one EarMaster module each day."

Other students used fewer formal routines. Student C reviewed the previous day's work before choosing a similar or slightly more difficult task, while Student H adjusted suggested exercises according to available time and difficulty.

Feedback also helped some students decide what needed attention. EarMaster scores and visual indicators showed repeated errors, while Piascore recordings and annotations could be reviewed later. Student K explained:

"I continue to adhere to the teacher's instructions, but I now also review the app's feedback following each session. It gradually helps me understand what I need to focus on and how to correct my errors independently."

The applications did not demonstrate measurable musical improvement, but they gave students information that could guide practice. Some also described satisfaction when they completed a difficult exercise or saw a clearer sequence in their work. From around Week 8, classroom observations recorded more students opening the applications without prompting and trying unfamiliar activities on their own.

Uneven learning behaviour

Changes in learning behaviour were uneven. Some students began to make more decisions independently, while others continued to follow application sequences or teacher instructions. Six showed some passive engagement. Student F explained:

"I typically don't make many plans before starting my practice. I just launch the app and do whatever it recommends."

Classroom observations showed that some students used the applications mainly because activities had been assigned and rarely explored beyond what was required. Digital exercise therefore did not automatically lead to greater independence.

Other students also began to look for ways to deal with challenges. During the classroom observations, Student H was seen looking for the Bluetooth pedal settings in Piascore. In the interviews, Student O mentioned using online tutorials, while Student Q explained that they referred to the manual when they needed help. These examples suggest that some students were becoming more willing to look for solutions on their own before asking for help. Several students also reported using feedback from one practice session to decide what to work on in the next.

This was not a uniform move towards complete independence. Teacher guidance remained important, particularly when an application did not explain an error clearly. The more noticeable change was that some students were able to take the first steps themselves before seeking assistance.

Importance of teachers, peers

Teacher support remained important throughout the study, especially in the early weeks. Demonstrations helped students understand both how a function worked and why it might be useful. As familiarity increased, students needed less help with basic operation, but teachers were still important for more complex musical or learning problems.

In the interviews, seven students referred specifically to peer collaboration. Early conversations focused on operating the applications; later, discussion shifted more towards exercises and learning tasks. Some students who initially asked classmates for help later became the people others approached.

Practical problems continued even after students became more familiar with the applications. In the interviews, all 18 reported some form of emotional difficulty, including frustration, hesitation, or boredom. Fifteen reported problems with features, ten experienced technical problems, and two specifically mentioned Wi-Fi difficulties. Other issues included synchronisation problems, Bluetooth audio delay, crashes, device overheating, and difficulty opening larger files.

Repeated interruptions could turn a technical problem into frustration, while uncertainty about a function could make students less willing to continue. Over the 16 weeks, Piascore and EarMaster became useful to many students in ordinary ways: organising materials, providing exercises, showing feedback, and giving practice a clearer starting point. Their value depended on how the tools were used, the support available, and whether the technology suited the task.

DISCUSSION

The findings show that Piascore and EarMaster became useful when students could connect functions with everyday learning needs. Their value was not immediately clear to everyone. Some students needed time to understand the applications, while others found practical uses more quickly. What mattered most was not access to technology itself, but whether it fitted the problems students were trying to solve. Their use became more meaningful when students began to see where particular functions could fit into their own learning.

The applications extended support into the period between formal lessons. Piascore helped students with scores and organise practice materials, while EarMaster provided structured activities in pitch, rhythm, sight-singing, and music theory. This broadly supports earlier research showing that mobile technologies can extend music learning beyond scheduled class time (Debevc et al., 2020; Macrides & Angeli, 2020; Ouyang, 2023).

Students used functions more regularly when they solved a familiar problem. An annotation helped preserve something that needed attention in a score, while an EarMaster exercise could make the remaining difficulty more visible. Digital feedback could identify mistakes, but posture, breathing, instrumental technique, interpretation, and expression required teacher expertise and judgement. The applications therefore worked more

convincingly as an extension of teaching than as an alternative to it. This finding is also consistent with Mohammadian et al. (2026), who highlighted the teaching challenges that remain when technology is introduced into music learning. This pattern can also be understood through TAM. Students seemed more likely to keep using a function when they could see a practical use for it. Students used Piascore to organise and annotate their scores, while EarMaster was mainly used for aural and rhythm practice. In this sense, usefulness related to the task in front of them rather than to the application in general.

The findings also challenge the idea that mobile technology automatically makes students independent. Some participants began setting smaller goals, reviewing results, looking for solutions, and changing the way they practised. Others continued to follow the application sequence or wait for teacher direction. Becoming more independent was therefore not simply a result of using the applications, but of what students began to do with the feedback and choices made available to them.

From a constructivist perspective, the value of an activity depends partly on what learners do with the experience (Palincsar, 1998). EarMaster could identify an incorrect answer, but students still had to interpret the mistake. Likewise, Piascore recordings or annotations only became useful when students returned to them and used them to guide later work. Student K explained that they usually looked at the app's feedback after each practice session to see which areas needed more attention and how mistakes could be corrected. This suggests that the feedback was more useful when students took time to understand it and consider how to apply it in their practice. This reflects Carless and Boud's (2018) view that feedback becomes useful when learners can interpret and act on it, a concern also raised in de Bruin's (2023) study of instrumental music teaching. The applications could point out a problem, but students still had to decide what to do with that information.

Greater independence should therefore be interpreted carefully. For some students, it developed after teachers or classmates had helped them through the early stages. Later, they were more willing to try a solution before asking for assistance. In this sense, support from teachers and classmates could be part of the process of becoming more independent, rather than something separate from it. In this study, independence was closer to taking greater responsibility for practice than to learning entirely alone.

Self-Determination Theory helps explain this pattern. Autonomy appeared in small decisions about what to practise and how to use available time. Student A, for instance, described setting a daily goal of completing one EarMaster module, showing how some students began to organise their practice more independently. Students showed a sense of competence when they were able to complete exercises they had found difficult before or felt that they were making progress through continued practice. Relatedness remained important because support from teachers and classmates often made difficulties easier to manage (Ryan & Deci, 2023).

The applications themselves did not motivate the students. Confusing interfaces, unclear feedback, and technical problems could have the opposite effect. Students were more likely to continue when they could understand the task and see some progress in what they were doing. Novelty might attract attention, but a sense of progress gave the students a stronger reason to continue.

Internet problems, device limitations, crashes, screen size, audio delay, and the physical practice environment all affected their experience. These practical issues help explain why teacher involvement remains important. They helped students identify useful functions, interpret unclear feedback, and deal with musical problems beyond the applications' capabilities. Peer support was especially useful in the earlier weeks. At times, this support helped students overcome problems that might otherwise have interrupted their practice. Such guidance should not be seen as evidence that students failed to learn independently. For some students, it made it easier to deal with similar problems on their own later.

Mobile applications appear most useful when they relate to existing learning rather than added simply because technology is available. Piascore and EarMaster supported learning by giving students additional ways to organise work, practise skills, review feedback, and continue learning between lessons. Their usefulness also depended on how easily they could become part of students' usual practice.

Strengthening music education through mobile applications is therefore not about replacing established teaching methods. It is about widening the support available during the parts of music learning when teachers cannot always be present. In this study, the applications were most useful when they worked alongside teacher guidance and students' own practice rather than on their own.

CONCLUSION

With continued use, several students incorporated the applications into normal practice, using feedback to identify areas for attention, set smaller goals, and sometimes try solutions before turning to the teacher. Others continued to rely more heavily on external guidance. This shows that simply having access to an application does not mean that students will use it in the same way or gain the same kind of support from it.

The educational value of the applications therefore depended not only on their functions but also on how students used them and the support surrounding that use. Teachers remained important when students could not interpret feedback or connect a digital activity with their musical work. Classmates also supported early use, while technical and environmental problems sometimes reduced the applications' usefulness. In this study, the applications worked best when they were used alongside normal teaching and practice rather than treated as something separate.

This is particularly relevant in tertiary music education, where students spend much of their time practising outside formal lessons. Piascore and EarMaster gave students additional ways to organise their practice and work on skills, but students did not benefit from them in the same way. As Liu et al. (2023) noted in their review of mobile technology-supported music education, this area has received growing research attention. The present study adds to this work by showing how students' use of the applications changed over 16 weeks. Some students began to use feedback to plan their practice, while others continued to rely on teachers or classmates when they encountered difficulties. These differences suggest that the value of mobile applications depends not only on their functions but also on how students use them in their everyday learning.

The study was conducted at one private university in Zhengzhou with a small sample, so the findings reflect a specific setting. Students' experiences were explored more extensively than teachers' perspectives, and interviews could not capture every aspect of private practice outside class.

Future research could examine other institutions and specialisations, follow students over longer periods, and investigate teachers' decisions when integrating digital tools. Combining qualitative accounts with measures of practice behaviour or musical learning may also provide a fuller picture of mobile-supported tertiary music education.

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