Studies in Educational Management
2026(19)35–55

Research Article
https://doi.org/10.32038/sem.2026.19.03

Effect of Integrated Teaching Method on Elementary Students' Academic Self-Efficacy, Academic Engagement, and Academic Performance

Ali Sheykholeslami *, Maryam Ghadimi, Komeil Parsa

Department of Counseling, Faculty of Educational Sciences and Psychology, University of Mohaghegh Ardabili, Ardabil, Iran

Received: 14 September 2025 | *Revised:* 08 February 2025 | *Accepted*: 19 *April 2026*

Keywords:
Integrated Teaching Method, Academic Self-Efficacy, Academic Engagement, Academic Performance, Elementary Students

Corresponding author:
Ali Sheykholeslami
a_sheikholslamy@yahoo.com

JEL classification
O33; O44; Q55; Q56; R11

ABSTRACT

Although the findings of teaching method studies conducted to date have offered insights into the positive influence of novel teaching strategies on improving students' academic performance, there is no conclusive evidence addressing the effect of integrated teaching methods on pupil's academic self-efficacy, academic engagement, and academic performance. This study compares the differential effects of employing an integrated teaching method on enhancing primary school students' academic attitudes. To set the scene, 40 6th-grade students were randomly assigned to two groups: an experimental group trained using the integrated teaching method (n = 20) and a control group that stuck to the traditional teaching method (n = 20). The participating groups took Jinks and Morgan's academic self-efficacy, Fredricks and Blumenfield's academic engagement, and teacher-made academic performance pretests. Having completed 8 sessions of integrated teaching, students took the aforementioned tests as posttests. The data analysis demonstrated the effectiveness of the integrated teaching method in increasing the variables, as the participants in the control group outperformed them. The findings of the study act as a driving force for potential educational implications which are discussed in detail.

How to cite this article:
Sheykholeslami, A., Ghadimi, M., & Parsa, K. (2026). Effect of integrated teaching method on elementary students' academic self-efficacy, academic engagement, and academic performance. *Studies in Educational Management*, *19*, 35-55. https://doi.org/10.32038/sem.2026.19.03

Introduction

It goes without saying that the development of a country is in an intimate correlation with people who possess essential skills. Given that education is one of the most substantial paths for strengthening skills, the education system in every country emphasizes educating adolescents (Klassen et al., 2021). Adolescents spend a major part of their lives in school while experiencing multiple learning designs, developing important skills, and laying the foundation for their future careers. Notably, academic performance measures are of paramount importance in paving the way for future educational and professional development, specifically during this age span (Mammadov & Schroeder, 2023). Storch (2007) claimed that academic performance is the net result of evaluation tests, while previous psychological and educational researchers have studied a variety of elements that affect students' academic performance, namely personality, cognitive ability, peer relationships, positive and negative emotions, and school environment. Academic self-efficacy, defined as an individual's belief and capacity to execute essential actions to accomplish desired academic outcomes, consists of optimizing social, cognitive, behavioral, and emotional resources that are of primary importance for academic achievement (Artino, 2012; Schunk & DiBenedetto, 2022). Research has shown that students who hold a higher sense of self-efficacy are more likely to prioritize tasks effectively, avoid procrastination while exhibiting resilience in the face of setbacks, more importantly, dedicate a great amount of effort to their studies as the most important prerequisite of academic performance (Affuso et al., 2023; Honicke & Broadbent, 2016; Khine & Nielsen, 2022; Zhu, 2026) and should be considered in the process of designing an educational program. Stated differently, instructors are advised to create a learning environment for the pupil that would enhance confidence in learning and in being successful (Sihotang et al., 2017). More importantly, educating skilled students is not totally possible unless they are motivated. Academic engagement is a definite, satisfying, vitalizing, and study-based disposition in which students are motivated to participate in the learning process (Schaufeli et al., 2002). Three dimensions have laid the ground for academic engagement, including, vigor, dedication, and absorption. Vigor involves the energy and excitement generated by students' studies and the anticipation of attending classes. Dedication represents the inspiration and pride students experience during their studies. Last, but not least, absorption indicates the pleasure derived from full engagement in their studies and learning. In effect, they lose track of time when they are passionate about studying (Carmona-Halty et al., 2021). Academic engagement is seen as a substantial outcome of education since it enhances students' involvement in academic activities (Greenwood et al., 2002), reduces the risk of dropout (Lei et al., 2022), and fosters well-being (Tayama et al., 2019). In the same vein, academic engagement enhances academic performance (Guo et al., 2026; Kwon et al., 2018) and aligns with students' motivation to study hard (Ketonen et al., 2016). Regarding the increasing demand for synthesizing the aforementioned skills, which can help students become more confident in their ability to accomplish academic assignments, it is not sufficient to simply memorize knowledge through traditional teaching methods (Shin, 2018; Wu et al., 2018). It is necessary to develop higher-order, complex skills to meet challenges resiliently, which require self-management, active participation in the teaching process,

collaboration, critical thinking, and communication (Frydenberg & Andone, 2011). Because conventional methods of teaching and prediction fall short of capturing the dynamics of a student's capacity to build a prosperous professional career (Bernacki et al., 2020), this calls for an innovative teaching method. Therefore, implementing models that motivate and involve students in the classroom so they can reap the benefits of their success has become essential as instructors and policymakers seek to improve the learning process (Alazemi et al., 2023). Scholars have reported a significant correlation between the minimum interaction of the students in the classroom and poor concentration and motivation, which results in an increasing level of anxiety and stress symptoms, and consequently disappointing academic performance (Sinval et al., 2025). To foster students' engagement, motivation, and concentration while reducing learning anxiety and improving their academic performance, a combination of a game with the study unit or another favorite subject is recommended (Hainey et al., 2016). An integrated teaching method, as an innovative approach, combines pertinent elements from different subjects in educational activities (Wang & Wang, 2023). It is a novel concept that leverages the integration of games and academic objectives to stimulate, engage, and evaluate students' academic performance (Chans & Portuguez Castro, 2021; Partovi & Razavi, 2019). Gamification, as an approach to integrated education, offers diverse benefits, including student engagement in the learning process, keeping them active in medical learning contexts (Pesare et al., 2016), and motivating them to learn new concepts (Chans & Portuguez Castro, 2021). Regardless of the theoretical background that provides insight into the undeniable effect of integrating complicated subjects with physical activity on students' motivation and academic performance and influential function (Zang et al., 2024), substantial proportion remains unaccounted for the applied research on the favorable effect of integrated teaching method on students' ASE, AE, and AP within the scope of a mechanism of prediction.

This study's primary goal is to design a novel teaching program based on an integrated teaching method to create a deep-learning-based model by taking into account that it can help to open the door for better results in improving the students' ASE, AE, and AP, and in turn, a promising future for the students of elementary school. While scholars have primarily explored multiple factors influencing academic self-efficacy that take credit for shaping or reshaping students' perceptions, decisions, and actions as a result (Bandura, 1997; Hinduja et al., 2024), regrettably, research remain inconclusive regarding exploring the effect of integrated teaching method on educational attitudes comprehensively and the amount of research in the context of individualized teaching is very limited especially in developing countries like Iran. What is more, students' academic performance has declined in studies investigating academic performance (Iqbal et al., 2021), while they remain indecisive about their future (Zahoor & Mahmood, 2023). To bridge this lacuna, our study aims to investigate students' academic self-efficacy, engagement, and performance by employing an integrated teaching method in the primary stage of school.

Literature Review

Integrated Teaching Method

The accelerated growth of globalization and its sophisticated expectations set the stage for more complex challenges that require multiple skills, disciplines, and concepts to address them

(Bewersdorff et al., 2025). Students face diverse problems every day, and only some of them see these dilemmas as challenges and consequently overcome them. As previously stated, given the significant impact of self-efficacy on the complexity of educational problems, developing a framework to enhance students' confidence cannot be overlooked. This is why a multidisciplinary structure within formal schooling is necessary, one that grounds the arguments for designing an integrated teaching structure (Arthur et al., 2026). More importantly, Bauersfeld et al. (2026) indicated that integrated teaching approaches facilitate the integration of multiple knowledge to allow learners to combine them into a single coherent structure. Developing a connection between prior knowledge and novel skills is a prerequisite for meaningful learning when synthesizing different subjects. Under this view, the artificial separation of subjects deprives students of the joy of solving their problems based on what they have learned, as they are unable to build a bridge through their knowledge. Researchers agree that, by reason of integrated education, building the foundation for authentic learning, it is imperative to design an integrated system to engage students (Hartt et al., 2020). According to Drake and Burns (2004) and Drake and Reid (2020), curriculum integration is described through three approaches, namely, multidisciplinary, interdisciplinary, and transdisciplinary, with the clear definition that no position is superior to another; yet, the appropriateness of each stands out from others by the context in which they are being employed. Multidisciplinary approaches are characterized by using a theme to make meaningful connections between subjects, with the identifiable aspects of each discipline within the curriculum. In interdisciplinary approaches, the subjects are interconnected beyond a theme with a special focus on interdisciplinary skills and content. Stated differently, the subjects are too connected to be distinguished from one another. Lastly, transdisciplinary approaches connect social, environmental, political, international, and economic concerns by using real-world issues as the center of attention, not subjects.

Academic Self-Efficacy

Self-efficacy is conceptualized as an individual's convictions about executing a course of tasks within a required deadline (Bandura, 1997). Academic self-efficacy, a subset of self-efficacy, is defined as one's confidence in their ability to achieve a desired goal in academic tasks across varying levels of difficulty and distinct circumstances (Ford et al., 2023). A previous study conducted by Codella et al. (2020) confirmed the direct influence of academic self-efficacy on students' motivation and learning. In a similar vein, Sevgi (2026) showed that students with higher self-efficacy can mitigate the adverse impact of uncertainty by adopting adaptive coping behaviors. According to Affuso et al. (2025), Martos Martínez et al. (2021), Weber and Harzer (2022), and Zeinalipour (2022), a significant correlation has been proposed between academic self-efficacy and academic performance. In addition, Kahn and Nauta (2001) have reported that students who hold strong beliefs about their ability to succeed exhibit a greater amount of eagerness and resilience in performing their academic tasks and eventually are more self-confident, which sheds light on the pivotal role of academic self-efficacy in predicting students' academic performance in educational levels up to 14 percent. Strong self-efficacy influences learners to behave in ways that are promising for enhancing their academic performance (Travis et al., 2020). Moreover, students

are more likely to put effort into their educational assignments if they have a high level of academic self-efficacy. In marked contrast, students with low academic self-efficacy tend to overestimate the complexity of the tasks needed to successfully perform, and, as a reprehensible effect, poor academic performance. In general, recent research has shown an association between academic self-efficacy, academic engagement, motivation, effort, and ultimately success (Yuksel & Baily, 2024) and academic performance on the grounds that academic self-efficacy accurately predicts class participation and avoidant coping (Bai et al., 2022; Lei et al., 2022). Empirical research indicates that school performance can be predicted by academic self-efficacy (Honicke & Broadbent, 2016). On the other hand, low self-efficacy can lead to less commitment to completing school-related tasks, non-adaptive academic behaviors, poor academic performance, and burnout (Liu et al., 2026; Vogel & Human-Vogel, 2016). Unwilling academic performance and difficulty coping with educational requirements, which affect students' mental health and future, are the result of low levels of self-efficacy (Cassidy, 2015). As put by Su et al. (2018), self-efficacious students are typically able to achieve higher educational scores because their confidence positively influences their effort during classroom activities. Additionally, Yang et al. (2022) reported that students who believe in themselves are better able to sustain academic strain and are less prone to procrastinate.

Academic Engagement

Engagement, as a multidimensional construct, impacts students' behavior, cognition, and motivation (Sharma & Bhaumik, 2013). Engagement has been characterized as one of the most important drives in initiating behaviors in which a certain goal is being set, followed, and reached from a psychological angle. Engagement in education leads students to participate in the learning process as the main factor (Perkmann et al., 2021). As noted by Fredricks et al. (2004), engagement is a malleable and dynamic construct which includes cognitive, behavioral, and emotional domains as an integrated whole and aligns with Schaufeli's model of engagement on the grounds that these are two complementary models that are reliable for use in diverse empirical research. Student involvement in academic activities is conceptualized as cognitive engagement and enthusiasm (Alonso-Tapia et al., 2023; Pintrich & Schragben, 2012). It is also noteworthy that Fredricks et al. (2004) illustrated that academic engagement positively influenced students' positive attributions, persistence, and flexibility in the context of learning. Widely conducted empirical research has laid the groundwork, articulating the association and underscoring the contribution of academic engagement to the mental and physical well-being of the learner. As such, Hosseinmardi et al. (2022) found reciprocal correlations among academic engagement, learners' motivation, and school engagement. Also, the research done by Xerri et al. (2018) investigated the elements influencing academic engagement. Peer relationships, the student-teacher relationship, students' sense of purpose, and their willingness to continue higher education are among the factors that the academic engagement depends on. Namaziandost et al. (2023) conducted a study that confirmed that emotional regulation plays a mediating role in enhancing engagement, self-efficacy, and anger in higher education. Cong et al. (2024), Liu et al. (2018), and Schunk and Mullen (2012) concluded

that academic engagement is positively related to stimulation, self-efficacy, self-control, satisfaction, and emotion.

Academic Performance

Citizenry's optimal performance in the academic domain is the most fundamental metric for measuring a prosperous society's progress (Glewwe & Kremer, 2006). This is why scholars have conducted numerous studies to identify the factors that can determine academic performance. Asif et al. (2017) represented that university exam marks accurately predict students' performance. A data mining study was used by Mishra et al. (2014) to predict students' academic performance. Honick and Broadbent (2016) explored the elements that affect academic performance and found that self-efficacy, as a factor that builds confidence to try hard, knowing that they will be successful, is of paramount importance in predicting academic performance. Tong et al. (2022) concluded that applying an integrated teaching method fosters students' academic performance in self-regulation and reading. As noted by Yang et al. (2019), an integrated teaching method has a positive effect on students' academic performance in rural areas. Vo et al. (2017) demonstrated that academic performance is significantly affected by an integrated teaching method, especially in higher grades.

The Study

Previous research has presented evidence suggesting that integrated teaching method results in enhancing students' academic performance (e.g., Bimbola & Daniel, 2010; Doraisamy & Radhakrishnan, 2013; Vashe et al., 2019), academic engagement, self-efficacy, problem-solving, malleability, and, self-regulating of the learners (Fitriani et al., 2020), academic achievement, cognitive performance, and science process skills (Rahmiwati et al., 2022), reading strategies and active memory of the elementary school students (Guthrie et al., 2000) but the research remain inconclusive regarding the joint result of integrated teaching method on academic self-efficacy, engagement and performance in sixth grade. Our proposed model integrates all subjects to build a foundation for meaningful learning about fractions in math, the only one of its kind in Iran.

Method

This study was conducted to assess the effect of an integrated teaching method on students' academic self-efficacy, engagement, and performance based on exploring the learning process and completed tests by students. The following are the research questions addressed in the study:

RQ_1: Does the integrated teaching method impact students' academic self-efficacy in sixth grade?

We examined the influence of an integrated teaching method on students' academic self-efficacy as the first research question in this study. More importantly, we sought to demonstrate the influence of this strategy on elementary school students within the examination of their attitudes to determine if they were capable of being more confident about their capacity to execute an educational task and to believe that they can complete an assignment successfully or not. We hypothesized that, because the integrated teaching method includes all subjects, we will benefit

from students' attention during their favorite lessons. Based on their initial motivation to learn, they will be self-efficacious in completing the academic tasks they are asked to do.

RQ_2: Does the integrated teaching method in sixth grade impact students' academic engagement after being exposed to it for 8 sessions?

In the second research question, we ought to investigate whether the augmentation of the integrated teaching method increased the level of academic engagement among students in the experimental group at the conclusion of the training. We hypothesized that academic engagement would be significantly higher in the experimental group. This hypothesis is based on active participation of the students in the process of learning. Previous research has demonstrated that a better learning solution can be obtained by dividing subjects and complicated skills (Luft, 2005) and integrated with other subjects as an individualization learner-oriented strategy and the influence of this method can be seen in enhanced academic performance (Sharma et al., 2017).

RQ_3: Does the integration of subjects in sixth grade impact students' academic performance?

In the last question of this research, we focused on investigating the academic performance of the experimental group based on their scores on a researcher-designed test with embedded questions focused on what has been taught through this method. We hypothesized that, considering that previous research has provided several pieces of evidence about the factors influencing academic performance, such as academic self-efficacy (Feldman & Kubota, 2015) and academic engagement (Schellenberg & Bailis, 2015), providing novel teaching methods, including an integrated teaching method as a meaningful learning strategy, would significantly increase the academic performance of the students in sixth grade.

The present study utilized a semi-experimental approach, wherein a prospective study of 2 teaching designs compared the objectives of the research: the experimental group underwent integrated teaching method training (see Table 1 for full demographic information), and the control group. For the remainder of this paper, the students who were administered with the integrated teaching method will be referred to as group A, and those with the traditional teaching method will be referred to as group B. To evaluate the academic performance of the math subject in sixth grade, academic self-efficacy, and academic engagement in elementary school, a pretest and posttest design with a control group was adapted. Participants were all male sixth-grade students from Namin state's public schools. Study participants were then selected into two classes of twenty students by random sampling with available sampling methods. Both groups were briefly informed about the process and the purpose of the study, and then they were given the Academic Self-efficacy Questionnaire of Jinks and Morghan (1999), the Academic Engagement Questionnaire of Fredricks and Blumenfield (2004), and a researcher-designed paper-and-pencil test to evaluate the initial objectives of the study as a pretest to collect primary data sources to work with. Completing the tests ranged from 45 to 60 minutes. Relatedly, to explore the influence of an integrated teaching method, the experimental group participants received a researcher-designed integrated teaching strategy in which the challenging subject of fractions was synthesized with all of the other subjects within a one-hour-long plan consisting of 8 sessions. Comparatively, the control group continued

to study using the same traditional method they had used before. After 8 sessions, each of the groups completed all three tests as posttest.

Table 1

Demographic Summary of Teaching sessions of Fractions in Mathematics Integrated with Physical Education, Science, Literature, Art, Theology, and Social Siences

Equipment: Ball, Gate/cone, Notebook, Pencil		
Sessions	Content	Objectives
First	1. I greeted students and informed them about teaching sessions 2. I informed the students about a surprising game and had them come to the yard to play penalties as *how many did you get?* 3. Then I asked them to stay in a raw knowing that they will be given 10 penalty opportunites and they will have to try to turn them into as many goals as they can without missing and while waiting, they will have to cheer each other up and encourage their friends. 4. Having all the penalties done, I asked them to write down *how many they got* of ten penalties with a beautiful handwriting.	▪ Motivating ▪ Active Engagement while learning ▪ Heighten Confidence ▪ Encouraging Each Other ▪ Sentence Making ▪ Enhancing Handwriting ▪ Enthusiasm
Second	1. I asked them to write their sentences without any order on the board. 2. Then I asked them what we could do to organize all this data since I wanted them to come up with drawing a table as we were going to learn about classification of data in science subject.	▪ Drawing table and classification ▪ Valuing their sentences to build their confidence
Third	1. I asked them to write a funny story about what happened yesterday and certainly mention five of their and their goals	▪ Reminiscing ▪ Story writing ▪ Story telling
Fourth	1. I asked them to turn their writings into numbers in their group as I taught them for easier applicability 2. As I was talking about the importance of friendship and helping each other, first, the student who had made all 10 penalties as goals were praised and then the ones with less goals were mentioned. Since the most important aim of this session was teaching add up fractions with uneven denominators according to friendship, I had them plus their fractions in order to reach to a whole.	▪ Using Numbers Correctly ▪ Friendship ▪ Adding Fractions ▪ Academic engagement
Fifth	1. Then we wrote fractions with different denominators and as it was not fair to plus the penalties with different denominators, we reached the concept of reduction to common denominator	▪ Understanding the abstract of justice through math
Sixth	1. I asked them to set 7 goals for each day of a week and to check how many they got at the end of the week.	▪ Goal setting ▪ Real life- related goals
Seventh	1. I asked them to select a part of this method in which they were most excited and provide a conference about what they have learnt. 2. Then I asked them to find different ways to learn fractions other than this.	▪ Self-efficacy ▪ Creativity ▪ Critical thinking
Eighth	1. Posttest of each variable were completed by students.	▪ Evaluation

Results

The ultimate goal of this research was to examine whether an integrated teaching method affects students' academic self-efficacy, academic engagement, and academic performance by conducting a statistical analysis in SPSS (V21).

Table 2

Descriptive Statistics of Academic Self-Efficacy in Pretest and Posttest

Groups	Statistic	Pretest	Posttest
Experimental	*M*	52.6	60.15
	SD	4.16	3.90
Control	*M*	52.05	52.60
	SD	5.98	4.74

As presented in Table 2, the mean and standard deviation of academic self-efficacy in the experimental group is 52.6 and 4.16, respectively, in the pretest and 60.15 and 3.90 in the posttest, respectively. The mean of the control group in the pretest was 52.05, and the standard deviation was 5.98, while in the posttest the mean and standard deviation were 52.69 and 4.64, respectively.

Our assumptions in RQ-1 were confirmed by employing a linear regression in SPSS (V21), in which we used an effect size of .58 from a binomial logistic regression and obtained a predicted power of .99. Post hoc training was not included as a variable in the analysis to account for differences in academic self-efficacy levels before attending the integrated teaching methods. The results showed a significant effect in the binomial logistic regression. ($F = 48.42$, $p < .001$) which aligns with Kahraman and Alrawadieh (2021), Alsswey and Malak (2025), Yao et al. (2024), Wang (2023), and Hakyemez and Mardikyan (2021) research. This result also supports our first hypothesis that an integrated teaching method would significantly impact students' academic self-efficacy.

Table 3

Descriptive Statistics of Academic Engagement in Pretest and Posttest

Groups	Statistic	Pretest	Posttest
Experimental	*M*	31.55	37.45
	SD	3.12	3.53
Control	*M*	31.80	31.20
	SD	2.42	3.12

As shown in Table 3, the mean and standard deviation of academic engagement in the pretest of the experimental group are 31.55 and 3.12, respectively, and 37.45 and 3.53 in the posttest. On the other hand, in the control group, the mean academic engagement score on the pre-test was 31.80, with a standard deviation of 2.42. The posttest results showed a mean of 31.20 and a standard deviation of 3.12.

To test for differences in the amount of academic engagement in the experimental group, Wilks Lambda, Hotelling trace, and Roy's largest Root test were conducted. Results of the tests indicated

a statistically significant difference in academic engagement (F = 63.40, p < .001). This result aligns with those of Baranova et al. (2019), Aram et al. (2022), and Zen and Ariani (2022). All the assumptions for this variable on the impact of the integrated teaching method on academic engagement were met.

Table 4

Descriptive Statistics of Academic Performance in Pretest and Posttest

Groups	Statistic	Pre-tst	Posttest
Experimental	*M*	15.25	17.10
	SD	2.51	2.44
Control	*M*	15.65	15.85
	SD	3.32	3.16

As shown in Table 4, the mean of academic performance in pretest of the experimental group was 15.25, and its standard deviation in the pretest was 2.51. The mean and standard deviation of the experimental group were 17.10 and 2.44, respectively. On the contrary, in the control group, the mean academic performance in the pre-test was 15.65, while it was 15.85 in the posttest. Moreover, the standard deviation of academic performance in the pretest was 3.32, but in the posttest it was determined 3.16.

Academic performance was assessed for each individual. To study the academic performance of the students, a linear regression model was conducted. The difference between the control and experimental groups was statistically significant (F = 9.78, p < .001). Due to this result, our hypothesis about the impact of the integrated teaching method on raising students' academic performance in comparison with the control group was verified, which aligns with Ebrahimzadeh et al. (2021), Karimi et al. (2019), Wang and Zhang (2019), Park et al. (2023), Sung et al. (2016), and Fanxing et al. (2023).

Discussion

The goal of this study was to determine the impact of an integrated teaching method on students by assessing their academic self-efficacy, academic engagement, and academic performance. In other words, it was an attempt to investigate the existence or absence of a significant impact of the integrated teaching method on students' academic self-efficacy, which was verified through RQ-1, which showed that the experimental group had a higher level of academic self-efficacy than the control group, due to the significant influence of the the integrated teaching method (see Table 2). We also discovered that the level of academic engagement was significantly higher in the experimental group than in the control group, since they were exposed to an integrated teaching method as a verification of RQ-2. Last but not least, based on the results, we confirmed that the control group had a lower level of academic performance compared to the the experimental group.

Our analysis of the study suggests integrating subjects as a novel teaching method that prioritizes individualization in order to attract each students' interest as well as satisfy them with providing the opportunity to participate in the process of learning actively to have a favorable

impact on enhancing students' academic self-efficacy and improving their confidence in educational fields. Based on the results, we also believe that all the variables in this study (ITM, ASE, AE, and AP) are interrelated and that an increase in one of them leads to parallel increases in the others. Stated differently, people who hold high levels of self-efficacy are more engaged in the process and therefore perform better in academic tests. Some studies reveal similarities and share the same results regarding the impact of the teaching method on raising students' academic self-efficacy and the reciprocal effect of the variables, whereas others seem to have certain contradictions. As an example, Hinduja et al. (2024) found that higher academic performance, as measured by grades, does not necessarily result in higher self-efficacy levels, which is inconsistent with this study and prior literature (Shane-Simpson, 2025; Smith & Hirschl, 2022; Van Dinther et al., 2011). There is a possibility that the tests are not tailored to measure students' attitudes toward learning and, as a result, these tests are poor metrics that focus solely on reproducing prior knowledge (as also discussed in Ilyas & Azam, 2022). As has already been provided empirical evidence for the substantial positive association between how students believe in their capacity and their performance by Choi (2005) for college students, Lane et al. (2004), and Lent et al. (1986) our study has also verified to the direct influence of academic self-efficacy to academic performance in elementary stage which is also congruent with Rueda-Gómez et al. (2023) and Tomás et al. (2020). This highlights the exhibition of superior academic performance by students who harbor an optimistic attitude towards their aptitude, compared to students who are less self-efficacious in educational realms. Our results also point to an inevitable fact that within integrated tasks we encouraged students to participate in the process and explicate their reasoning by laying emphasis on their creativity, which is in line with Marchant et al. (2023) and Spitzig and Renner (2025) studies that show high active participation through learning, led to a potential rise in academic engagement. This study, being among the first to demonstrate the efficiency of an integrated teaching method on complex educational factors, has provided empirical support to the favorable impact of combining math with physical education and other subjects on students' academic performance (Table 4) and is consistent with previous studies (Cox, 2022; Syväoja et al., 2024; Vasquez, 2013; Vetter et al., 2018). This may be because students experience joy when combining different subjects and see them as challenges. Games and the design of academic contexts that trigger the competitive spirit of human beings while creating or sustaining a safe environment have always attracted the attention of Pellas et al. (2019). The first session of this study is pertinent to the gamification of Kahoot (Bawa, 2019; Wang & Tahir, 2020) which promotes a cooperative learning atmosphere in which students can work as a team, compete, participate actively in contrast with traditional methods where the teaching process is monopolized with the teacher or a few confident extrovert students (Licorish et al., 2018; Licorish et al., 2024) since it offers a playful and humor based environment that is safe and comfortable so the students can play while learning and express their opinions while not being judged (Holflod, 2023; Kangas, 2010; Rice, 2009). Existing literature demonstrates that integrating theoretical concepts with games creates a more in-depth comprehension that is too challenging to understand (Dever et al., 2022; Hwang et al., 2024; Tobar-Muñoz, 2017). As expected by previous consistent research, the

results showed that an integrated teaching method that combines educational subjects, especially when used as a game, significantly influences students' academic performance. It is also noteworthy that the results in previous research confirmed that the students of the experimental group, who were nurtured in the gamified learning environment, had higher levels of self-efficacy and academic achievement with lower levels of anxiety and stress symptoms than the control group among university students (Alsswey & Malak, 2025; Lin et al., 2024; Mee Mee et al., 2020; Meluso et al., 2012; Ouyang et al., 2026; Santinah & Saluky, 2022; Vlachopoulos & Makri, 2017).

While the current study's strength lies in its uniqueness as the first research to explore the effect of an integrated teaching method on complex factors of the educational framework in a primary school in a developing country, it yielded significant results on ASE, AE, and AP among Iranian students, which can add to the literature.

This study was developed as one of the first to validate novel strategies in the learning process, while the potential use of an integrated teaching method in educational domains was demonstrated in the results. In line with validating mastery-based learning among primary school students, a longitudinal skill retention of pupils was also measured within the flow of an integrated teaching method while implementing this approach across challenging subjects. Given the prior literature on the positive effects of novel teaching strategies on academic performance, the integrated teaching approach, with a longer goal-setting and mastery skills process for learners in their academic assignments, could be a valid teaching strategy for elementary school students.

This research contains some limitations that must be addressed in detail. First and foremost, this study was conducted in one rural public school with a limited number of students, which also used a convenience sampling method with one particular independent variable; hence, the credibility of this research in terms of generalization is restricted. However, we believed the problems we focused on in this study encompass all students struggling with learning difficulties in rural areas of Iran. More importantly, the indication that the integrated teaching method had a significant impact on students' academic performance lacked a follow-up analysis to validate. Notably, this study evaluated learning of a challenging subject using a paper-pencil test for academic performance; therefore, it is not possible to tell from these results whether participants were actually learning through this procedure or simply wrote by chance. Moreover, this study utilized self-report questionnaires as outcome measures, which might increase the risk of social desirability bias. Future studies are expected to focus on validating this research with more exhaustive analyses of the necessary criteria for being a competent student in the abiding time, such as the gold standard introduced by the McGaghie group, and on developing or creating multidimensional tests assessing students' academic performance. Expansion into a continuing study with more datapoints after education would also improve understanding of forgetting or retention of knowledge. This may help provide a clear understanding of the mediating role of the integrated teaching method on the study's variables.

Conclusion

This study provided evidence that an integrated teaching method can be an effective learning approach for increasing students' academic self-efficacy by boosting their confidence, enhancing

their academic engagement through active participation in the learning process, and raising their academic performance. Compared with other teaching methods, the integrated teaching method can be employed to improve students' academic achievement in educational domains. With all due respect to the previous research and this study, which confirmed the direct influence of the integrated teaching method on personal traits and educational factors, further research is needed to sustain the feeling of having sufficient capacity to reach every goal and to make theoretical subjects more real-life related.

We received no funding for this research.

Ali Sheykholeslami: Conceptualization, Methodology, Writing - Review & Editing, Supervision
Maryam Ghadimi: Formal Analysis, Investigation, Data Curation, Writing - Original Draft, Project Administration
Komeil Parsa: Resources, Writing - Review & Editing, Visualization

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

No generative AI tools were used in the writing or analysis of this manuscript.

Data will be available on request from the authors.

We are grateful for the editors and reviewers' instructive comments on the original version of the manuscript.

References

Affuso, G., Zannone, A., Esposito, C., De Angelis, G., Dragone, M., Pannone, M., Miranda, M. C., Aquilar, S., & Bacchini, D. (2025). The reciprocal effects of learning motivation, perceived academic self-efficacy and academic performance in adolescence: A four-wave longitudinal study. *European Journal of Psychology of Education*, *40*(1), Article 6. https://doi.org/10.1007/s10212-024-00900-y

Affuso, G., Zannone, A., Esposito, C., Pannone, M., Miranda, M. C., De Angelis, G., Aquilar, S., Dragone, M., & Bacchini, D. (2023). The effects of teacher support, parental monitoring, motivation and self-efficacy on academic performance over time. *European Journal of Psychology of Education*, *38*(1), 1–23. https://doi.org/10.1007/s10212-021-00594-6

Alazemi, A. F. T., Gheisari, A., & Patra, I. (2023). The consequences of task-supported language teaching via social media on academic engagement, emotion regulation, willingness to communicate, and academic well-being from the lens of positive psychology. *Asian-Pacific Journal of Second and Foreign Language Education*, *8*(1), Article 47. https://doi.org/10.1186/s40862-023-00220-6

Alonso-Tapia, J., Merino-Tejedor, E., & Huertas, J. A. (2023). Academic engagement: Assessment, conditions, and effects a study in higher education from the perspective of the person-situation interaction. *European Journal of Psychology of Education*, *38*(2), 631–655. https://doi.org/10.1007/s10212-022-00621-0

Alsswey, A., Malak, M. Z., & El-Qirem, F. A. (2025). Effect of virtual reality on perceptions of usability, suitability, satisfaction, and self-efficacy among architecture and design university students. *Architectural Science Review*, *68*(1), 56–64. https://doi.org/10.1080/00038628.2024.2338212

Aram, Y., Sharifi Rahnemo, S., Fathi, A., Rahnemo, M. S., & Aram, F. (2022). The effectiveness of teaching english-language lessons using study strategies by producing video content on students' academic enthusiasm and vitality. *Languages*, *7*(3), Article 189. https://doi.org/10.3390/languages7030189

Arthur, Y. D., De Vittori, T., Welcome, N. B., Dogbe, C. S. K., & Asare, B. (2026). Enhancing TVET students' interest in mathematics through the history of mathematics and self-efficacy. *Journal of Applied Research in Higher Education*, *18*(1), 206–219. https://doi.org/10.1108/JARHE-05-2024-0238

Artino, A. R. (2012). Academic self-efficacy: From educational theory to instructional practice. *Perspectives on Medical Education*, *1*(2), 76–85. https://doi.org/10.1007/s40037-012-0012-5

Asif, R., Merceron, A., Ali, S. A., & Haider, N. G. (2017). Analyzing undergraduate students' performance using educational data mining. *Computers & Education*, *113*, 177–194. https://doi.org/10.1016/j.compedu.2017.05.007

Bai, B., Nie, Y., & Lee, A. N. (2022). Academic self-efficacy, task importance and interest: Relations with English language learning in an Asian context. *Journal of Multilingual and Multicultural Development*, *43*(5), 438–451. https://doi.org/10.1080/01434632.2020.1746317

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.

Baranova, T., Khalyapina, L., Kobicheva, A., & Tokareva, E. (2019). Evaluation of students' engagement in integrated learning model in a blended environment. *Education Sciences*, *9*(2), Article 138. https://doi.org/10.3390/educsci9020138

Bauersfeld, J. L., Bourcevet, P., Hahn, H., & Gold, B. (2026). Isolated or integrated? Instructional approaches to foster professional vision of teaching quality. *Learning and Instruction*, *102*, Article 102301. https://doi.org/10.1016/j.learninstruc.2025.102301

Bawa, P. (2019). Using Kahoot to inspire. *Journal of Educational Technology Systems*, *47*(3), 373–390. https://doi.org/10.1177/0047239518804173

Bernacki, M. L., Vosicka, L., & Utz, J. C. (2020). Can a brief, digital skill training intervention help undergraduates "learn to learn" and improve their STEM achievement? *Journal of Educational Psychology*, *112*(4), 765–781. https://doi.org/10.1037/edu0000405

Bewersdorff, A., Hornberger, M., Nerdel, C., & Schiff, D. S. (2025). AI advocates and cautious critics: How AI attitudes, AI interest, use of AI, and AI literacy build university students' AI self-efficacy. *Computers and Education: Artificial Intelligence*, *8*, Article 100340. https://doi.org/10.1016/j.caeai.2024.100340

Bimbola, O., & Daniel, O. I. (2010). Effect of constructivist-based teaching strategy on academic performance of students in integrated science at the junior secondary school level. *Educational Research and Reviews*, *5*(7), 347–353. http://www.academicjournals.org/ERR2

Carmona-Halty, M., Salanova, M., Llorens, S., & Schaufeli, W. B. (2021). Linking positive emotions and academic performance: The mediated role of academic psychological capital and academic engagement. *Current Psychology*, *40*(6), 2938–2947. https://doi.org/10.1007/s12144-019-00227-8

Cassidy, S. (2015). Resilience building in students: The role of academic self-efficacy. *Frontiers in Psychology*, *6*, Article 1781. https://doi.org/10.3389/fpsyg.2015.01781

Chans, G. M., & Portuguez Castro, M. (2021). Gamification as a strategy to increase motivation and engagement in higher education chemistry students. *Computers*, *10*(10), Article 132. https://doi.org/10.3390/computers10100132

Choi, N. (2005). Self-efficacy and self-concept as predictors of college students' academic performance. *Psychology in the Schools*, *42*(2), 197–205. https://doi.org/10.1002/pits.20048

Codella, R., Puci, M. V., Vandoni, M., Correale, L., Galvani, C., Togni, F., Casolo, F., Passi, A., Orizio, C., Alberti, G., Esposito, F., Montomoli, C., & La Torre, A. (2020). School self-efficacy is affected by gender and motor skills: Findings from an Italian study. *PeerJ*, *8*, Article e8949. https://doi.org/10.7717/peerj.8949

Cong, Y., Yang, L., & Ergün, A. L. P. (2024). Exploring the relationship between burnout, learning engagement and academic self-efficacy among EFL learners: A structural equation modeling analysis. *Acta Psychologica*, *248*, Article 104394. https://doi.org/10.1016/j.actpsy.2024.104394

Cox, R. T. (2022). *The impact of physical education on students' performance outcomes in mathematics*. (Publication No. 375) [Doctoral dissertation, St. John's University]. Theses and Dissertations.https://scholar.stjohns.edu/theses_dissertations/375

Dever, D. A., Wiedbusch, M. D., Cloude, E. B., Lester, J., & Azevedo, R. (2022). Emotions and the comprehension of single versus multiple texts during game-based learning. *Discourse Processes*, *59*(1-2), 94–115. https://doi.org/10.1080/0163853X.2021.1950450

Doraisamy, R., & Radhakrishnan, S. (2013). The effectiveness of integrated teaching over traditional teaching among first year MBBS students: A preliminary study. *Medical Journal of Dr. DY Patil University*, *6*(2), 139–141. https://doi.org/10.4103/0975-2870.110296

Drake, S. M., & Burns, R. C. (2004). *Meeting standards through integrated curriculum*. Assiciation for Supervision and Curriculum Development.

Drake, S. M., & Reid, J. L. (2020). 21st century competencies in light of the history of integrated curriculum. *Frontiers in Education*, *5*, Article 122. https://doi.org/10.3389/feduc.2020.00122

Ebrahimzadeh, A., Abedini, M. R., Ramazanzade, K., Bijari, B., Aramjoo, H., & Zare Bidaki, M. (2021). Effect of integrated teaching on students' learning. *Strides in Development of Medical Education*, *18*(1), 1–6. https://doi.org/10.22062/sdme.2021.192468.1011

Fanxing, K., Gao, Y., Herold, F., Hossain, M. M., Yeung, A. S., Ng, J. L., Kramer. A. F., & Zou, L. (2023). Relationships between physical activity, sleep, and screen time with academic performance and psychological functioning among US children and adolescents with depression. *Complementary Therapies in Clinical Practice*, *53*, Article 101806. https://doi.org/10.1016/j.ctcp.2023.101806

Feldman, D. B., & Kubota, M. (2015). Hope, self-efficacy, optimism, and academic achievement: Distinguishing constructs and levels of specificity in predicting college grade-point average. *Learning and Individual Differences*, *37*, 210–216. https://doi.org/10.1016/j.lindif.2014.11.022

Fitriani, A., Zubaidah, S., Susilo, H., & Al Muhdhar, M. H. I. (2020). PBLPOE: A learning model to enhance students' critical thinking skills and scientific attitudes. *International Journal of Instruction*, *13*(2), 89–106. https://doi.org/10.29333/iji.2020.1327a

Ford, C. J., Usher, E. L., Scott, V. L., & Chen, X. Y. (2023). The 'perfect' lens: Perfectionism and early adolescents' math self-efficacy development. *British Journal of Educational Psychology*, *93*(1), 211–228. https://doi.org/10.1111/bjep.12550

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Frydenberg, M., & Andone, D. (2011). Learning for 21st century skills. In *International Conference on Information Society (i-Society 2011)* (pp. 314–318). IEEE. https://doi.org/10.1109/i-Society18435.2011.5978460

Glewwe, P., & Kremer, M. (2006). Schools, teachers, and education outcomes in developing countries. In E. A. Hanushek & F. Welch (Eds.), *Handbook of the economics of education* (Vol. 2, pp. 945–1017). Elsevier. https://doi.org/10.1016/S1574-0692(06)02016-2

Greenwood, C. R., Horton, B. T., & Utley, C. A. (2002). Academic engagement: Current perspectives on research and practice. *School Psychology Review*, *31*(3), 328–349. https://doi.org/10.1080/02796015.2002.12086159

Guo, L., Ru, Q., Wei, X., Hui, S., Zhang, T., & Shao, H. (2026). The relationship between teacher academic support and primary school students' academic resilience: The chain mediating role of just world belief and academic engagement. *Acta Psychologica*, *264*, Article 106589. https://doi.org/10.1016/j.actpsy.2026.106589

Guthrie, J. T., Wigfield, A., & VonSecker, C. (2000). Effects of integrated instruction on motivation and strategy use in reading. *Journal of Educational Psychology*, *92*(2), 331–341. https://doi.org/10.1037/0022-0663.92.2.331

Hainey, T., Connolly, T. M., Boyle, E. A., Wilson, A., & Razak, A. (2016). A systematic literature review of games-based learning empirical evidence in primary education. *Computers & Education*, *102*, 202–223. https://doi.org/10.1016/j.compedu.2016.09.001

Hakyemez, T. C., & Mardikyan, S. (2021). The interplay between institutional integration and self-efficacy in the academic performance of first-year university students: A multigroup approach. *The International Journal of Management Education*, *19*(1), Article 100430. https://doi.org/10.1016/j.ijme.2020.100430

Hartt, M., Hosseini, H., & Mostafapour, M. (2020). Game on: Exploring the effectiveness of game-based learning. *Planning Practice & Research*, *35*(5), 589–604. https://doi.org/10.1080/02697459.2020.1778859

Hinduja, P., Fakir Mohammad, R., & Siddiqui, S. (2024). Factors influencing students' academic self-efficacy in related domains. *SAGE Open*, *14*(4), Article 21582440241289738. https://doi.org/10.1177/21582440241289738

Holflod, K. (2023). Playful learning and boundary-crossing collaboration in higher education: a narrative and synthesising review. *Journal of Further and Higher Education*, *47*(4), 465–480. https://doi.org/10.1080/0309877X.2022.2142101

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

Hosseinmardi, A. A., Ghorban Shiroodi, S., Zarbakhshbahri, M. R., & Tizdast, T. (2022). The relationship of academic engagement, school engagement, and school belonging with academic achievement by mediated the academic achievement motivation in male students. *Sociology of Education*, *7*(2), 178–189. https://doi.org/10.22034/ijes.2021.534830.1123

Hwang, G. J., Chuang, W. H., & Hsia, L. H. (2024). Comprehending complex chemistry problems in a structured and enjoyable manner: A concept mapping-based contextual gaming approach. *Education and Information Technologies*, *29*(13), 18745–18767. https://doi.org/10.1007/s10639-024-12615-0

Ilyas, M. R., & Azam, S. (2022). Learner autonomy: Effectiveness and challenges at intermediate level in Punjab, Pakistan. *Journal of Communication and Cultural Trends*, *4*(1), 57–75. https://doi.org/10.32350/jcct.41.03

Iqbal, J., Qureshi, N., Ashraf, M. A., Rasool, S. F., & Asghar, M. Z. (2021). The effect of emotional intelligence and academic social networking sites on academic performance during the COVID-19 pandemic. *Psychology Research and Behavior Management*, 14, 905–920. https://doi.org/10.2147/PRBM.S316664

Jinks, J., & Morgan, V. (1999). Children's perceived academic self-efficacy: An inventory scale. *The Clearing House*, *72*(4), 224–230. https://doi.org/10.1080/00098659909599398

Kahn, J. H., & Nauta, M. M. (2001). Social-cognitive predictors of first-year college persistence: The importance of proximal assessment. *Research in Higher Education*, *42*, 633–652. https://doi.org/10.1023/A:1012225510213

Kahraman, O. C., & Alrawadieh, D. D. (2021). The impact of perceived education quality on tourism and hospitality students' career choice: The mediating effects of academic self-efficacy. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *29*, Article 100333. https://doi.org/10.1016/j.jhlste.2021.100333

Kangas, M. (2010). Creative and playful learning: Learning through game co-creation and games in a playful learning environment. *Thinking Skills and Creativity*, *5*(1), 1–15. https://doi.org/10.1016/j.tsc.2009.11.001

Karimi, P., Lotfi, A. R., & Biria, R. (2019). Enhancing pilot's aviation English learning, attitude and motivation through the application of content and language integrated learning. *International Journal of Instruction*, *12*(1), 751–766. https://doi.org/10.29333/iji.2019.12148a

Ketonen, E. E., Haarala-Muhonen, A., Hirsto, L., Hänninen, J. J., Wähälä, K., & Lonka, K. (2016). Am I in the right place? Academic engagement and study success during the first years at university. *Learning and Individual Differences*, *51*, 141–148. https://doi.org/10.1016/j.lindif.2016.08.017

Khine, M. S., & Nielsen, T. (Eds.). (2022). *Academic self-efficacy in education: Nature, assessment, and research*. Springer. https://doi.org/10.1007/978-981-16-8240-7

Klassen, R. M., Rushby, J. V., Maxwell, L., Durksen, T. L., Sheridan, L., & Bardach, L. (2021). The development and testing of an online scenario-based learning activity to prepare preservice teachers for teaching placements. *Teaching and Teacher Education*, *104*, Article 103385. https://doi.org/10.1016/j.tate.2021.103385

Kwon, K., Kupzyk, K., & Benton, A. (2018). Negative emotionality, emotion regulation, and achievement: Cross-lagged relations and mediation of academic engagement. *Learning and Individual Differences*, *67*, 33–40. https://doi.org/10.1016/j.lindif.2018.07.004

Lane, J., Lane, A. M., & Kyprianou, A. (2004). Self-efficacy, self-esteem and their impact on academic performance. *Social Behavior and Personality: An International Journal*, *32*(3), 247–256. https://doi.org/10.2224/sbp.2004.32.3.247

Lei, W., Wang, X., Dai, D. Y., Guo, X., Xiang, S., & Hu, W. (2022). Academic self-efficacy and academic performance among high school students: A moderated mediation model of academic buoyancy and social support. *Psychology in the Schools*, *59*(5), 885–899. https://doi.org/10.1002/pits.22653

Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of Counseling Psychology*, *33*(3), 265–269. https://doi.org/10.1037/0022-0167.33.3.265

Licorish, S. A., da Costa, D. A., Zolduoarrati, E., & Grattan, N. (2024). Relating team atmosphere and group dynamics to student software development teams' performance. *Information and Software Technology*, *167*, Article 107377. https://doi.org/10.1016/j.infsof.2023.107377

Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, *13*(1), 9. https://doi.org/10.1186/s41039-018-0078-8

Lin, Y. L., Wang, W. T., & Hsieh, M. J. (2024). The effects of students' self-efficacy, self-regulated learning strategy, perceived and actual learning effectiveness: A digital game-based learning system. *Education and Information Technologies 29*(16), 22213–22245. https://doi.org/10.1007/s10639-024-12700-4

Liu, R. D., Zhen, R., Ding, Y., Liu, Y., Wang, J., Jiang, R., & Xu, L. (2018). Teacher support and math engagement: Roles of academic self-efficacy and positive emotions. *Educational Psychology*, *38*(1), 3–16. https://doi.org/10.1080/01443410.2017.1359238

Liu, Y., Li, M., Chen, H., & Zhang, X. (2026). Multilevel analysis of teachers' well-being and personal accomplishment and students' self-esteem, self-efficacy, and academic burnout: A conservation of resources perspective. *Teaching and Teacher Education*, *172*, Article 105386. https://doi.org/10.1016/j.tate.2026.105386

Luft, A. R., & Buitrago, M. M. (2005). Stages of motor skill learning. *Molecular Neurobiology*, *32*, 205–216. https://doi.org/10.1385/MN:32:3:205

Mammadov, S., & Schroeder, K. (2023). A meta-analytic review of the relationships between autonomy support and positive learning outcomes. *Contemporary Educational Psychology*, *75*, Article 102235. https://doi.org/10.1016/j.cedpsych.2023.102235

Marchant, P., Cornejo, C., & Felmer, P. (2023). Student insights in mathematics problem solving: Cognition, affect, and gesture. *International Journal of Science and Mathematics Education*, *21*(3), 713–736. https://doi.org/10.1007/s10763-022-10288-0

Martos Martínez, Á., Molero Jurado, M. D. M., Pérez-Fuentes, M. D. C., Barragán Martín, A. B., Simón Márquez, M. D. M., Tortosa Martínez, B. M., Sisto, M., & Gázquez Linares, J. J. (2021). Self-efficacy, positive future outlook and school burnout in Spanish adolescents. *Sustainability*, *13*(8), Article 4575. https://doi.org/10.3390/su13084575

Mee Mee, R. W., Shahdan, T. S. T., Ismail, M. R., Ghani, K. A., Pek, L. S., Von, W. Y., Woo, A., & Rao, Y. S. (2020). Role of Gamification in Classroom Teaching: Pre-Service Teachers' View. *International Journal of Evaluation and Research in Education*, *9*(3), 684–690. https://doi.org/10.11591/IJERE.V913.20622

Meluso, A., Zheng, M., Spires, H. A., & Lester, J. (2012). Enhancing 5th graders' science content knowledge and self-efficacy through game-based learning. *Computers & Education*, *59*(2), 497–504. https://doi.org/10.1016/j.compedu.2011.12.019

Mishra, T., Kumar, D., & Gupta, S. (2014). Mining students' data for prediction performance. In *2014 Fourth international conference on advanced computing & communication technologies (ACCT)* (pp. 255–262). IEEE. https://doi.org/10.1109/ACCT.2014.105

Namaziandost, E., Heydarnejad, T., & Rezai, A. (2023). Iranian EFL teachers' reflective teaching, emotion regulation, and immunity: Examining possible relationships. *Current Psychology*, *42*(3), 2294–2309. https://doi.org/10.1007/s12144-022-03786-5

Ouyang, H., Xie, H., Wang, Y., Chen, X., Cheng, Q., Hou, B., & Zhang, P. (2026). Academic stress, cognitive appraisal, academic self-efficacy, and academic anxiety among Chinese college students: A moderated mediation model. *Acta Psychologica*, *263*, Article 106322. https://doi.org/10.1016/j.actpsy.2026.106322

Park, H., Yang, S., & Choi, H. (2023). The impact of an integrated teaching methodology on students' learning outcomes and academic performance in gateway programming courses: Exploring relationships, associations, and experimental effects. In *Proceedings of the 24th annual conference on information technology education (SIGITE '23)* (pp. 99–105). ACM. https://doi.org/10.1145/3585059.3611408

Partovi, T., & Razavi, M. R. (2019). The effect of game-based learning on academic achievement motivation of elementary school students. *Learning and Motivation*, *68*, Article 101592. https://doi.org/10.1016/j.lmot.2019.101592

Pellas, N., Fotaris, P., Kazanidis, I., & Wells, D. (2019). Augmenting the learning experience in primary and secondary school education: A systematic review of recent trends in augmented reality game-based learning. *Virtual Reality*, *23*(4), 329–346. https://doi.org/10.1007/s10055-018-0347-2

Perkmann, M., Salandra, R., Tartari, V., McKelvey, M., & Hughes, A. (2021). Academic engagement: A review of the literature 2011–2019. *Research Policy*, *50*(1), Article 104114. https://doi.org/10.1016/j.respol.2020.104114

Pesare, E., Roselli, T., Corriero, N., & Rossano, V. (2016). Game-based learning and gamification to promote engagement and motivation in medical learning contexts. *Smart Learning Environments*, *3*, 1–21. https://doi.org/10.1186/s40561-016-0028-0

Pintrich, P. R., & Schragben, B. (2012). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In *Student perceptions in the classroom*, (pp. 149–184). Routledge. https://doi.org/10.4324/9780203052532

Rahmiwati, S., Festiyed, F., & Ratnawulan, R. (2022). Development of student competencies in integrated science subjects class VIII based on cognitive technology in the era of society 5.0. *Linguistics and Culture Review*, *6*(S3), 237–247. https://doi.org/10.21744/lingcure.v6nS3.2142

Rice, L. (2009). Playful learning. *Journal for Education in the Built Environment*, *4*(2), 94–108. https://doi.org/10.11120/jebe.2009.04020094

Rueda-Gómez, K. L., Rodríguez-Muñiz, L. J., & Muñiz-Rodríguez, L. (2023). Performance and mathematical self-concept in university students using Khan Academy. *Heliyon*, *9*(4), Article e15441. https://doi.org/10.1016/j.heliyon.2023.e15441

Santinah, S., & Saluky, S. (2022). The effect of online games on learning motivation and learning achievement. *Information Technology Engineering Journals*, *7*(1), 22–31. https://doi.org/10.24235/itej.v7i1.100

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*, 71–92. https://doi.org/10.1023/A:1015630930326

Schellenberg, B. J., & Bailis, D. S. (2015). Predicting longitudinal trajectories of academic passion in first-year university students. *Learning and Individual Differences*, *40*, 149–155. https://doi.org/10.1016/j.lindif.2015.04.008

Schunk, D. H., & DiBenedetto, M. K. (2022). Academic self-efficacy. In K.-A. Allen, M. J. Furlong, D. Vella-Brodrick, & S. M. Suldo (Eds.), *Handbook of positive psychology in schools: Supporting process and practice* (3rd ed., pp. 268–282). Routledge. https://doi.org/10.4324/9781003013778-21

Schunk, D. H., & Mullen, C. A. (2012). Self-efficacy as an engaged learner. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 219–235). Springer. https://doi.org/10.1007/978-1-4614-2018-7_10

Sevgi, U. S. (2026). Navigating the unknown: Behavioral responses as a pathway from academic self-efficacy to academic motivation. *Learning and Motivation*, *93*, Article 102247. https://doi.org/10.1016/j.lmot.2026.102247

Shane-Simpson, C., Desens, E., Kleutsch, A., & Obeid, R. (2025). Relationships among study guide format, academic motivation, self-efficacy, and student grades. *Teaching of Psychology*, *52*(1), 33–38. https://doi.org/10.1177/00986283221134594

Sharma, B. R., & Bhaumik, P. K. (2013). Student engagement and its predictors: An exploratory study in an Indian business school. *Global Business Review*, *14*(1), 25–42. https://doi.org/10.1177/0972150912466364

Sharma, N., Doherty, I., & Dong, C. (2017). Adaptive learning in medical education: The final piece of technology enhanced learning? *The Ulster Medical Journal*, *86*(3), 198–200.

Shin, M. H. (2018). Effects of project-based learning on students' motivation and self-efficacy. *English Teaching*, *73*(1), 95–114. https://doi.org/10.15858/engtea.73.1.201803.95

Sihotang, L., Setiawan, D., & Saragi, D. (2017). The effect of learning strategy and self-confidence toward student's learning outcomes in elementary school. *IOSR Journal of Research & Method in Education*, *7*(4), 65–72. https://doi.org/10.9790/7388-0704016572

Sinval, J., Oliveira, P., Novais, F., Almeida, C. M., & Telles-Correia, D. (2025). Exploring the impact of depression, anxiety, stress, academic engagement, and dropout intention on medical students' academic performance: A prospective study. *Journal of Affective Disorders*, *368*, 665–673. https://doi.org/10.1016/j.jad.2024.09.116

Smith, C. M., & Hirschl, N. (2022). College attendance among low-income youth: Explaining differences across Wisconsin high schools. *Center for Educational Policy Studies Journal*, *12*(3), 33–57. https://doi.org/10.26529/cepsj.1047

Spitzig, J., & Renner, B. J. (2025). Student engagement and retention of adult learners at community colleges. *Journal of College Student Retention: Research, Theory & Practice*, *26*(4), 1010–1027. https://doi.org/10.1177/15210251221138065

Storch, N. (2007). Development in L2 writing after a semester of study in an Australian university. *Indonesian Journal of English Language Teaching*, *3*(2), 35–51. https://doi.org/10.25170/ijelt.v3i2.1583

Su, Y., Zheng, C., Liang, J. C., & Tsai, C. C. (2018). Examining the relationship between English language learners' online self-regulation and their self-efficacy. *Australasian Journal of Educational Technology*, *34*(3), 105–121. https://doi.org/10.14742/ajet.3548

Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, *94*, 252–275. https://doi.org/10.1016/j.compedu.2015.11.008

Syväoja, H. J., Sneck, S., Kukko, T., Asunta, P., Räsänen, P., Viholainen, H., Kulmala, J., Hakonen, H., & Tammelin, T. H. (2024). Effects of physically active math lessons on children's math performance and math-related affective factors: Multi-arm cluster randomized controlled trial. *British Journal of Educational Psychology*, *94*(3), 839–861. https://doi.org/10.1111/bjep.12684

Tayama, J., Schaufeli, W., Shimazu, A., Tanaka, M., & Takahama, A. (2019). Validation of a Japanese version of the work engagement scale for students. *Japanese Psychological Research*, *61*(4), 262–272. https://doi.org/10.1111/jpr.12229

Tobar-Muñoz, H., Baldiris, S., & Fabregat, R. (2017). Augmented reality game-based learning: Enriching students' experience during reading comprehension activities. *Journal of Educational Computing Research*, *55*(7), 901–936. https://doi.org/10.1177/0735633116689789

Tomás, J. M., Gutiérrez, M., Georgieva, S., & Hernández, M. (2020). The effects of self-efficacy, hope, and engagement on the academic achievement of secondary education in the Dominican Republic. *Psychology in the Schools*, *57*(2), 191–203. https://doi.org/10.1002/pits.22321

Tong, D. H., Uyen, B. P., & Ngan, L. K. (2022). The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane. *Heliyon*, *8*(12), Article e12657. https://doi.org/10.1016/j.heliyon.2022.e12657

Travis, J., Kaszycki, A., Geden, M., & Bunde, J. (2020). Some stress is good stress: The challenge-hindrance framework, academic self-efficacy, and academic outcomes. *Journal of Educational Psychology*, *112*(8), 1632–1643. https://psycnet.apa.org/doi/10.1037/edu0000478

Van Dinther, M., Dochy, F., & Segers, M. (2011). Factors affecting students' self-efficacy in higher education. *Educational Research Review*, *6*(2), 95–108. https://doi.org/10.1016/j.edurev.2010.10.003

Vashe, A., Devi, V., Rao, R., Abraham, R. R., Pallath, V., & Umakanth, S. (2019). Using an integrated teaching approach to facilitate student achievement of the learning outcomes in a preclinical medical curriculum in India. *Advances in Physiology Education*, *43*(4), 522 –528. https://doi.org/10.1152/advan.00067.2019

Vasquez, J. A., Comer, M., & Sneider, C. (2013). *STEM lesson essentials, grades 3-8: Integrating science, technology, engineering, and mathematics*. Heinemann.

Vetter, M., O'Connor, H., O'Dwyer, N., & Orr, R. (2018). Learning "math on the move": effectiveness of a combined numeracy and physical activity program for primary school children. *Journal of Physical Activity and Health*, *15*(7), 492–498. https://doi.org/10.1123/jpah.2017-0234

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, *14*, 22. https://doi.org/10.1186/s41239-017-0062-1

Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, *53*, 17–28. https://doi.org/10.1016/j.stueduc.2017.01.002

Vogel, F. R., & Human-Vogel, S. (2016). Academic commitment and self-efficacy as predictors of academic achievement in additional materials science. *Higher Education Research & Development*, *35*(6), 1298–1310. https://doi.org/10.1080/07294360.2016.1144574

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. *Computers & Education*, *149*, Article 103818. https://doi.org/10.1016/j.compedu.2020.103818

Wang, C. J. (2023). Learning and academic self-efficacy in self-regulated learning: validation study with the BOPPPS model and IRS methods. *Asia-Pacific Education Researcher*, *32*(1), 37–51. https://doi.org/10.1007/s40299-021-00630-5

Wang, C., & Wang, D. (2023). Managing the integration of teaching resources for college physical education using intelligent edge-cloud computing. *Journal of Cloud Computing*, *12*(1), 82. https://doi.org/10.1186/s13677-023-00455-1

Wang, S., & Zhang, D. (2019). Student-centered teaching, deep learning and self-reported ability improvement in higher education: Evidence from Mainland China. *Innovations in Education and Teaching International*, *56*(5), 581–593. https://doi.org/10.1080/14703297.2018.1490662

Weber, M., & Harzer, C. (2022). Relations between character strengths, school satisfaction, enjoyment of learning, academic self-efficacy, and school achievement: An examination of various aspects of positive schooling. *Frontiers in Psychology*, *13*, Article 826960. https://doi.org/10.3389/fpsyg.2022.826960

Wu, P. H., Hwang, G. J., Yang, M. L., & Chen, C. H. (2018). Impacts of integrating the repertory grid into an augmented reality-based learning design on students' learning achievements, cognitive load and degree of satisfaction. *Interactive Learning Environments*, *26*(2), 221–234. https://doi.org/10.1080/10494820.2017.1294608

Xerri, M. J., Radford, K., & Shacklock, K. (2018). Student engagement in academic activities: A social support perspective. *Higher Education*, *75*, 589–605. https://doi.org/10.1007/s10734-017-0162-9

Yang, G., Sun, W., & Jiang, R. (2022). Interrelationship amongst university student perceived learning burnout, academic self-efficacy, and teacher emotional support in China's English online learning context. *Frontiers in Psychology*, *13*, Article 829193. https://doi.org/10.3389/fpsyg.2022.829193

Yang, J., Yu, H., & Chen, N. S. (2019). Using blended synchronous classroom approach to promote learning performance in rural area. *Computers & Education*, *141*, Article 103619. https://doi.org/10.1016/j.compedu.2019.103619

Yao, H., Liu, W., & Chen, S. (2024). Teachers sustainable teaching innovation and graduate students creative thinking: The chain mediating role of playfulness climate and academic self-efficacy. *The International Journal of Management Education*, *22*(1), Article 100900. https://doi.org/10.1016/j.ijme.2023.100900

Yuksel, P., & Bailey, J. (2024). Designing a holistic syllabus: A blueprint for student motivation, learning efficacy, and mental health engagement. In M. Khosrow-Pour (Ed.), *Innovative instructional design methods and tools for improved teaching* (pp. 1–17). IGI Global. https://doi.org/10.4018/979-8-3693-3128-6.ch004

Zahoor, I., & Mahmood, M. (2023). Career maturity level of intermediate students: A comparative analysis. *Pakistan Journal of Educational Research*, *6*(1), 49–61. https://doi.org/10.52337/pjer.v6i1.717

Zang, W., Zhu, J., Xiao, N., Fang, M., Li, D., Li, H., Yan, J., Jing, H., & Wang, S. (2024). Effects of aerobic exercise on children's executive function and academic performance: A systematic review and meta-analysis. *Heliyon*, *10*(7), Article e28633. https://doi.org/10.1016/j.heliyon.2024.e28633

Zeinalipour, H. (2022). School connectedness, academic self-efficacy, and academic performance: Mediating role of hope. *Psychological Reports*, *125*(4), 2052–2068. https://doi.org/10.1177/00332941211006926

Zen, Z., & Ariani, F. (2022). Academic achievement: The effect of project-based online learning method and student engagement. *Heliyon*, *8*(11), Article e11509. https://doi.org/10.1016/j.heliyon.2022.e11509

Zhu, Y. (2026). A study of the effect of AI usage on students' self-efficacy and academic performance in business education: Moderating effect of teacher support [Registered report-stage I]. *Acta Psychologica*, *263*, Article 106256. https://doi.org/10.1016/j.actpsy.2026.106256