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Research Paper

Transforming Music Lessons with Piascore and EarMaster at a Tertiary Institution in China

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Abstract: The integration of digital applications has increasingly influenced teaching and learning practices in higher education, including performance-based music education. This study explores how music lessons are transformed through the use of digital applications by foregrounding tertiary-level learners' experiences. Adopting a qualitative research design, data were collected through interviews and classroom observations involving 18 tertiary-level music students at a higher education institution in China over a 16-week period. Two music learning applications, Piascore and EarMaster, were integrated into regular learning activities to support practice organisation, feedback, and independent learning. Guided by the Self-Determination Theory and constructivist perspectives, qualitative data were analysed using thematic analysis. The findings indicate that the applications supported more flexible and student-centred learning practices by enhancing learners' awareness of practice organisation, progress monitoring, and strategy adjustment. Piascore was associated with improved score management and practice structuring, while EarMaster promoted accuracy and immediate feedback during skill-based practice. Learners' motivation was closely linked to visible progress and increased control over learning routines. However, challenges related to self-discipline, feedback interpretation, and the continued need for teacher guidance were also identified. The study highlights the importance of pedagogically integrating digital applications to support sustainable development in higher music education.

Keywords: Music education, tertiary learners, Piascore, Earmaster, pedagogical support

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Introduction

The rapid development of digital technologies has increasingly influenced teaching and learning practices in higher education (Kirkwood & Price, 2014; Selwyn, 2016). Technological tools change how learning and assessment are structured in higher education, reshaping traditional pedagogical roles and assessment practices. For example, IR 4.0 technologies have been shown to shift assessment toward more learner-centred, technology-enabled modes in higher education institutes (Ramasamy & Lee, 2022). Across disciplines, educators are exploring how digital tools can be integrated into classroom instruction to support more flexible, student-centred, and development-oriented learning environments (Laurillard, 2012). Rather than being viewed solely as a technological innovation, digital applications are increasingly discussed in relation to how they reshape pedagogical practices and learners' engagement with learning processes (Kirkwood & Price, 2014).

Within this broader context, the use of music-specific digital applications in performance-based learning environments has become increasingly common, raising questions about how students experience and make sense of such tools in their everyday learning. In this regard, digital applications are not pedagogically neutral, as they may influence how learners organise practice, interpret feedback, and assume responsibility for their own learning processes. In higher music education, students increasingly engage with a range of digital tools that address different learning needs, from score management applications (e.g., forScore, Newzik, Piascore) to structured skill-development platforms (e.g., SmartMusic, EarMaster).

Applications such as Piascore support digital score reading and practice organisation, while EarMaster provides structured skill training and immediate feedback as part of the regular music learning activities. Music learning has traditionally been characterised by teacher-led instruction and repetitive practice, with students often relying heavily on teachers to identify problems, monitor progress, and determine learning priorities (McPherson & Zimmerman, 2004). While this approach has long supported the development of technical skills, it may offer fewer opportunities for learners to actively organise their own learning, reflect on practice strategies, or exercise autonomy beyond lesson time (Zimmerman, 2002).

In contrast to this traditional model, recent discussions on progressive education emphasise learner autonomy, engagement, and reflective practice as central to educational development (Fullan, 2016; OECD, 2019). From this perspective, digital applications such as Piascore, and EarMaster, hold potential to influence how music lessons are organised and experienced by learners. By offering flexible access to learning materials and feedback, these applications may influence how learners approach practice routines and time management (Kirkwood & Price, 2014), an issue closely related to the broader discussion on self-regulated learning.

At the same time, differences like feedback and task structure across applications may shape learners' motivation and engagement in distinct ways, particularly during independent practice (Hattie & Timperley, 2007). However, their impact on motivation and engagement is likely shaped by distinct feedback and task structures, which may influence learners in different ways during independent practice (Hattie & Timperley, 2007). Applications such as Piascore primarily function as organisational and representational tools, supporting score access, annotation, and the management of practice materials. These features are widely used in professional and educational contexts, especially among advanced performers and ensemble musicians, where digital scores facilitate flexible rehearsal, efficient navigation of repertoire, and the preservation of interpretive or technical guidance across learning situations (Riley, 2017).

By contrast, applications such as EarMaster are designed around structured task progression and automated feedback, offering exercises that target specific aspects of musicianship, including rhythm, pitch accuracy, and aural skills. Similar forms of task-based digital training have been increasingly adopted in higher music education and general musicianship contexts, where immediate feedback supports focused practice and the development of self-monitoring skills (Papadopoulos & Papanikolaou, 2021).

While these applications differ in their pedagogical emphasis, existing research suggests that their educational impact depends less on the tools themselves than on how learners interpret and incorporate digital features into their practice routines. Feedback and task structures may create opportunities for motivation and engagement, but their effectiveness is shaped by learners' prior experiences, confidence, and access to instructional guidance within the learning environment. Student satisfaction and engagement in digitally mediated learning environments depend not only on the tools themselves but also on pedagogical design, lecturer traits, and technical support, as evidenced in studies of online learning satisfaction (Garg et al., 2024). However, existing research suggests that such positive pedagogical outcomes are not automatic; they depend on how learners engage with digital tools and how their use is framed within the instructional context.

Beyond changes in motivation and organisation, the use of such applications may also influence learners' awareness of their own learning processes (Zimmerman, 2002). When learners engage with tools that encourage monitoring accuracy, tracking progress, and adjusting strategies, they may begin to reflect more consciously on how they practise, rather than focusing solely on practice quantity (Pintrich, 2004). These experiences are increasingly recognised as an important outcome of progressive teaching approaches in higher education (OECD, 2019).

However, the integration of digital applications into music education does not automatically result in positive learning experiences (Selwyn, 2016). Learners

may encounter challenges such as difficulties maintaining self-discipline when using organisational tools, uncertainty in interpreting automated feedback, or confusion about how to balance independent practice with teacher guidance (Azevedo & Cromley, 2004). Understanding these challenges is crucial for assessing the educational value of specific digital applications and for promoting sustainable teaching development (Kirkwood & Price, 2014).

Despite growing interest in technology-enhanced music learning, existing research has often prioritised instructional effectiveness or skill outcomes, with comparatively less attention paid to learners' lived experiences of integrating specific digital applications into everyday music learning (Bauer, 2014; Kirkwood & Price, 2014). There remains a need to better understand how students experience the use of different types of music learning applications. Listening to learners' voices is therefore essential for understanding whether and how such digital tools contribute to meaningful educational development (OECD, 2019).

By situating Piascore and EarMaster within learners' everyday music learning experiences, this study moves beyond a focus on technological functionality to explore how students make sense of digital applications as part of their learning environment. This orientation provides an essential foundation for examining learners' voices and experiences via the following research questions:

1. How do learners describe their experiences of using Piascore and EarMaster in music lessons and independent practice?
2. What challenges and support needs do learners identify when using Piascore and EarMaster in their everyday music learning?

Literature Review

To examine how learners experience the use of digital applications in music education, it is important to consider not only what these tools are designed to do but how they are taken up, interpreted, and used by students in practice. Existing studies suggest that digital applications may support changes in motivation, practice organisation, and learner engagement; however, such outcomes vary considerably across individuals and learning contexts. Understanding these differences requires theoretical perspectives that account for learners' agency and interpretations. A sole focus on technological features or instructional efficiency is insufficient.

In response to this need, the present study drew on the Self-Determination Theory and constructivist perspectives to examine how tertiary-level music students make sense of digital applications within their everyday practice routines. These frameworks were used not as prescriptive models, but as interpretive lenses to explore learners' motivation, autonomy, and reflective engagement in technology-enhanced music learning.

Self-Determination Theory and Learning Motivation in Music Education

The Self-Determination Theory (SDT) provides a well-established framework for understanding learning motivation by emphasising the psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). In music education, SDT has been widely applied to explain variations in students' motivation, persistence, and engagement in practice (Bonneville-Roussy & Bouffard, 2015; Evans, 2015). Research consistently demonstrates that when learners experience a sense of autonomy and competence, they are more likely to adopt self-regulated and sustained practice behaviours.

Digital learning environments have the potential to support these motivational needs by allowing learners greater control over pacing, repetition, and feedback (Ryan & Deci, 2020). In music-specific contexts, features such as playback, progress tracking, and immediate error detection may enhance learners' perceptions of competence, while flexible access supports autonomy. However, SDT-informed studies also caution that increased autonomy without sufficient pedagogical support may lead to uncertainty or reduced motivation for some learners, particularly those accustomed to teacher-directed instruction (Evans & Bonneville-Roussy, 2016). This suggests that digital applications can create conditions for motivation, but do not guarantee motivational outcomes.

In addition to autonomy, competence, and relatedness, SDT also differentiates between intrinsic and extrinsic motivation (Ryan & Deci, 2020). In music education, this distinction is important because sustained practice often depends on whether learners perceive activities as personally meaningful or externally imposed. Research has shown that when music students feel a sense of ownership over practice tasks, they are more likely to adopt self-regulated strategies and persist in the face of technical challenges (Bonneville-Roussy & Bouffard, 2015). In digitally supported contexts, features such as repetition and immediate feedback may contribute to learners' sense of competence. However, without appropriate pedagogical framing, such features may also create pressure. Viewing learners' experiences through an SDT perspective, therefore allows a closer examination of how digital tools shape motivational processes in practice.

This suggests that digital applications like Piascore and EarMaster can create conditions for autonomy, but they do not guarantee motivational outcomes. A learner given organisational freedom by Piascore might feel empowered, or conversely, overwhelmed without clear teacher guidance on how to structure that freedom.

Constructivist Perspectives and Reflective Music Learning

From a constructivist perspective, learning is understood as an active process in which learners construct meaning through interaction with tasks, tools, and prior

knowledge (Fosnot, 2013). Applied to music education, constructivist approaches emphasise reflection, experimentation, and learner agency rather than passive imitation (McPherson et al., 2012). Digital applications align with this perspective insofar as they provide learners with opportunities to test strategies, interpret feedback, and adjust practice approaches independently.

Studies in digital and blended music learning environments indicate that constructivist-oriented tools support reflective practice by making learning processes visible (Papageorgi et al., 2022; Schiavio & van der Schyff, 2018). However, learners differ in their ability to interpret and act upon digital feedback. While some students engage in critical reflection and strategic adjustment, others rely on teacher confirmation or struggle to contextualise feedback meaningfully. These findings highlight that reflection is not solely a technological outcome, but a pedagogically mediated process shaped by learners' prior experiences and instructional framing.

From a constructivist perspective, music learning involves interpretation and adjustment rather than a simple reproduction of instruction (McPherson et al., 2012). Learners may experiment with phrasing, tempo, or articulation while gradually refining their understanding of musical structure. Digital applications can make certain elements of performance more visible, such as rhythmic accuracy or pitch precision, which may support reflective adjustment. At the same time, the construction of musical meaning remains shaped by prior experience and teacher guidance. Digital tools therefore function as resources within a broader learning process rather than as direct transmitters of knowledge.

Integrating Motivation and Meaning-Making in Digital Music Learning

Although the SDT and constructivist theory originate from different traditions, both emphasise learner agency and the centrality of active engagement in learning. Research increasingly suggests that motivation and reflective learning are closely connected in music education (Evans & Bonneville-Roussy, 2016; McPherson et al., 2019). Motivation and reflective learning are interconnected rather than separated in music education (McPherson & Zimmerman, 2004). Learners who monitor progress and adjust strategies often report stronger engagement in practice.

In digitally mediated environments, structured feedback may support this process by encouraging learners to pause and evaluate their performance. However, the extent to which such feedback contributes to sustained motivation depends on how learners interpret and incorporate it into existing routines. Qualitative insights into how tertiary-level music students negotiate these processes remain relatively limited. Digital applications may support this integration by simultaneously influencing learners' sense of control, feedback interpretation, and self-evaluation.

However, existing literature tends to examine motivational outcomes or learning strategies in isolation, with fewer studies exploring how learners experience the

integration of digital tools within their everyday practice routines. In particular, qualitative insights into how tertiary-level music students negotiate autonomy, feedback, and teacher guidance when using specific applications remain limited. This gap is particularly pronounced when we consider specific cultural and educational settings. For instance, in the Chinese higher education context, traditional pedagogical norms and examination-oriented learning cultures continue to shape students' expectations and learning behaviours.

The literature suggests that digital applications hold potential to support motivation, reflection, and learner agency in music education, but their educational impact is contingent on pedagogical integration and learners' interpretive engagement. While the SDT and constructivist perspectives provide complementary insights into motivation and meaning-making, there remains a lack of qualitative research examining how these processes unfold in practice from the learner's perspective. Addressing this gap, the present study explores tertiary-level music students' experiences of using Piascore and EarMaster, with particular attention to how digital applications shape learning motivation, practice organisation, and self-directed learning within a specific educational context.

Methodology

Research Design and Context

This study adopted a qualitative research design to explore learners' experiences of integrating digital music learning applications—specifically Piascore and EarMaster into tertiary-level music education. A qualitative design was adopted because the study sought to explore learners' experiences and interpretations of digital application use rather than to measure predefined variables. The research questions focus on how students describe their engagement and identify challenges in context. Qualitative inquiry is therefore appropriate for capturing nuanced perspectives that may not be accessible through quantitative approaches (Creswell & Poth, 2018). The research was situated within a 16-week teaching and learning cycle, during which digital applications were embedded into regular music lessons and independent practice activities. In the first week of the study, teachers introduced students to the basic functions and classroom use of Piascore and EarMaster, ensuring that all participants had sufficient familiarity with the applications before data collection began. From Week 2 onwards, students were encouraged to incorporate the applications into their everyday learning routines alongside traditional instruction.

Importantly, the study did not aim to compare the effectiveness of Piascore and EarMaster as separate tools. Instead, both applications were treated as part of a broader digital learning environment embedded within existing teaching practices.

This study was conducted in a tertiary-level music education programme at a higher education institution in China. The institution offers a structured undergraduate music programme combining individual instrumental instruction, theory courses, and ensemble participation. The programme reflects common features of tertiary music education in China, where performance training remains central and teacher guidance plays a significant role in shaping learning routines. Participants were second- and third-year tertiary-level music students. Pedagogically, these students had progressed beyond beginner stages and were able to reflect more critically on their learning processes. Practically, they were enrolled in courses where the digital applications were integrated and were therefore able to provide relevant experiential insights. Participants were selected through purposive sampling, as the study required students who had sustained exposure to both applications throughout the semester. All 18 students (Students A–R) took part in the interviews, with written informed consent obtained before the research. All participants were informed of the purpose of the study.

Data Collection

Data collection was conducted over a 16-week instructional period (one academic semester), during which Piascore and EarMaster were integrated into regular music learning activities. During the first week, the teacher introduced both applications and demonstrated their use in lessons and individual practice. Following this initial orientation, students used Piascore and EarMaster continuously throughout the semester as part of their normal coursework and independent practice. Rather than treating the applications as experimental interventions, they were embedded within existing teaching and learning practices to reflect authentic learning conditions. The teacher who introduced and used the applications in lessons was not the researcher. This separation helped maintain analytical independence from the instructional setting. Interviews were conducted by the researcher outside formal assessment contexts to minimise potential pressure or social desirability bias.

Data were collected through semi-structured interviews conducted toward the end of the 16 weeks. Semi-structured interviews were selected to provide both consistency and flexibility (Kvale & Brinkmann, 2009). While guiding questions ensured coverage of key topics, the format allowed participants to elaborate on individual experiences and perceived changes over the semester. Although interviews were conducted once, students were encouraged to reflect on their experiences across the semester, including early adjustments, changes in learning organisation, shifts in motivation and engagement, and ongoing challenges related to digital application use. This retrospective approach enabled the study to capture learners' perceptions of change over time within a single data collection phase. Although repeated interviews

might have captured more immediate shifts, the retrospective format was chosen to prioritise overall reflection.

All interviews were guided by a semi-structured interview list designed to explore learners' experiences of using digital applications in music learning. The interview list addressed areas such as learning organisation, motivation and engagement, self-directed learning, and perceived challenges. Example questions included: "How did you use Piascore or EarMaster during independent practice?" and "What challenges did you encounter when interpreting digital feedback?"

Data Analysis

Thematic analysis was employed as a systematic approach to identifying patterns across participants' accounts (Braun & Clarke, 2006). An inductive coding process was used to remain grounded in the data, with themes refined iteratively in relation to the research questions. All interviews were audio-recorded and transcribed verbatim prior to analysis. The thematic analysis followed an inductive and iterative process (Braun & Clarke, 2006). Initial familiarisation involved repeated reading of the transcripts to gain an overall sense of the data. Open coding was then conducted to identify meaningful units related to learners' experiences with digital applications. Initial codes were generated across the dataset before being grouped into broader patterns. Codes were subsequently compared, refined, and grouped into broader themes that reflected recurring patterns across participants' accounts.

Themes were continuously reviewed in relation to the research questions to ensure analytical coherence. Representative student quotations were selected to illustrate key themes and to preserve the authenticity of learners' voices. To enhance credibility, emerging codes and themes were discussed with academic supervisors for peer feedback. Reflective notes were maintained during analysis to acknowledge the researcher's interpretive position and minimise potential bias.

The study received approval from the relevant institutional ethics committee. Participants (Students A-R) provided informed consent and were informed of their right to withdraw at any time without consequence. Pseudonyms were used to protect identities, and data were stored securely with access limited to the researcher.

Findings

This section presents the findings in relation to the two research questions. Analysis of the interview data revealed three interrelated themes: (1) Changes in practice organisation and learning structure. (2) Evolving experiences of feedback and self-monitoring. (3) Negotiated forms of engagement and support needs. Rather than indicating a dramatic transformation, participants' accounts point to gradual and

context-dependent adjustments in how digital applications were incorporated into everyday music learning.

Changes in Practice Organisation and Learning Structure (Research Question 1)

Learners frequently described how the integration of Piascore and EarMaster became embedded in their regular learning routines, both in lesson-based and independent contexts. Rather than treating the applications as separate from instruction, students often spoke about them as tools that supported continuity between classroom learning and individual practice.

Several learners highlighted the role of Piascore in capturing and retaining teachers' instructions during lessons. Being able to annotate scores in real time allowed students to preserve specific guidance for later use in independent practice.

> *I can mark things right away when the teacher explains, like fingerings or reminders, so I don't forget after class.* (Student A)

> *When the teacher talks about a certain place in the score, I can find it very quickly and mark it. Later, when I practise, I remember why I marked it.* (Student L)

> *I used to write notes on paper, but now everything stays on the score. When I open it again, I know exactly what the teacher meant.* (Student B)

These accounts suggest that Piascore supported learners in organising learning across contexts by linking in-class explanation with subsequent practice. Rather than altering lesson content, the digital annotation functioned as a practical means of carrying instructional input into independent learning.

In contrast, EarMaster was primarily associated with independent practice and skill-focused work. Learners described the application as providing structure and clarity when practising alone.

> *With EarMaster, I know exactly what I'm practising. It's not just playing through pieces without knowing what the problem is.* (Student Q)

> *When I practise alone, EarMaster tells me immediately if something is wrong, so I don't have to guess.* (Student R)

For these learners, the value of EarMaster lies in its ability to define tasks and reduce uncertainty during individual practice, particularly for technical skills that are difficult to evaluate without external reference points. Over time, students also

reported becoming more selective in how they used digital applications as part of their learning routines. Initial exploration gradually shifted toward more intentional and personalised engagement.

> *At first I just used whatever functions were there, but later I only use the ones that really help my practice.* (Student L)

> *Now I don't open everything. I choose what I need for that day.* (Student Q)

> *I learned that using fewer functions but using them properly is more helpful than trying everything.* (Student H)

These experiences indicate that learners increasingly make decisions about how digital tools fit their own learning needs, rather than using all available functions indiscriminately. This suggests that the digital tools did not simply introduce new routines, but gradually reshaped how learners conceptualised responsibility for organising their own practice.

Experiences of Feedback and Self-Monitoring (Research Question 1)

Learners' experiences with feedback were a central aspect of how they described using digital applications. Many students referred to the immediacy of feedback as a key feature that shaped how they monitored their practice during independent learning. Several learners explained that feedback helped them become more aware of errors and areas requiring attention, reducing reliance on guesswork.

> *Before, I didn't really know if I was improving or not. Now I can see it more clearly, so I feel more willing to continue.* (Student B)

> *When I practise with the app, I know what I'm checking. It feels more specific.* (Student H)

These accounts suggest that feedback was experienced as a reference point that made practice more concrete and focused. Rather than simply playing through pieces, learners described paying closer attention to accuracy and specific aspects of performance. Learners also reported noticing patterns in their practice over time, which influenced how they adjusted their learning strategies.

> *I realised that I always make the same mistake, so I started to practise that part more.* (Student E)

Now I think first about what I should practise, not just how long. (Student O)

When I see the same mistake appear again, I know it's something I need to slow down and fix, not ignore. (Student I)

Through repeated interaction with feedback, students became more attentive to recurring issues and began to make small adjustments in how they approached practice, indicating changes in self-monitoring behaviour. From a self-regulated learning perspective, this pattern reflects an emerging shift from reactive error correction toward more deliberate monitoring of recurring issues (Zimmerman, 2002).

Shifts in Engagement and Emerging Self-Directed Learning (Research Question 1)

Learners' descriptions of motivation and engagement suggested gradual changes rather than immediate or uniform increases in enthusiasm. Engagement was often linked to a sense of structure, routine, and perceived progress. Some learners described a transition from novelty-driven interest to more stable, routine-based engagement.

At first it was interesting because it was new, but later it became more like part of my routine. (Student M)

I don't always feel motivated, but I still practise because it feels more organised now. (Student N)

For these students, engagement was sustained not by excitement, but by the predictability and manageability of practice supported by digital tools. Learners also described taking on greater responsibility for learning decisions, although this development was often cautious and partial.

Sometimes I'm not sure if I'm focusing on the right thing, so I still need the teacher to check. (Student I)

I can decide more than before, but I don't want to practise in the wrong way. (Student P)

These accounts highlight that self-directed learning was experienced as negotiated rather than absolute. Learners valued increased involvement in decision-making but continued to seek confirmation and reassurance from teachers. This pattern indicates that autonomy developed gradually and remained closely connected to teacher

support. Rather than replacing guidance, digital tools appeared to operate within established pedagogical relationships.

Importantly, students consistently emphasised that digital applications did not replace teachers' roles in musical judgment and guidance.

> *The app can tell me if it's right or wrong, but I still need the teacher to tell me if it sounds musical.* (Student R)

> *I still follow what the teacher says first. The app just helps me practise better.* (Student K)

Overall, learners' experiences suggest that engagement and self-directed learning developed gradually through everyday interactions with digital tools, while remaining closely connected to teacher support and instructional context.

Difficulties in Interpreting Digital Feedback (Research Question 2)

One of the most frequently mentioned challenges concerned understanding and responding to digital feedback, particularly during the early stages of application use. While feedback was valued, learners sometimes found it difficult to interpret its meaning or translate it into practical adjustments:

> *Sometimes the app just tells me it's wrong, but I don't know exactly why.* (Student B)

> *"I know it's giving feedback, but I still feel confused about how to fix the problem.* (Student E)

> *I can see the result, but I still need time to understand what I should change in my playing.* (Student H)

These experiences suggest that feedback was not always immediately actionable, which could create uncertainty during practice.

Maintaining Self-Discipline and Emotional Balance (Research Question 2)

Learners also described challenges related to sustaining self-discipline and managing emotional responses during independent practice. Extended interaction with digital tools sometimes led to frustration or fatigue.

> *When I keep getting it wrong, I feel a bit frustrated and don't really want to continue.* (Student M)

> *If I practise alone for a long time with the app, I can feel tired more quickly.* (Student H)

These accounts suggest that while digital tools provide structure, they also intensified learners' awareness of errors, which could increase emotional pressure.

Need for Technical and Pedagogical Support (Research Question 2)

In addition to emotional and interpretive challenges, learners reported practical difficulties related to technical use, particularly during the initial stages.

> *At first, I didn't really know how to use all the functions, so I needed someone to show me.* (Student A)

> *Sometimes I accidentally delete things or don't know where my notes went.* (Student L)

Beyond technical issues, learners strongly emphasised the ongoing need for teacher guidance when using digital applications:

> *The app is helpful, but I still need the teacher to tell me if I'm practising in the right direction.* (Student I)

> *I don't want to rely only on the app, because music is not just right or wrong.* (Student R)

> *Sometimes I follow the app, but I still want the teacher to tell me if this is really what I should focus on now.* (Student Q)

Learners also expressed sensitivity as to how digital tools were introduced and assessed within institutional contexts:

> *If it becomes compulsory, I think it might feel stressful.* (Student P)

> *It's better if we can try it first, not be judged by it immediately.* (Student Q)

Together, these findings indicate that learners' support needs extend beyond technical instruction to include pedagogical guidance, emotional reassurance, and the careful framing of expectations.

Learners' voices confirmed that the use of Piascore and EarMaster became part of their everyday music learning in gradual and practical ways. Students did not describe

dramatic changes in how they learned but rather spoke about small adjustments in how they organised practice, responded to feedback, and stayed engaged over time. For many, digital applications helped make practice more structured and specific, particularly during independent learning, while lessons continued to play an important role in shaping priorities and musical understanding.

At the same time, learners were clear about the limits of digital tools. Difficulties in interpreting feedback, maintaining self-discipline, and managing emotional responses during practice were common, especially when students worked alone. Across accounts, teacher guidance remained central, both for helping learners make sense of digital feedback and for providing reassurance about learning direction. Overall, learners' responses suggest that digital applications were experienced as supportive resources rather than replacements for instruction, and that meaningful use depended on guided integration within existing teaching and learning practices.

Discussion

Learners' experiences of using Piascore and EarMaster were characterised not by uniform enthusiasm, but by gradual and uneven adjustments in practice organisation and engagement. Rather than producing immediate transformation, digital applications appeared to support incremental shifts in how students structured practice and interpreted feedback. When revisiting the findings, it becomes apparent that learners' experiences were shaped less by the presence of digital applications themselves than by how these tools were taken up within existing learning routines. Learners did not describe sudden or radical changes in the way they learned. Instead, they spoke about gradual adjustments in how they organised practice, monitored progress, and approached learning tasks over time.

This pattern is consistent with previous research suggesting that digital tools in music education tend to support incremental rather than transformative change when they are embedded in everyday practice (McPherson & Zimmerman, 2004; Papadopoulos & Papanikolaou, 2021). In this context, digital applications appear to support learners' sense of involvement and engagement, although such experiences developed unevenly and were closely linked to individual learning habits and instructional settings (Ryan & Deci, 2020).

Overall, these gradual and uneven changes indicate that the contribution of digital applications was not experienced as an immediate improvement, but as a slow reshaping of everyday practice habits. Rather than triggering rapid shifts in learning behaviour, Piascore and EarMaster appeared to support small, cumulative adjustments in how learners planned their practice, directed their attention, and reflected on progress (McPherson et al., 2019). Such patterns suggest that the educational value of these tools lies in their sustained use over time, echoing constructivist views that learning develops through ongoing interaction with

learning environments rather than through short-term or isolated technological interventions (Papadopoulos & Papanikolaou, 2021).

The findings also point to a range of challenges that shaped how learners engaged with digital applications in practice. Difficulties in interpreting automated feedback, sustaining self-discipline, and managing emotional responses during independent learning were reported by several students. Similar concerns have been noted in earlier studies on technology-supported and self-regulated learning, where learners often require guidance to translate feedback into meaningful action (Azevedo & Cromley, 2004; Hattie & Timperley, 2007). While immediate feedback was generally valued, it did not consistently provide the contextual understanding needed for learners to decide how best to adjust their practice. As a result, digital tools sometimes increase cognitive or emotional demands, particularly in performance-based learning where qualitative judgment remains central.

Importantly, learners continued to emphasise the role of teachers in helping them interpret feedback, set priorities, and maintain confidence. This supports existing arguments that technology-enhanced learning is most effective when digital tools operate alongside, rather than independently from, pedagogical guidance (Laurillard, 2012; Selwyn, 2016). This emphasis on pedagogical guidance echoes broader findings that learner engagement and satisfaction in digitally mediated learning environments are shaped not only by technological tools, but also by pedagogical design and instructor support (Garg et al., 2024).

Learners' accounts further indicate that increased autonomy did not involve unrestricted or comprehensive use of digital applications. Instead, autonomy was often expressed through selective engagement with features that learners felt addressed specific practice needs. This pattern suggests that self-directed learning was less about technical proficiency with the applications and more about developing judgment regarding when and how digital tools were useful (Papadopoulos & Papanikolaou, 2021). In this sense, autonomy emerged as a situated and negotiated process, shaped by learners' prior experiences, confidence levels, and continued access to instructional support. This finding contributes to discussions within the Self-Determination Theory by suggesting that autonomy in technology-enhanced learning may develop through supported independence rather than complete instructional withdrawal. In this context, teacher scaffolding appeared to remain central in sustaining learners' confidence while digital tools extended opportunities for self-monitoring.

From a theoretical perspective, these findings offer further insight into how motivation and learning develop in technology-enhanced music education. The Self-Determination Theory highlights the importance of autonomy and competence for sustained engagement (Deci & Ryan, 2000; Evans, 2015), while constructivist perspectives emphasize learners' active role in making sense of

learning experiences through reflection and adaptation (Fosnot, 2013; Schiavio & Van der Schyff, 2018). The present study extends these perspectives by illustrating that, in this context, learner autonomy and reflective engagement were not fixed outcomes of technology use. Instead, they emerged gradually and were shaped by learners' confidence, prior learning habits, and access to instructional support. By foregrounding learners' voices, this study highlights the importance of pedagogical integration when introducing digital applications and suggests that meaningful technology use in higher music education depends on aligning digital affordances with sustained guidance and learners' developmental needs.

While traditional instructional approaches remain central, the absence of digital support may limit opportunities to address contemporary learners' needs, particularly in relation to independent practice. The present findings suggest that digital applications, when carefully integrated into existing pedagogical frameworks, can play a constructive role in supporting current and future music learning practices (Papadopoulos & Papanikolaou, 2021).

Overall, the findings indicate that the educational value of digital applications lies less in their technical features and more in how they are integrated into pedagogical relationships and everyday learning routines.

Conclusion

This study demonstrates that integrating digital applications into tertiary music education is not a neutral technological addition, but a pedagogically mediated process that reshapes how learners organise practice, interpret feedback, and assume responsibility for learning. The findings confirm that digital applications do not lead to uniform or automatic transformations in music learning. Instead, students described gradual and uneven changes in how they organised practice, engaged in learning tasks, and reflected on their own progress. This pattern echoes previous research suggesting that technology-enhanced music learning is more likely to support incremental developments when embedded in everyday practice rather than produce immediate or transformative effects (McPherson & Zimmerman, 2004; Papadopoulos & Papanikolaou, 2021).

Teacher guidance remained important in shaping musical direction. Digital applications did not replace this role, but functioned as structured supports that extended learning beyond lesson time. This finding aligns with existing research emphasising the continued centrality of teachers in technology-enhanced learning environments, where digital tools function most effectively as complements to, rather than replacements for instructional support (Laurillard, 2012; Selwyn, 2016).

Learners responded most positively when digital tools were introduced as supportive resources rather than evaluative systems, a perspective consistent with research on autonomy-supportive and learner-centred approaches in music

education (Ryan & Deci, 2020). By foregrounding learners' experiences, this study underscores the importance of balancing technological support with pedagogical sensitivity in higher music education. Overall, the findings suggest that meaningful and sustainable use of digital applications depends on guided integration that aligns technological affordances with learners' developmental needs and existing instructional contexts.

Several limitations of this study warrant consideration. The research was carried out within a single institutional context, which means that the findings may not be directly transferable to other music education settings. Moreover, the analysis drew largely on learners' self-reported accounts. Although these accounts provide valuable insight into how students experience and interpret the use of digital applications in their everyday practice, they do not necessarily reflect observable learning behaviours or longer-term changes in musical performance.

For educators, the findings suggest that introducing digital applications requires more than technical demonstration. Ongoing pedagogical scaffolding remains essential to help students interpret feedback, make informed decisions about tool use, and maintain balance between independent practice and guided instruction. For institutions, the study highlights the importance of supporting teachers in developing pedagogical approaches that integrate technology meaningfully rather than treating digital tools as standalone solutions.

Future research could extend this work by comparing learner experiences across different institutional and cultural contexts, including contrasts between Chinese higher education settings and those in other educational systems. In addition, examining teachers' perspectives on integrating digital applications would provide a complementary understanding of how pedagogical decisions shape learners' experiences.

By capturing learners' voices, this study provides empirical grounding for discussions of autonomy and motivation that have often been framed theoretically or from teacher perspectives. Furthermore, situating the analysis within the Chinese higher education context offers insights into how technology-enhanced music learning unfolds in settings shaped by strong traditions of teacher-led instruction.

Taken together, the findings suggest that the educational potential of digital applications lies not in technological innovation alone, but in how such tools are embedded within evolving pedagogical relationships and learning cultures.

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