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Research article

Measuring Self-efficacy in Music Ensemble class in Secondary School: A Cross-Sectional Study

Medición de la Autoeficacia en la clase de Conjunto Musical en Secundaria: Un estudio transversal

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Abstract
Introduction: Self-efficacy beliefs play an important role in music performance and learning. Despite their importance, few studies have examined self-efficacy in secondary school music students, particularly in ensemble settings. This study aims to explore and measure the self-efficacy levels of secondary school music students participating in ensemble classes. **Methods:** A total of 188 students from the 2nd and 3rd year Compulsory Secondary education participated in the study as part of a school project. To assess their self-efficacy, the Music Performance Self-Efficacy Scale (MPSES) was administered. The results were compared to established reference values for these subscales. **Results:** The findings indicated that (a) the participants'

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self-efficacy scores were significantly lower than the reference values, (b) significant differences in self-efficacy were observed between 2nd and 3rd-year students in two of the subscales, particularly in terms of group interaction and preparation, and (c) no significant gender differences were found. **Conclusion:** This study contributes to a deeper understanding of self-efficacy in music education, particularly in secondary school ensemble settings, and highlights areas for further research and intervention to improve students' musical confidence and performance skills.

Keywords: self-efficacy; secondary school; ensemble; music education; music performance; student confidence.

Resumen
Introducción: Las creencias de autoeficacia desempeñan un papel importante en la interpretación musical. A pesar de su importancia, pocos estudios han examinado la autoeficacia en estudiantes de música de secundaria, particularmente en contextos de conjunto. Este estudio pretende explorar y medir los niveles de autoeficacia de los estudiantes de música de secundaria que participan en clases de conjunto. **Métodos:** Un total de 188 estudiantes de 2º y 3º de Educación Secundaria Obligatoria participaron en el estudio como parte de un proyecto escolar. Se administró la Escala de Autoeficacia en la Interpretación Musical (MPSES). Los resultados se compararon con valores de referencia establecidos para estas subescalas. **Resultados:** Los resultados indicaron que (a) las puntuaciones fueron significativamente más bajas que los valores de referencia, (b) se observaron diferencias significativas en la autoeficacia entre los estudiantes de 2º y 3º curso en dos de las subescalas, y (c) no se encontraron diferencias significativas entre sexos. **Conclusiones:** Este estudio contribuye a una comprensión más profunda de la autoeficacia en la educación musical, en particular en los conjuntos de la escuela secundaria, y pone de relieve las áreas de investigación e intervención para mejorar la confianza musical de los estudiantes y sus habilidades de interpretación.

Palabras clave: autoeficacia; enseñanza secundaria; conjunto; educación musical; interpretación musical; confianza de los alumnos.

1. Introduction

Over time, educational experts have investigated the influence of individual willpower in shaping behavior, persistence, and even achieving significant milestones in human development. In recent decades, findings from cognitive psychology have highlighted the critical role cognition plays in promoting specific actions and behaviors (Hendicks, 2016; Zapata & Canet, 2009). Rather than encouraging students to act, teachers aim to equip them with lasting cognitive tools that will guide their decision-making processes throughout life (Bandura, 1997, 2012).

As students progress in their education, their self-perception evolves based on past experiences and environmental factors, forming what is known as self-concept (Bong et al., 2003; Axpe et al., 2015; Retamero & Botella, 2022). A closely related construct, self-efficacy refers to a student's beliefs in their abilities to successfully perform specific tasks and navigate their learning process (Boon, 2020; Klassen & Usher, 2010). Initially introduced by Bandura (1997), self-efficacy is now a fundamental component of social-cognitive theory, and he defines it as "the conviction that one can successfully execute the behavior required to produce the desired outcome" (p. 79).

Based on previous research, one of the primary benefits of fostering students' self-efficacy is its positive impact on perseverance, self-regulation, and, consequently, academic performance (Bandura, 2012; Zimmerman, 2000). Studies have consistently shown that students who believe in their own abilities to perform specific tasks —especially in the face of setbacks— are more likely to remain motivated and engage actively in the task, investing greater effort and time toward achieving their goals (Bandura, 1997, 2012; Zimmerman, 2000). This belief in one's own abilities serves as a powerful motivator, encouraging persistence and adaptive learning behaviors.

In the field of music education, self-efficacy is particularly important as it is linked to other developmental factors such as self-regulation and increased engagement in both formal and informal practice (McPherson & McCormick, 2006). Musicians with higher levels of self-efficacy tend to demonstrate greater knowledge and skill in music performance compared to their peers with lower self-efficacy (Hendricks, 2016; Hewitt, 2015; McCormick & McPherson, 2003; McPherson & McCormick, 2000). These findings suggest that self-efficacy is not only a predictor of motivation but also of actual performance outcomes in musical contexts.

Moreover, the predictive power of self-efficacy in musical performance has been well-documented in the literature. For instance, McCormick and McPherson (2003, 2006) found that self-efficacy beliefs were significant predictors of musical performance achievement, as students with higher self-efficacy tended to practice more effectively, engage in more deliberate practice, and perform better in evaluations. This highlights the critical role self-efficacy plays in fostering optimal learning environments in music education.

Furthermore, several studies have explored how musical activities can positively influence various psychological variables that are important within the school environment. Researchers such as Eerola and Eerola (2014), Pajares and Kranzler (1995), as well as Pajares (2003), have reported that musical engagement not only enhances students' musical abilities but also contributes to broader cognitive, emotional, and social development. These benefits include improvements in self-esteem, academic motivation, and emotional regulation, which can further support students' overall academic success.

Students may believe they have the necessary skills for some tasks but not for others. In the context of music education, this belief can apply to a wide range of activities, such as playing an instrument, singing, listening, composing, and understanding music theory. Ritchie and Williamon (2010) explored the task-specific nature of self-efficacy by comparing two distinct musical tasks: self-efficacy for music performance and self-efficacy for music learning.

Their findings confirmed that self-efficacy is task-specific, as most participants reported higher levels of self-efficacy for music learning than for music performance, aligning with Zelenak's (2020) suggestion that self-efficacy can vary across different areas of musical activity (Zelenak, 2020, p. 43). Additionally, a recent meta-analysis of 46 studies by Zelenak (2024) confirmed the positive relationship between self-efficacy and achievement, demonstrating that self-efficacy is a malleable construct that can be influenced through targeted interventions.

In this context, school music programs provide a valuable setting for nurturing self-efficacy beliefs. For instance, studies on instrumental performance have shown that students in ensemble settings with higher levels of self-efficacy tend to achieve better outcomes in auditions for competitive ensembles and earn more prestigious chair placements than those with lower self-efficacy (Cahill, 2013). These findings highlight the role of self-efficacy in fostering motivation, persistence, and success in music-related activities.

Given the significant influence of self-efficacy on performance outcomes, the current study seeks to explore how these beliefs manifest in secondary school music students and how they relate to their experiences in ensemble classes.

1.1. Current study

While previous studies have established a strong connection between self-efficacy beliefs and various aspects of musical achievement, including instrumental performance (Clark, 2008; McCormick & McPherson, 2003; Zelenak, 2020), there remains a gap in research specifically examining self-efficacy in music ensemble classes at the secondary school level. Most research to date has focused on adults or individual music skills, with little attention paid to how self-efficacy functions within group dynamics, such as in music ensembles. As such, this study aims to fill this gap by exploring self-efficacy in the context of secondary school music students.

Given the challenges and collaborative nature of ensemble classes, it is crucial to investigate how students' beliefs in their own abilities shape their engagement, motivation, and interactions within a group setting. Understanding these factors is essential for informing teaching strategies and promoting more effective music education.

To guide this study, the following research questions were formulated:

1. How do secondary school music students perceive their own self-efficacy in music ensemble classes?

2. Are there any notable differences in self-efficacy beliefs based on students' grade level (e.g., 2nd year vs. 3rd year)?

3. In what ways does gender influence self-efficacy beliefs in a music ensemble class, if at all?

These questions aim to better understand the complex role of self-efficacy in music education, particularly in collaborative and ensemble contexts, providing insight into how students perceive and use their abilities within a group dynamic.

2. Methods

2.1. Study design

This study aims to investigate self-efficacy beliefs among secondary school students in instrumental music classes. To achieve this, a cross-sectional study design was employed with a non-probabilistic sampling method. The study adhered to the international guidelines for the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (von Elm et al., 2008), ensuring transparency and consistency in reporting. All participants were provided with a detailed explanation of the study's procedures, and the study was carried out in accordance with the ethical standards set out in the Declaration of Helsinki.

2.2. Participants

The study was conducted in a semi-private school located on the outskirts of Valencia, Spain. Semi-private schools in Spain are funded by both the State and private contributions, offering an interesting blend of public and private educational experiences.

The participants were students enrolled in Compulsory Secondary Education (ESO), which spans four academic years, with students typically ranging from 12 to 16 years of age.

A total of 188 students participated in the study: 140 students from 2nd year (ages 12-13) and 48 students from 3rd year (ages 13-14). The final sample included 110 male students and 78 female students. No dropouts were recorded throughout the study, and all students completed the assessment.

The participants were recruited in May 2024, with the data collection protocol being finalized in September 2023.

2.3. Inclusion and Exclusion Criteria

The inclusion criteria were:

- Students enrolled in the 2nd (ages 12-13) and 3rd (ages 13-14) year of Compulsory Secondary Education.

Exclusion criteria included:

- Students who lacked sufficient proficiency in Spanish to understand and follow the instructions for the study measures.

- Students who were enrolled in Official Conservatories of Music or similar institutions, as these students could be exempt from the music curriculum at their school, making them ineligible for the study.

Despite being given the option to opt out, no students chose to withdraw from the study.

2.4. Outcome measures

The instrument used was the Music Performance Self-Efficacy Scale (MPSES) developed by Zelenak (2020), a 24-item instrument designed to measure beliefs related to music performance across four dimensions: Enactive Mastery Experience, Vicarious Experience, Verbal/Social Persuasion, and Physiological and Affective States. Participants responded to each item using a continuous Likert-type scale ranging from 1 (Strongly Disagree) to 100 (Strongly Agree). Higher scores reflect greater self-efficacy in each domain. Subscale and total scores were calculated by summing item responses.

These four dimensions are fundamental in understanding how students evaluate their ability to perform musical tasks. Based on Bandura's (1997) theory of self-efficacy, these dimensions reflect different sources of self-efficacy. Below is a detailed description of the four dimensions of the scale:

a) **Enactive Mastery Experience:** This dimension assesses the impact of students' direct experiences of success or failure in music performance. The items in this category (1, 4, 6, 8, 10, 12, 14, 16) are designed to measure how students feel about their ability to perform a musical task based on their past personal experiences. Previous successes in music performance often serve as one of the most powerful sources of self-efficacy, reinforcing students' belief in their ability to perform similar tasks in the future.

c) **Vicarious Experience:** Items (2, 5, 11, 18, 20) in this category measure the influence of observing others, such as peers or professional musicians. Seeing others successfully complete similar musical tasks can instill confidence in students, particularly when they see someone like themselves succeed. This dimension reflects the role of role models in shaping self-efficacy, and is especially relevant in collaborative learning environments, such as music ensemble classes.

d) **Verbal/Social Persuasion:** Social persuasion involves positive reinforcement and constructive feedback students receive from teachers, peers, or family members. Items (3, 7, 9, 13, 21, 22) measure how encouragement or suggestions for improvement influence students' perceptions of their abilities. This dimension is closely related to motivation, as social feedback can boost students' confidence, helping them overcome doubts or frustration during their musical learning process.

e) **Physiological and Affective States:** This dimension (items 15, 17, 19, 23, 24) assesses how students' emotional and physiological responses (such as nervousness, anxiety, or enjoyment) affect their perception of ability in musical performance situations. For instance, a student may experience anxiety before a performance, which could diminish their belief in their capabilities, or they may feel highly energized or focused, increasing their confidence in performance. Emotional and physiological states are crucial factors that affect both preparation and actual performance outcomes.

Each of these dimensions significantly influence the development of self-efficacy, which in turn affects students' music performance. For example, the direct experience of success (enactive mastery experience) has a profound impact on intrinsic motivation and persistence in the face of challenges. Observing successful role models and receiving positive feedback also play a crucial role in strengthening self-efficacy beliefs, especially for students encountering difficulties in their learning. Finally, emotional regulation and the ability to manage stress during performances are essential factors contributing to success or failure in music interpretation.

2.5. Procedure

We initially contacted the school's management, who directed us to the secondary music teacher. After providing an overview of the study, we reached a collaborative agreement to proceed with the research. The main researcher was informed about the school's long-standing tradition of annual concert projects. In the 2023-2024 academic year, students participated in a musical initiative called "Music for Inclusion". This project aimed to foster collaboration between secondary music students and special education needs (SEN) students from a partner institution. The project encouraged students to work toward a common goal: a musical concert where secondary students performed alongside their SEN peers. They rehearsed and performed the same pieces together, promoting inclusivity and shared musical experience.

The project involved eight participant groups—five from 2nd year, two from 3rd year, and one from the SEN group—with performances interspersed among them. The teacher, adhering to the Spanish curriculum, divided the academic year into three blocks: the first (September to November), second (December to February), and third (March to concert date). Music classes took place twice a week, with the same structure applied for both 2nd and 3rd-year students, except for the instrument assignments, as 3rd-year students continued playing the same instrument chosen the previous year.

The first semester, beginning in September 2023, was dedicated to reviewing basic musical concepts, followed by practicing simpler pieces to consolidate prior learning. By the end of the first semester, students were introduced to more advanced concepts such as keys, intervals, scales, and ledger lines. A sight-reading test was conducted to assess students' progress. In the second semester, students were assigned instruments based on their preferences and skill levels. After this, they moved on to selecting the repertoire for the concert, with the teacher presenting a variety of musical pieces in different styles. A survey was conducted to allow students to vote on the final choice of work. From this point onward, the classes primarily focused on rehearsals, with the teacher leading the sessions and interspersing minor non-concert activities to cover other aspects of the curriculum.

Ethical approval was obtained in accordance with the institutional procedures, ensuring adherence to ethical standards for research involving human participants. All participants' questionnaires were anonymized to protect their privacy and confidentiality. In line with ethical guidelines, informed consent was obtained from the parents of all participants, ensuring they were fully aware of the study's purpose and procedures. Participation was entirely voluntary, and no material incentives were offered for taking part. Additionally, participants were informed that they could withdraw from the study at any time without any consequences. All data collected was handled with care and stored securely to maintain confidentiality.

2.6. Statistical analysis

The sociodemographic and clinical variables of the participants were analyzed using the Statistics Package for Social Sciences (SPSS 24, IBM). An independent samples Student's t-test was used to compare questionnaire scores between two academic courses and between genders. Cohen's *d* effect sizes were calculated for multiple comparisons of the outcome variables. According to Cohen's method, the magnitude of the effect was classified as small (0.20–0.49), medium (0.50–0.79) or large (0.80).

3. Results

3.1. Self-efficacy in music students

Participants showed a total score of 1679 ± 358. In terms of subscales, participants scored 483 ± 131 in enactive mastery experience, 306 ± 113 in vicarious experience, 448 ±113 in verbal/social persuasion and 381 ± 82.5 in physiological and affective states (Table 1).

Table 1.

Results of MPSES Scale

	Enactive mastery experience	Vicarious experience	Verbal/social persuasion	Physiological and affective states	Total score
Mean	483	306	448	381	1679
Standard Deviation	131	113	113	82.5	358
Minimum	95.0	0	85	135	750
Maximum	700	500	600	500	2335

Source: Subscale scores are based on the Music Performance Self-Efficacy Scale (Zelenak, 2020). See Outcome Measures for full description.

Differences between course and gender

Between-group comparisons revealed statistically significant differences based on course level (second-year vs third-year students) in the enactive mastery experience and vicarious experience domains, with third-year students scoring higher. Specifically, the t-test showed significant differences for enactive mastery experience ($t = 2.312$, $p = 0.022$, $d = -0.39$) and vicarious experience ($t = -2.538$, $p = 0.012$, $d = -0.42$) (Table 2). However, no significant differences were found in verbal/social persuasion, physiological and affective states, and total score (Table 2 and Figure 1). Finally, no gender differences were observed ($p > 0.05$)

Table 2.

Main differences between group years (2^{nd} vs. 3^{rd})

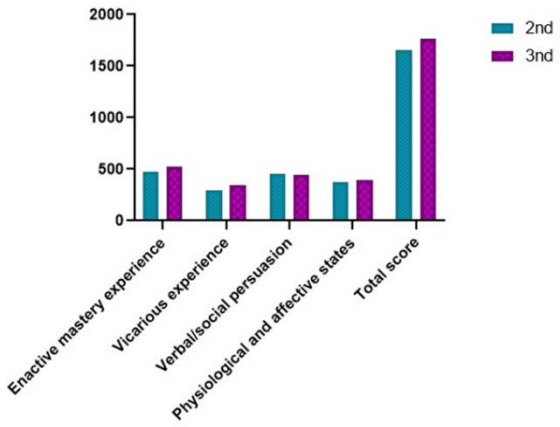
	Statistic (Student's t)	*p*	Mean difference	Effect Size (*d*)	η^2
Enactive mastery experience	-2.312	0.022	-50.20	-0.3867	0.028
Vicarious experience	-2.538	0.012	-47.30	-0.4246	0.033
Verbal/social persuasion	0.437	0.662	8.27	0.0732	0.002
Physiological and affective states	-1.596	0.112	-21.94	-0.2669	0.015
Total score	-1.873	0.063	-111.36	-0.3132	0.022

Source: Own elaboration.

4. Discussion

Figure 1.

Main differences between 2nd and 3rd students



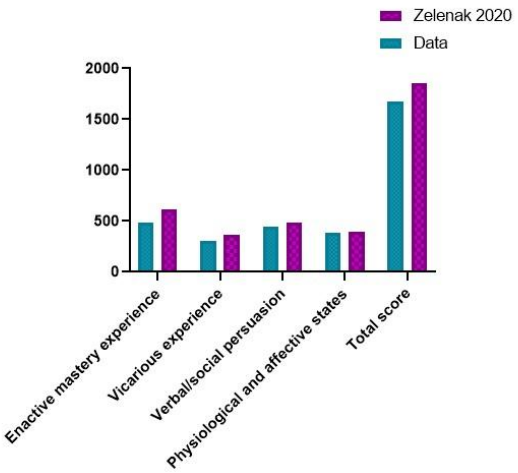
Source: Own elaboration.

4.1. Main findings

The primary aim of this cross-sectional study was to examine self-efficacy levels among secondary school music students in ensemble classes. Overall, 188 participants scored below the reference values established by Zelenak (2020), which were based on a study of 290 middle and high school bands, chorus, and string orchestra students. Zelenak's research provided a set of reference scores for comparison purposes. Accordingly, Figure 2 illustrates the comparison of the cumulative score and the four self-efficacy sources.

Figure 2.

Overall and four subscales result compared to reference values



Source: Own elaboration.

Considering that no specific strategies to enhance self-efficacy were implemented during the lessons, these results are not unexpected. They align with previous research suggesting that most music students may not have received explicit instruction on how to develop self-efficacy in their musical practice (Creech & Gaunt, 2013; Miksza et al., 2018). Consequently, it is plausible to hypothesize that the predominance of teacher-centered instruction in secondary school ensembles could contribute to lower self-efficacy levels. Additionally, McPherson and McCormick (2000) emphasized that self-efficacy is task-specific rather than a general trait. In this regard, it is important to note that no data on general self-efficacy was collected in this study.

Regarding the second research question, statistically significant differences were found between 2nd- and 3rd-year secondary students. Specifically, the latter scored higher in two sources of self-efficacy: enactive mastery experience and vicarious experience. According to previous studies in music education (McPherson & McCormick, 2006), enactive mastery experience develops over time as students are required to tackle increasingly challenging tasks. In this sense, 3rd-year students were likely more familiar with this type of project, having participated in a similar one the previous year. Additionally, another possible explanation could be the students' interest and motivation in the subject. While music is a compulsory subject in the 2nd year, it becomes an elective in the 3rd year, meaning that those who chose it may have been more intrinsically motivated. In this context, psychological research supports the notion that intrinsic motivation enhances learning outcomes (Butler, 2022; Woody, 2021).

Regarding vicarious experience, research suggests that not all students respond positively to learning situations that involve comparison with others. Specifically, students ranked against each other in competitive musical settings may experience negative impacts on their vicarious experiences, leading to decreased confidence (Hendricks, 2016). In contrast, our participants engaged in a collaborative, non-competitive environment, where the focus was on collectively accomplishing the project's main objective. This cooperative setting may have mitigated any negative effects of comparison, potentially contributing to the higher scores observed in vicarious experience.

As for gender differences in self-efficacy within music, previous research has yielded mixed results. While some studies have reported no significant differences between male and female students (Clark, 2008; White, 2010), others have identified disparities, often suggesting that male students may exhibit higher self-efficacy in certain musical contexts (Hewitt, 2015; Randles, 2011). In our study, no significant gender differences were found ($p > 0.05$), suggesting that the inclusive and collaborative nature of the learning environment may have helped create an equitable experience for all students.

4.2. Limitations

This research study has several limitations that should be considered when interpreting the results. First, the cross-sectional nature of this study makes it impossible to establish causality. As this was a study carried out in a secondary school located in the city of Valencia, results are limited by geography. Second, the study's sample size could be considered small, however, the results can be used to calculate the sample size for future studies that wish to replicate this investigation. Third, it would have been interesting to measure other variables to find out if there is an association between self-efficacy levels and academic attainment. For instance, researchers interested in continuing investigation of self-efficacy beliefs in music performance in secondary school may go deeper into its relationship with music performance.

4.3. Future research

Future research could explore interventions specifically designed to enhance self-efficacy in ensemble contexts, considering both the task-specific and general aspects of this construct. To strengthen the validity of such studies, experimental designs should incorporate random sampling and large sample sizes to establish causality, while longitudinal approaches are essential to assess the stability and long-term effectiveness of these interventions. Expanding the scope to include diverse cultural contexts and educational systems could also provide a more comprehensive understanding of how self-efficacy beliefs develop and influence music education outcomes. Additionally, examining the role of peer dynamics, instructor feedback, and individual differences in shaping self-efficacy could further clarify the complexities of this construct. These efforts could inform more effective pedagogical strategies, fostering greater confidence, motivation, and achievement among music students.

5. Conclusions

This study offers valuable insights into the role of self-efficacy beliefs in the context of secondary school music education, particularly within ensemble settings. The findings underscore the nuanced and multifaceted nature of self-efficacy, suggesting that it is not a static trait but a dynamic construct influenced by experience, environment, and individual differences. The observed differences between 2nd and 3rd-year students highlight the developmental aspect of self-efficacy, as increased exposure to collaborative musical experiences appears to strengthen students' belief in their abilities.

This progression suggests the potential of ensemble classes to foster self-efficacy over time when students are engaged in supportive, non-competitive environments. Moreover, the absence of significant gender differences in self-efficacy aligns with the idea that inclusive and cooperative learning contexts can help mitigate potential disparities, promoting an equitable space for all students to build confidence and motivation. Given the relevance of self-efficacy in shaping student motivation, persistence, and performance, it is crucial for educators to consider strategies that actively promote students' belief in their abilities. Intentional efforts to provide positive feedback, encourage peer modeling, and create meaningful performance opportunities can help strengthen self-efficacy, enhancing students' musical learning experiences and overall personal development.

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