Malaysian Journal of Social Sciences and Humanities (MJSSH) (e-ISSN : 2504-8562)
2026, Volume 11, Issue 5, e003961
DOI: https://doi.org/10.47405/mjssh.v11i5.3961

RESEARCH ARTICLE

Exploring Self-Regulated Learning Processes in Online Piano Tutorials among Young Beginners in China

Mao Yi[1], Wang I Ta[2*]

[1]Faculty of Creative Arts, Universiti Malaya, 50603 Kuala Lumpur, Malaysia
Email: s2028782@siswa.um.edu.my
[2]Faculty of Creative Arts, Universiti Malaya, 50603 Kuala Lumpur, Malaysia
Email: wangita@um.edu.my

CORRESPONDING AUTHOR (*):
Wang I Ta
(wangita@um.edu.my)

KEYWORDS:
Online piano tutorials
Self-regulated learning
Student learning behavior
Technology support
Tutor guidance

CITATION:
Mao, Y., & Wang, I. T. (2026). Exploring Self-Regulated Learning Processes in Online Piano Tutorials among Young Beginners in China. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 11*(5), e003961. https://doi.org/10.47405/mjssh.v11i5.3961

ABSTRACT

With the growing prevalence of online music education, understanding how piano beginners manage practice and progress in online environments is essential. This study adopts Zimmerman's self-regulated learning (SRL) cyclical phases model to examine students' development of planning, monitoring, and reflection behaviors during the online piano tutorials. Data were collected through semi-structured interviews with 11 online tutors and 11 parents whose children were taking online piano tutorials, as well as observations of 8 students. The study analyzed how tutor guidance and digital tools jointly shape students' self-regulation. Findings showed that in the forethought phase, students rely heavily on tutors' external cues for task planning and motivation. In the performance phase, students gradually use multiple strategies and digital tools to monitor their practice. In the self-reflection phase, students shift from attributing mistakes to uncontrollable factors toward more controllable causes and adjust strategies based on feedback. This study extends SRL theory to the context of online piano tutorials and offers theoretical and practical insights for online piano education.

Contribution/Originality: This study contributes to the literature on online piano education. It uses Zimmerman's self-regulated learning (SRL) cyclical phases model to examine how tutor guidance and digital tools shape student behavior in SRL phases. It also documents students' shift from external regulation to self-regulation in online learning environment.

1. Introduction

Online music learning has grown rapidly in recent years. Online piano learning now takes several forms, including technology-driven platforms such as Skoove, Simply Piano, and Soft Mozart, interactive practice software such as SmartMusic®, and real-time online piano tutorials. These platforms attract parents and students because they offer immediate feedback, interactive tasks, and flexible structures (Buck, 2008; Lei, 2023;

Ruan, 2024; Zhang, 2020). They show particular value in piano study, where learners often need individualized instruction (Xu, 2022).

Online piano tutorials focus on the practice process of piano students and offer immediate error correction and a highly interactive instructional setting (Cai, 2019; Xu, 2022). However, these tutorials often target young beginners who have limited skills in managing learning tasks on their own (Hallam et al., 2012; Redman, 2022; Wan et al., 2023; Wang et al., 2025; Zhang, 2020). Current research on online piano learning often examines technology support, student motivation, or instructional quality, but it rarely explores how young beginners regulate learning, sustain motivation, manage emotions, and develop strategies in real-time online piano tutorials (Dammers, 2009; Liu et al., 2024; Lu, 2025; Palvia et al., 2018).

SRL offers a key framework for understanding how students plan before music practice, monitor performance during tasks, and reflect after completion (Andreou, 2022; Cogdill, 2015; McPherson & Renwick, 2013). However, most existing studies focus on SRL behaviors in the technology support or general music learning context and pay less attention to how students in online piano tutorials develop goal setting, strategy adjustment, and self-evaluation skills under the joint influence of tutors, parents, and technology (Ng et al., 2024; Wan et al., 2023). Therefore, this study draws on Zimmerman's SRL cyclical phases model to examine students' self-regulation processes and influencing factors in online piano tutorials.

1.1. Research Objectives

This study examines how students develop and apply SRL in online piano tutorials and how tutors, parents, and digital platforms influence this process. By investigating students' behaviors across the forethought, performance, and self-reflection phases of SRL, the study aims to understand the dynamic impact of online piano tutorials on students' SRL processes. The research question guiding this study is as follow: How do online piano tutorials influence students' self-regulated learning processes?

2. Literature Review

2.1. Self-Regulated Learning (SRL)

SRL refers to how learners control their cognition, motivation, and behavior (Zimmerman, 1986; Zimmerman & Schunk, 2011). Existing studies show that SRL helps students set goals, monitor progress, adjust strategies, and handle difficulties. It is a core process that supports learner autonomy (Albelbisi, 2019; Papamitsiou & Economides, 2019; Winnie, 2010). Since SRL does not develop instantly, teachers need to create a supportive environment that promotes the gradual growth of regulatory skills (Hayes et al., 2015).

Scholars have modelled learners' SRL from different theoretical perspectives, such as Zimmerman's cyclical phases model (Zimmerman & Campillo, 2003), Boekaerts's dual processing model (Boekaerts & Cascallar, 2006), and Pintrich's SRL model (Pintrich, 2000). The current study adopts Zimmerman's model, which has been widely applied in music education and practice (McPherson & Renwick, 2013; Peistaraite & Clark, 2020). Zimmerman's SRL cyclical phases model consists of three phases: forethought, performance, and self-reflection (Zimmerman & Campillo, 2003).

The forethought phase refers the learners' self-motivation before learning, including task analysis and self-motivation beliefs (Zimmerman, 2002). The performance phase involves learners' strategy use and self-monitoring during task engagement, including self-control and self-observation (Zimmerman & Campillo, 2003). After completing a task, learners enter the self-reflection phase, where they evaluate their outcomes, attribute success or failure, and generate self-reactions (Panadero & Alonso-Tapia, 2014; Zimmerman & Campillo, 2003). The judgments formed in this phase will influence the goal setting and strategic planning in the next cycle of the forethought phase (Dabbagh & Kitsantas, 2012). These cyclical phases interact dynamically allowing students to continuously plan, monitor, and evaluate their learning behaviors until they reach their goals (Zimmerman & Campillo, 2003). These cyclical processes are important for children because they help them identify problems, regulate emotions, stay on task, and develop strategy use over time (Lee et al., 2023).

2.2. SRL in Music Teaching and Learning

The three components of self-regulation, namely metacognition, behavior, and cognition, are critical for music learning outcomes (Peistaraite & Clark, 2020). Music learning depends on learners' self-regulation, because instrumental learners must act independently during personal practice (McPherson & Renwick, 2013).

Under Zimmerman's model, music learners organize practice through the phases of forethought, performance, and self-reflection. They set goals for technical skills and musical expression based on the practice task, monitor their progress and apply strategies during practice, and evaluate and adjust their work after practice (Andreou, 2022; McPherson et al., 2019; Usher & Schunk, 2017). This cycle helps learners refine their skills through continuous reflection and is central to effective music learning.

Bonneville-Roussy and Bouffard (2015) define formal practices as a goal-directed, focused process that integrates self-regulation and practice strategies. This structured, goal-oriented self-regulation supports long-term skill development and performance improvement (Hatfield et al., 2017; Hatfield & Lemyre, 2016). In contrast, elementary school ages students often lack self-regulation skills and struggle to practice independently or manage challenges without teacher supervision (Hallam et al., 2012). Self-regulation skills develop progressively through students' learning preferences, practice opportunities, and teacher guidance and feedback (Wan et al., 2023). Teaching self-regulation strategies and targeted instructional interventions guide music students in developing SRL strategies and enhance their learning outcomes (McPherson, 2005; McPherson et al., 2013). Especially in the early stages of music education, young learners rely on teachers' emotional, cognitive, and behavioral support, as well as appropriate resources and tools, to develop self-regulation and sustain independent practice (Wan et al., 2023).

Although previous studies have highlighted the importance of SRL in music education (McPherson & Renwick, 2013; Peistaraite & Clark, 2020), research on how sustained interactions among students, tutors, and parents foster and maintain SRL in online piano tutorials remains limited. In addition, existing research has mainly examined the structure and outcomes of SRL in face-to-face learning, with less attention to online music learning contexts. Little is known about how young learners develop SRL skills

with support from digital platforms. This gap underscores the need to examine the emergence and development of SRL in online music tutorial settings.

2.3. SRL in Online Learning

SRL is a key factor in online learning success, helping learners manage challenges in online environments (Adam et al., 2017; Wong et al., 2019). Effective use of SRL strategies has been shown to improve course completion and learning outcomes in online settings (Anthonysamy et al., 2020; Jin et al., 2023; Kizilcec et al., 2017; Xu et al., 2022).

Compared with face-to-face lessons, online environments demand higher levels of self-regulation and learning management due to the lack of teacher supervision and peer support (Azevedo et al., 2008; Bol & Garner, 2011; Kizilcec et al., 2017). However, Davis et al. (2016) note that effective SRL strategies from traditional classrooms may not suit the unique structure and interaction patterns of online settings because of the absence of adaptive support and social accountability. Therefore, teacher guidance (Wong et al., 2019), parental support (Wang et al., 2025), and the use of technological tools (Azevedo et al., 2008) play crucial roles in supporting SRL in online learning.

Miao and Ma (2023) note that teacher guidance can strengthen students' SRL skills and self-efficacy, increasing their engagement in online learning. However, Huh et al. (2024) argue that although teachers use multiple strategies to support K–12 students' SRL in online settings, these strategies may hinder rather than promote students' independent regulation; therefore, teachers need to explicitly teach SRL strategies, balance direct instruction with student autonomy, and gradually transfer the control of learning back to students through personalized instruction.

Parental support in online learning has also been highlighted (Huh et al., 2024). Wang et al. (2025) note that parents support children's SRL by guiding media use and providing environmental and resource support to help children develop digital skills, establish behavioral norms, and create conditions that support online learning.

Online technologies can provide real-time feedback and guide learning to support SRL (Jin et al., 2023; Ng et al., 2024). However, their regulatory functions often rely on teacher guidance to reach full effect (Azevedo et al., 2008). Learners also need to develop the ability to select and manage learning materials independently without teachers' presence (Anthonysamy et al., 2020).

Despite these insights, existing research has focused mainly on general online learning environments and pays limited attention to how SRL develops in online piano tutorials among elementary age students. This gap highlights the need for more context-specific and process-oriented studies to examine how students, tutors, and technology tools collaborate to foster SRL in online piano tutorial settings.

3. Research Methods

3.1. Research Design

This qualitative study explored how online piano tutorials in China support young beginners' SRL processes. Data collection involved semi-structured interviews and

observations. Interviews with tutors and parents examined instructional strategies and technology use, while observation focused on students' learning behaviors during online tutorials.

3.2. Participants

This study recruited interview participants in China via snowball sampling (Browne, 2005). The participants included 11 online piano tutors (T1-T11) and 11 parents (P1-P11) whose children were taking online piano tutorials. The selection criteria for tutors include having at least four years of piano training, and possessing a minimum of three months of online piano tutoring experience. Eligible parents' children should complete over 20 hours of online piano tutorials. After distributing study information on social media, interested individuals completed a contact form. The researcher then invited qualified individuals for interviews.

The researcher used convenience sampling to select 8 students (S1-S8) for observation (Cohen et al., 2017). These students were attending the researcher's online piano tutorials. The students were aged 7-12 and had completed at least 10 online piano tutorials. All observations were conducted with parental consent.

3.3. Data Collection

Semi-structured interviews were conducted via WeChat and lasted 30 to 60 minutes. The interviews focused on tutors' instructional strategies, use of digital tools, and parental observations of students' practicing. All interviews were audio-recorded and transcribed verbatim.

Observations were carried out during the researcher's own online piano tutorials. Brief notes were taken under predefined categories, focusing on goal setting, strategy use, attention and emotion regulation, responses to feedback, and self-reflection. All tutorials were audio-recorded with parental consent, and the recordings were later expanded into detailed notes.

3.4. Data Analysis

Both interview and observation data were analyzed using thematic analysis (Braun & Clarke, 2006). Coding was conducted in NVivo 14. The initial coding identified behaviors linked to SRL phases. These codes were organized into themes based on Zimmerman's cyclical phases to illustrate the support provided by tutors and technology tools.

To enhance trustworthiness, the data were reread several times and conducted member checking with the tutors and parents. Observation data served to triangulate interview findings, while the researcher maintained a reflexive positionality throughout the process.

4. Findings

4.1. Forethought Phase

The forethought phase involves students' task analysis and self-motivational beliefs. Findings indicate that students initially relied on tutors and parents for planning but gradually shifted toward more independent engagement as their SRL skills developed.

4.1.1. Task Analysis

Students initially struggled with goal setting, often set goals beyond their ability. T9 noted that this mismatch led to frustration and diminished motivation, which affected subsequent practice. To address this, tutors encouraged students to set smaller and process-oriented goals, which helped them adjust goals and sustain motivation. Parents also observed this change. P8 noted that her daughter shifted from avoiding practice to managing practice time independently.

Several students also showed greater strategic planning awareness before starting tasks. They no longer relied on unplanned repetition but reviewed the score in advance to identify potential difficulties (P5). This pattern was observed across multiple tutorials. In one observation, after the tutor-researcher introduced the metaphor of "*preparing for battle*" strategically, S8 shifted from relying on rote memory to score analysis before beginning practice.

4.1.2. Self-Motivational Beliefs

Many students initially showed low self-efficacy and tended to withdraw when facing difficulty. T8 noted that "*encouragement alone is not insufficient; students need specific strategies to understand and complete tasks.*" Structured task breakdown and guided instruction helped students achieve smaller goals, which strengthened their confidence and persistence (P6).

Some students also showed a mismatch between outcome expectations and actual ability. They overestimated the speed of skill acquisition and underestimated task difficulty (T4). For example, P3 reported that her daughter initially expected to complete the whole piece in a single tutorial, which indicated limited awareness of task complexity. Tutor guidance appeared to help students form more realistic expectations. P3 observed that her daughter's learning approach changed after receiving structured feedback. Through this process, students began to recognize the need for gradual improvement, forming more adaptive motivational beliefs prior to task engagement.

Task interest also plays a role in sustaining motivation. Tutors used strategies such as gamified practice and narrative explanation to increase student engagement (T5). P5 observed that once his son became interested in a piece, he practiced for longer periods on his own initiative. P8 also noted that a close tutor–student relationship supported a more positive attitude toward practice.

4.2. Performance Phase

The performance phase examines how students use strategies during practice. They adjusted their learning through self-control and self-observation, and they moved from reliance on external regulation toward greater autonomy in their practice routines.

4.2.1 Self-Control

Students' use of self-control strategies in practice primarily includes self-instruction, imagery, attention focusing, task strategies, and help-seeking.

Many students showed weak self-instruction skills at the start. They often practiced mechanical repetition without internal prompts (T10). Tutors encouraged students to verbalize cues to guide their practice. With tutor guidance, students began to use self-instruction during practice, such as "*watch the fingering,*" "*keep the rhythm*" (P7), and "*I must look at the score*" (S8).

Tutors used metaphorical imagery to support musical expression, particularly for younger students. T1 asked a student to imagine being "*a little rabbit*" to convey a lively musical style. P8 reported that her child imagined being a composer, and "*her playing now sounds more expressive.*"

Students also showed progress in regulating attention and managing their learning environment. Tutors addressed attention-related challenges by setting short-term goals and targeted verbal cues (T2), and parental support helped reduce external distractions (T8). Over time, some students began to manage their learning environment, asking parents to provide a "*distraction-free practice setting*" (P5, S8), which indicated stronger control over attention and practice conditions.

In terms of task strategies, most students initially relied on unstructured repetition without identifying or correcting errors. With tutor guidance, students adopted more targeted strategies. P7 noted that her child could "*break down difficult sections and tackle them one by one.*" Observation data supported this shift in practice. S8 practiced complex passages in segments. S1 moved from imitation to musical analysis. S4 used a metronome to increase tempo in difficult passages.

Help-seeking became an important regulatory strategy over time. T11 noted that some students "*did not ask questions when they did not understand*" and required tutor encouraging them to express their needs. P9 observed that his daughter began to record questions for later tutorials, reflecting a shift from passive reception to more active engagement with learning difficulties.

4.2.2. Self-Observation

Self-observation in students' practice encompassed two dimensions: metacognitive monitoring and self-recording.

Initially, beginners relied on external feedback and rarely detected their own errors. As T2 noted, "*I have to point out obvious mistakes because they do not hear their own errors in rhythm or notes.*" With continued guidance, some students began to show early metacognitive awareness and were able to pause during practice to identify and correct errors independently (P1). Observations reflected variation across students. S3 reminded himself, "*The left hand of this part is not steady. I will try again in a slower tempo.*" In contrast, S4 with weaker metacognitive skills still depended on tutor feedback to detect errors.

In addition to error monitoring, students paid more attention to their physical movements during practice. For example, in S7's initially playing, musical continuity was disrupted due to excessive movement. Although he made surface adjustments under tutor's guidance, he did not view these actions as problematic. However, after reviewing his own recordings, he independently recognized and corrected these behaviors. P5 similarly reported that his son used recordings to identify recurring issues during practice. For these students, playback functioned in the tutorial platform as an external reference, enabling more objective self-evaluation than relying solely on immediate tutor feedback.

4.3. Self-Reflection Phase

The self-reflection phase involves students' self-evaluation and emotional responses after completing a task. In the context of online piano tutorials, students show gradual development in self-judgment and self-reaction, indicating growing reflective awareness and adaptive learning ability.

4.3.1. Self-Judgement

Self-evaluation in the reflection phase was shown in students' growing ability to assess their performance and explain the causes of outcomes. Beginners relied heavily on tutor feedback and showed limited capacity for self-evaluation after practice. Tutors prompted reflection after practice by asking students assess their own playing, such as "*How would you evaluate your performance just now?*" (T10). As the tutorial progresses, students began to conduct self-assessment after practice and identify specific issues independently, such as fingering or rhythmic errors (P7, S2).

In terms of causal attribution, students gradually shifted from blaming uncontrollable factors to identifying causes they could address on their own. Some students initially held fixed beliefs about ability, with some students attributing errors to "*I have no musical talent*" (P2) or "*I lack ability*" (T4), which reduced their willingness to continue. Tutor guidance played a key role in reshaping these narratives by emphasizing effort and the learning process. As a result, students began to identify more specific and controllable causes, such as "*I did not practice enough*" (P1) or "*I lost focus just now*" (S2).

4.3.2. Self-Reaction

Students' self-reactions were illustrated in their emotional responses after self-evaluation and in subsequent behavioral adjustments.

Students' sense of satisfaction was closely related to their perceived progress after practice. P5 noted that continuous encouragement from tutors helped students maintain confidence, such as "*you did very well today,*" (T8) increased students' engagement in later practice. In addition to external feedback, students' recognition of their own progress also supported sustained motivation. T9 and P3 reported that students tended to practice more when they noticed small improvements. The use of digital tools in observation further reinforced this pattern. Some students clicked the "Like" button after completing tasks, while others expressed excitement by saying "*I did it!*" after overcoming challenges.

Students also displayed both defensive and adaptive behavioral patterns following self-judgement. Initially, some students avoided or resisted feedback and expressed frustration through passive or oppositional behavior (T4, S7). With continuous emotional support and guided reflection, many students shifted toward adaptive responses, including strategy adjustment, help-seeking, and active coping (P1). S7 illustrated a shift from defensive to adaptive response. He initially showed resistance to corrective feedback, such as hitting the screen, rolling his eyes, or stamping his feet. With continued tutor support and guidance, he became more receptive to feedback and began to apply more targeted practice strategies in later sessions.

5. Discussion

This study examined the development of SRL among young beginners in online piano tutorials. The findings show that tutor guidance, parental support, and the online learning environment jointly shape students' self-regulation across the forethought, performance, and self-reflection phases.

5.1. Forethought Phase

Consistent with prior SRL research, beginners struggled with realistic goal setting and strategic planning (Dong et al., 2020; Hallam et al., 2012; Zimmerman, 2000). In online tutorials, the main challenge was the mismatch between task demands and students perceived abilities, which contributed to unrealistic goals and insufficient preparation before practice. Through structured tutor guidance, these goals were gradually adjusted into realistic and process-oriented targets. This has been shown to promote student engagement (Hatfield, 2016). Students then transferred these skills to independent home practice. This suggests that stepwise goal setting in online tutorials may support the internalization of self-regulatory processes.

Regarding self-motivational beliefs, prior research shows that self-efficacy precedes and supports outcome expectations through accurate self-assessment (Schunk, 2012; Zimmerman, 2000). However, this study identified a different pattern. Some students held overly optimistic outcome expectations that exceeded their actual abilities. This pattern did not reflect genuine confidence but reflects limits in children's metacognitive capacity, which can lead to overestimation of performance (Was & Al-Harthy, 2018; Xia et al., 2024). With tutor guidance emphasizing gradual progress and realistic expectations, students developed more adaptive motivational orientations.

Task interest and perceive value also shaped motivational engagement. Students showed higher engagement when tasks were perceived as meaningful or interesting, consistent with research on motivation and task value (Fielding et al., 2022). This study found that task interest in online piano tutorials was not an inherent feature of the task, but it actively constructed through tutor–student interaction, including the use of gamified strategies and relational support.

5.2. Performance Phase

In the performance phase, students translate plans into action through self-control and self-observation strategies (Zimmerman, 2002). This study found that in online piano tutorials, these regulatory strategies developed progressively through tutor guidance, immediate feedback, and digital tools of the tutorial platform.

Students initially relied on verbal cues from the tutor during practice. With repeated practice and synchronous feedback, these external cues were gradually internalized, enabling students to remind themselves of musical and technical points independently. This reflects the internalization process described in SRL research (Panadero & Alonso-Tapia, 2014) and suggests that the online environment may accelerate this process.

Imagery helps students construct musical expression and engagement. This confirms the importance of imagery in music learning (Keller, 2012) and extends its application to young beginners' piano learning, whereas previous research focused mainly on professional musicians (Keller, 2012; Lotze, 2013) or clinical contexts (Park et al., 2023; Toader et al., 2023).

Attention focusing presented a consistent challenge, as environmental distractions and unclear task goals reduce students' focus (Massonnié et al., 2022). Tutors addressed this through real-time prompts and short-term goal setting, while parental support helped reduce external distractions. Over time, students became more active in managing their learning environment, indicating a mutually reinforcing relationship between attention control and environment management consistent with prior SRL research in online learning (Ejubovic & Puška, 2019).

As tutorials progressed, students shifted from unplanned repetition to more strategic practice, adjusting practice strategies to address specific technical challenges. This supports Uygun and Kılınçer's (2017) view that instrumental learning requires strategic approaches and highlights the role of strategy use in SRL models (Hewitt, 2001; Zimmerman & Schunk, 2011). The individualized feedback and real-time monitoring afforded by online tutorials appeared to facilitate this shift from passive repetition to strategic self-regulation.

Help-seeking behavior also shifted from passive to active. Initially, students waited for the tutor to identify problems rather than asking questions, reflecting low self-regulation (Panadero & Alonso-Tapia, 2014). As tutorials continued, students began recording questions, asking proactively, and requesting extra tutorials, showing features of strategic help-seekers who pursue learning goals through active support (Chou & Chang, 2021).

Regarding self-observation, most beginners initially relied on tutor feedback to detect errors, gradually internalizing these external cues as self-monitoring during practice. This aligns with Schneider's (2008) study, emphasizing the teacher's role in supporting children's metacognitive development. Notably, students also began to include bodily movement in self-observation and recognized that excessive motion could disrupt musical continuity. This aspect is rarely addressed in SRL research and suggests that metacognitive monitoring in music learning extends beyond cognitive regulation to include bodily awareness.

Self-recording reinforced this bodily awareness. Reviewing recordings enabled students to identify and correct physical behaviors that did not improve after direct tutor feedback, indicating that audio-visual self-review provides a form of feedback distinct from verbal instruction alone. With tutor encouragement, students used the platform's recording and playback functions to identify unnoticed errors and make targeted corrections (Panadero & Alonso-Tapia, 2014; Volioti & Williamon, 2021). This aligns

with Kegelaers et al. (2022), who found that audio or video recording enhances awareness of strengths and weaknesses and supports more accurate goal setting. The integration of recording functions in online tutorial platforms made this strategy more accessible and easier to incorporate into daily practice.

5.3. Self-Reflection Phase

The self-reflection phase involves self-judgement and self-reaction, which influence the next cycle of goal setting and strategy use (dos Santos Silva & Marinho, 2025). Consistent with prior research showing that beginners often rely on teacher feedback for evaluation (Song et al., 2024; Taras, 2003), students in this study initially depended heavily on tutor feedback to evaluate their performance. Over time, they showed greater independence in identifying errors and evaluating their performance across multiple dimensions, including technical accuracy, musical expression, and physical control. This multidimensional evaluation extends existing literature, which often focuses on accuracy-based feedback (Honicke & Broadbent, 2016) or reflection in professional performance contexts (dos Santos Silva & Marinho, 2025).

Regarding causal attribution, students' explanations for performance outcomes shifted from ability-based, avoidant attributions (McPherson & Renwick, 2013) toward controllable factors related to effort and strategy. This aligns with Weiner's (2010) attribution theory, which suggests that more adaptive and controllable attributions support sustained motivation. This shift suggests that online tutorials may play a role in facilitating more adaptive interpretations of performance, thereby supporting sustained engagement.

Turning to self-reaction, positive feedback from tutors and recognition of personal progress contributed to increased satisfaction and engagement, reflecting the established link between positive affect and sustained motivation (Schunk & DiBenedetto, 2020). Some students initially showed defensive responses, attributing mistakes to external factors and expressing frustration. These behaviors align with early emotional reactions commonly reported in SRL research (Panadero & Alonso-Tapia, 2014). With continued tutor guidance and emotional support, students gradually developed more adaptive responses, including adjusted strategies, help-seeking, and persisted through challenges. This shift confirms the connection between self-reflection and adaptive responses (Longhurst, 2024) and indicates that timely reinforcement in online tutorials supports regulation of positive emotions.

6. Conclusion

This study examined how young beginners develop SRL in online piano tutorials and showed that tutor guidance, parental support, and digital tools shape their learning processes. The findings suggest a developmental shift from externally guided behavior toward more autonomous regulation across the forethought, performance, and reflection phases. Students gradually demonstrated improved goal setting, more strategic practice, and more adaptive self-reflection. The online tutorial environment supported these processes through real-time feedback, individualized guidance, and accessible digital functions, which facilitated the development of regulatory skills. These findings contribute to existing research by illustrating how online instrumental instruction can support the development of SRL in young learners, particularly through the integration of instructional support and digital tools.

Several limitations should be acknowledged. The study was based on a small sample from a single online platform, which may limit the transferability of the findings across contexts and populations. In addition, the reliance on qualitative data and the absence of longitudinal or performance-based measures constrain the ability to assess long-term learning outcomes. Future research could expand the sample across different platforms and cultural contexts and incorporate mixed method approaches to further examine the development of SRL in online music education.

Ethics Approval and Consent to Participate

This study was approved by the Universiti Malaya Research Ethics Committee (UMREC), with approval number UM.TNC2/UMREC_2844.

Acknowledgement

This study draws in part on a doctoral thesis submitted to Universiti Malaya.

Funding

No funding was received for this study.

Conflict of Interest

The authors declare there are no conflicts of interest.

References

Adam, N. L., Alzahri, F. B., Cik Soh, S., Abu Bakar, N., & Mohamad Kamal, N. A. (2017). Self-Regulated Learning and Online Learning: A Systematic Review. In H. Badioze Zaman, P. Robinson, A. F. Smeaton, T. K. Shih, S. Velastin, T. Terutoshi, A. Jaafar, & N. Mohamad Ali (Eds.), *Advances in Visual Informatics* (pp. 143–154). Springer International Publishing. https://doi.org/10.1007/978-3-319-70010-6_14

Albelbisi, N. A. (2019). The role of quality factors in supporting self-regulated learning (SRL) skills in MOOC environment. *Education and Information Technologies*, *24*(2), 1681–1698. https://doi.org/10.1007/s10639-018-09855-2

Andreou, E. (2022). *The Relationship between Private Studio-Based Piano Lessons and Home-Based Private Practice: Case Studies of Young Piano Students* [Doctoral dissertation, University College London]. UCL Discovery. https://discovery.ucl.ac.uk/id/eprint/10145450/

Anthonysamy, L., Koo, A. C., & Hew, S. H. (2020). Self-regulated learning strategies in higher education: Fostering digital literacy for sustainable lifelong learning. *Education and Information Technologies*, *25*(4), 2393–2414. https://doi.org/10.1007/s10639-020-10201-8

Azevedo, R., Moos, D. C., Greene, J. A., Winters, F. I., & Cromley, J. G. (2008). Why is externally-facilitated regulated learning more effective than self-regulated learning with hypermedia? *Educational Technology Research and Development*, *56*(1), 45–72. https://doi.org/10.1007/s11423-007-9067-0

Boekaerts, M., & Cascallar, E. (2006). How Far Have We Moved Toward the Integration of Theory and Practice in Self-Regulation? *Educational Psychology Review*, *18*(3), 199–210. https://doi.org/10.1007/s10648-006-9013-4

Bol, L., & Garner, J. K. (2011). Challenges in supporting self-regulation in distance education environments. *Journal of Computing in Higher Education*, *23*(2), 104–123. https://doi.org/10.1007/s12528-011-9046-7

Bonneville-Roussy, A., & Bouffard, T. (2015). When quantity is not enough: Disentangling the roles of practice time, self-regulation and deliberate practice in musical achievement. *Psychology of Music*, *43*(5), 686–704. https://doi.org/10.1177/0305735614534910

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Browne, K. (2005). Snowball sampling: Using social networks to research non-heterosexual women. *International Journal of Social Research Methodology*, *8*(1), 47–60. https://doi.org/10.1080/1364557032000081663

Buck, M. W. (2008). *The efficacy of SmartMusic® assessment as a teaching and learning tool* [Doctoral dissertation, The University of Southern Mississippi]. ProQuest. https://www.proquest.com/docview/304477234/abstract/BEC9C2A7F2FE42DAPQ/1

Cai, Y. (2019). Duì xiàn shàng gāng qín péi liàn ruǎn jiàn de sī kǎo [Reflections on online piano training software]. *Modern Music*, (6), 163. https://doi.org/CNKI:SUN:DDMU.0.2019-06-070

Chou, C.-Y., & Chang, C.-H. (2021). Developing Adaptive Help-Seeking Regulation Mechanisms for Different Help-Seeking Tendencies. *Educational Technology & Society*, *24*(4), 54–66. https://doi.org/https://www.jstor.org/stable/48629244

Cogdill, S. H. (2015). Applying Research in Motivation and Learning to Music Education: What the Experts Say. *Update: Applications of Research in Music Education*, *33*(2), 49–57. https://doi.org/10.1177/8755123314547909

Cohen, L., Manion, L., & Morrison, K. (2017). *Research Methods in Education* (8th ed.). Routledge. https://doi.org/10.4324/9781315456539

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education, Social Media in Higher Education*, *15*(1), 3–8. https://doi.org/10.1016/j.iheduc.2011.06.002

Dammers, R. J. (2009). Utilizing Internet-Based Videoconferencing for Instrumental Music Lessons. *Update: Applications of Research in Music Education*, *28*(1), 17–24. https://doi.org/10.1177/8755123309344159

Davis, D., Chen, G., Van der Zee, T., Hauff, C., & Houben, G.-J. (2016). Retrieval practice and study planning in MOOCs: Exploring classroom-based self-regulated learning strategies at scale. *European Conference on Technology Enhanced Learning*, *9891*, 57–71. https://doi.org/https://doi.org/10.1007/978-3-319-45153-4_5

Dong, C., Cao, S., & Li, H. (2020). Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes. *Children and Youth Services Review*, *118*, 105440. https://doi.org/10.1016/j.childyouth.2020.105440

dos Santos Silva, C., & Marinho, H. (2025). Self-regulated learning processes of advanced musicians: A PRISMA review. *Musicae Scientiae*, *29*(1), 89–108. https://doi.org/10.1177/10298649241275614

Ejubovic, A., & Puška, A. (2019). Impact of Self-Regulated Learning on Academic Performance and Satisfaction of Students in the Online Environment. *Knowledge*

Management & E-Learning, *11*(3), 345–363. https://doi.org/https://doi.org/10.34105/j.kmel.2019.11.018

Fielding, J., Geiger, V., Miller, J., Bruder, R., Towara, U., & Ratnayake, I. (2022). Using situated expectancy value theory to explore initial teacher education students' motivation to engage with challenging mathematical tasks. *Teaching and Teacher Education*, *113*, 103663. https://doi.org/10.1016/j.tate.2022.103663

Hallam, S., Rinta, T., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T., & Lanipekun, J. (2012). The development of practising strategies in young people. *Psychology of Music*, *40*(5), 652–680. https://doi.org/10.1177/0305735612443868

Hatfield, J. L. (2016). Performing at the Top of One's Musical Game. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.01356

Hatfield, J. L., Halvari, H., & Lemyre, P.-N. (2017). Instrumental practice in the contemporary music academy: A three-phase cycle of Self-Regulated Learning in music students. *Musicae Scientiae*, *21*(3), 316–337. https://doi.org/10.1177/1029864916658342

Hatfield, J. L., & Lemyre, P.-N. (2016). Foundations of Intervention Research in Instrumental Practice. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.02014

Hayes, S., Smith, S. U., & Shea, P. (2015). Expanding Learning Presence to Account for the Direction of Regulative Intent: Self-, Co- and Shared Regulation in Online Learning. *Online Learning*, *19*(3), 15–31.

Hewitt, M. P. (2001). The Effects of Modeling, Self-Evaluation, and Self-Listening on Junior High Instrumentalists' Music Performance and Practice Attitude. *Journal of Research in Music Education*, *49*(4), 307–322. https://doi.org/10.2307/3345614

Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Educational Research Review*, *17*, 63–84. https://doi.org/10.1016/j.edurev.2015.11.002

Huh, Y., Lee, D., & Reigeluth, C. (2024). Teacher supports and technology needs to develop students' self-regulated learning at U.S. K-12 online schools. *Contemporary Educational Technology*, *16*(3), ep523. https://doi.org/10.30935/cedtech/14956

Jin, S.-H., Im, K., Yoo, M., Roll, I., & Seo, K. (2023). Supporting students' self-regulated learning in online learning using artificial intelligence applications. *International Journal of Educational Technology in Higher Education*, *20*(1), 37. https://doi.org/10.1186/s41239-023-00406-5

Kegelaers, J., Hoogkamer, L., & Oudejans, R. R. (2022). Practice and performance management strategies of emerging professional musicians in preparation for orchestra auditions. *Research Studies in Music Education*, *44*(1), 175–191. https://doi.org/10.1177/1321103X211054659

Keller, P. E. (2012). Mental imagery in music performance: Underlying mechanisms and potential benefits. *Annals of the New York Academy of Sciences*, *1252*(1), 206–213. https://doi.org/10.1111/j.1749-6632.2011.06439.x

Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses. *Computers & Education*, *104*, 18–33. https://doi.org/10.1016/j.compedu.2016.10.001

Lee, M., Lee, S. Y., Kim, J. E., & Lee, H. J. (2023). Domain-specific self-regulated learning interventions for elementary school students. *Learning and Instruction*, *88*, 101810. https://doi.org/10.1016/j.learninstruc.2023.101810

Lei, K. (2023). The effectiveness of special apps for online piano lessons. *Interactive Learning Environments*, *31*(10), 7455–7466. https://doi.org/10.1080/10494820.2022.2073373

Liu, Y., Seemuang, J., & Kaenampornpan, P. (2024). Exploring strategies for overcoming teaching challenges and enhancing learning in music education. *International Journal of Social Science Exceptional Research*, *3*(3), 48–52. https://doi.org/https://doi.org/10.54660/IJSSER.2024.3.3.48-52

Longhurst, D. (2024). *Cyclical Patterns of Self-Regulated Learning in College Students* [Doctoral dissertation, Utah State University]. Utah State University Digital Commons. https://digitalcommons.usu.edu/etd2023/276

Lotze, M. (2013). Kinesthetic imagery of musical performance. *Frontiers in Human Neuroscience*, *7*. https://doi.org/10.3389/fnhum.2013.00280

Lu, D. (2025). The Impact of Augmented Reality on Motor Skills in Piano Education: Improving the Left-Hand Technique with AR Piano. *International Journal of Human–Computer Interaction*, *41*(13), 8398–8408. https://doi.org/10.1080/10447318.2024.2408627

Massonnié, J., Frasseto, P., Mareschal, D., & Kirkham, N. Z. (2022). Learning in Noisy Classrooms: Children's Reports of Annoyance and Distraction from Noise are Associated with Individual Differences in Mind-Wandering and Switching skills. *Environment and Behavior*, *54*(1), 58–88. https://doi.org/10.1177/0013916520950277

McPherson, G. E. (2005). From child to musician: Skill development during the beginning stages of learning an instrument. *Psychology of Music*, *33*(1), 5–35. https://doi.org/10.1177/0305735605048012

McPherson, G. E., Nielsen, S. G., & Renwick, J. M. (2013). Self-regulation interventions and the development of music expertise. In H. Bembenutty, T. J. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman* (pp. 355–382). IAP Information Age Publishing. https://psycnet.apa.org/record/2013-11997-012

McPherson, G. E., Osborne, M. S., Evans, P., & Miksza, P. (2019). Applying self-regulated learning microanalysis to study musicians' practice. *Psychology of Music*, *47*(1), 18–32. https://doi.org/10.1177/0305735617731614

McPherson, G. E., & Renwick, J. M. (2013). Self-Regulation and Mastery of Musical Skills. In *Handbook of Self-Regulation of Learning and Performance*. Routledge. https://doi.org/10.4324/9780203839010.ch15

Miao, J., & Ma, L. (2023). Teacher Autonomy Support Influence on Online Learning Engagement: The Mediating Roles of Self-Efficacy and Self-Regulated Learning. *SAGE Open*, *13*(4), 21582440231217737. https://doi.org/10.1177/21582440231217737

Ng, D. T. K., Tan, C. W., & Leung, J. K. L. (2024). Empowering student self-regulated learning and science education through ChatGPT: A pioneering pilot study. *British Journal of Educational Technology*, *55*(4), 1328–1353. https://doi.org/10.1111/bjet.13454

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online Education: Worldwide Status, Challenges, Trends, and Implications. *Journal of Global Information Technology Management*, *21*(4), 233–241. https://doi.org/10.1080/1097198X.2018.1542262

Panadero, E., & Alonso-Tapia, J. (2014). ¿Cómo autorregulan nuestros alumnos? Modelo de Zimmerman sobre estrategias de aprendizaje. *Anales de Psicología*, *30*(2). https://doi.org/10.6018/analesps.30.2.167221

Papamitsiou, Z., & Economides, A. A. (2019). Exploring autonomous learning capacity from a self-regulated learning perspective using learning analytics. *British Journal of Educational Technology*, *50*(6), 3138–3155. https://doi.org/10.1111/bjet.12747

Park, J. I., Lee, I. H., Lee, S. J., Kwon, R. W., Choo, E. A., Nam, H. W., & Lee, J. B. (2023). Effects of music therapy as an alternative treatment on depression in children and adolescents with ADHD by activating serotonin and improving stress coping ability. *BMC Complementary Medicine and Therapies*, *23*(1), 73. https://doi.org/10.1186/s12906-022-03832-6

Peistaraite, U., & Clark, T. (2020). Emotion Regulation Processes Can Benefit Self-Regulated Learning in Classical Musicians. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.568760

Pintrich, P. R. (2000). Chapter 14—The Role of Goal Orientation in Self-Regulated Learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 451–502). Academic Press. https://doi.org/10.1016/B978-012109890-2/50043-3

Redman, B. P. (2022). *The use of videoconferencing and low-latency technologies for instrumental music teaching*. https://doi.org/10.17630/STA/246

Ruan, W. (2024). Increasing student motivation to learn the piano using modern digital technologies: Independent piano learning with the soft Mozart app. *Current Psychology*, *43*(44), 33998–34008. https://doi.org/10.1007/s12144-024-06924-3

Schneider, W. (2008). The Development of Metacognitive Knowledge in Children and Adolescents: Major Trends and Implications for Education. *Mind, Brain, and Education*, *2*(3), 114–121. https://doi.org/10.1111/j.1751-228X.2008.00041.x

Schunk, D. H. (2012). Social cognitive theory. In K. R. Harris, S. Graham, T. Urdan, C. B. McCormick, G. M. Sinatra, & J. Sweller (Eds.), *APA educational psychology handbook, Vol 1: Theories, constructs, and critical issues.* (pp. 101–123). American Psychological Association. https://doi.org/10.1037/13273-005

Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and social cognitive theory. *Contemporary Educational Psychology*, *60*, 101832. https://doi.org/10.1016/j.cedpsych.2019.101832

Song, H., Tsiakas, K., Ham, J., Markopoulos, P., & Barakova, E. I. (2024). 'How Would you Score Yourself?': The Effect of Self-assessment Strategy Through Robots on Children's Motivation and Performance in Piano Practice. *International Journal of Social Robotics*, *16*(2), 327–340. https://doi.org/10.1007/s12369-023-01080-3

Taras, M. (2003). To Feedback or Not to Feedback in Student Self-assessment. *Assessment & Evaluation in Higher Education*, *28*(5), 549–565. https://doi.org/10.1080/02602930301678

Toader, C., Tataru, C. P., Florian, I.-A., Covache-Busuioc, R.-A., Bratu, B.-G., Glavan, L. A., Bordeianu, A., Dumitrascu, D.-I., & Ciurea, A. V. (2023). Cognitive Crescendo: How Music Shapes the Brain's Structure and Function. *Brain Sciences*, *13*(10), 1390. https://doi.org/10.3390/brainsci13101390

Usher, E. L., & Schunk, D. H. (2017). Social Cognitive Theoretical Perspective of Self-Regulation. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of Self-Regulation of Learning and Performance* (2nd ed., pp. 19–35). Routledge.

Uygun, M. A., & Kılınçer, Ö. (2017). Examination of Strategies Fine Arts High School Students Use during the Practice and Learning of Instrumental Music. *Journal of Education and Training Studies*, *5*(4), 178. https://doi.org/10.11114/jets.v5i4.2228

Volioti, G., & Williamon, A. (2021). Performers' discourses on listening to recordings. *Research Studies in Music Education*, *43*(3), 481–497. https://doi.org/10.1177/1321103X19899168

Wan, L., Crawford, R., & Jenkins, L. (2023). Digital Listening Tools to Facilitate Children's Self-Regulation of Instrumental Music Practice. *Journal of Research in Music Education*, *71*(1), 67–90. https://doi.org/10.1177/00224294221093521

Wang, J., Chen, S., & Bai, B. (2025). Cultivating children's online self-regulated learning: The role of parental mediation and support. *Education and Information Technologies*. https://doi.org/10.1007/s10639-025-13555-z

Was, C. A., & Al-Harthy, I. S. (2018). Persistence of overconfidence in young children: Factors that lead to more accurate predictions of memory performance. *European Journal of Developmental Psychology*, *15*(2), 156–171. https://doi.org/10.1080/17405629.2016.1264936

Weiner, B. (2010). The Development of an Attribution-Based Theory of Motivation: A History of Ideas. *Educational Psychologist*, *45*(1), 28–36. https://doi.org/10.1080/00461520903433596

Winnie, P. H. (2010). Improving measurements of self-regulated learning. *Educational Psychologist*, *45*(4), 267–276. https://doi.org/https://doi.org/10.1080/00461520.2010.517150

Wong, J., Baars, M., Davis, D., Van Der Zee, T., Houben, G.-J., & Paas, F. (2019). Supporting Self-Regulated Learning in Online Learning Environments and MOOCs: A Systematic Review. *International Journal of Human–Computer Interaction*, *35*(4–5), 356–373. https://doi.org/https://doi.org/10.1080/10447318.2018.1543084

Xia, M., Poorthuis, A. M. G., & Thomaes, S. (2024). Children's overestimation of performance across age, task, and historical time: A meta-analysis. *Child Development*, *95*(3), 1001–1022. https://doi.org/10.1111/cdev.14042

Xu, L., Duan, P., Padua, S. A., & Li, C. (2022). The impact of self-regulated learning strategies on academic performance for online learning during COVID-19. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1047680

Xu, Y. (2022). *Guó nèi gāng qín péi liàn mó shì yǔ fā zhǎn qū shì yán jiū [Research on the Mode and Development Trend of Domestic Piano Sparring]* [Master's thesis, Shanghai Conservatory of Music]. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202202&filename=1022494695.nh

Zhang, Q. (2020). *Zài xiàn yīn lè péi liàn píng tái "VIP péi liàn" yùn yíng mó shì [Research on the Operation Model of Online Music Pratice Partner "PEILIAN·COM"]* [Master's thesis, Shanghai Conservatory of Music]. https://link.cnki.net/doi/10.27319/d.cnki.gsyyy.2020.000141doi:10.27319/d.cnki.gsyyy.2020.000141

Zimmerman, B. J. (1986). Special issue on self-regulated learning. *Contemporary Educational Psychology*, *11*(4), 305–427.

Zimmerman, B. J. (2000). Chapter 2 - Attaining Self-Regulation: A Social Cognitive Perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 13–39). Academic Press. https://doi.org/10.1016/B978-012109890-2/50031-7

Zimmerman, B. J. (2002). Becoming a Self-Regulated Learner: An Overview. *Theory Into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J., & Campillo, M. (2003). Motivating Self-Regulated Problem Solvers. In J. E. Davidson & R. J. Sternberg (Eds.), *The Psychology of Problem Solving* (pp. 233–262). Cambridge University Press. https://doi.org/10.1017/CBO9780511615771.009

Zimmerman, B. J., & Schunk, D. H. (Eds.). (2011). *Handbook of self-regulation of learning and performance*. Routledge.