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# Gamification as an alternative to increase students' motivation: a scoping review

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**ABSTRACT**

Gamification is the process of adding game-like features and mechanics in non-game contexts, such as learning, training, or marketing, to make them more engaging, enjoyable, and effective. This scoping review aims to investigate the impact of gamification on student motivation and identify the most frequently used and effective elements of gamification in educational contexts. A systematic search was conducted using five databases: Emerald, Scopus, Sage, Garuda, and Google Scholar. The preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) guidelines were followed. The review included 25 articles that met the inclusion criteria. The findings suggest that gamification can positively influence student motivation and engagement. However, the effectiveness of gamification elements varies across different contexts and learners. Points, levels, and leaderboards are among the most commonly used elements, but their impact on intrinsic motivation remains debatable. The review highlights the need for further research to understand the specific factors that contribute to the success or failure of gamification in education. The insights gained from this review can serve as a foundation for developing effective gamification-based educational materials that cater to the diverse needs of learners and foster their motivation to learn.



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## 1. INTRODUCTION

Advancements in technology and rapid development continue to bring exciting innovations into education. Conventional teaching methods alone are no longer considered sufficiently effective to increase student involvement in learning. As a result, new approaches are needed to meet the evolving needs of education and engage students in their studies [1]. In recent years, several new teaching methods have been implemented to facilitate increased student engagement and motivation.

Gamification is a modern and innovative technology that has gained significant attention in various fields including education. The technique involves integrating game-based elements, such as feedback systems, leaderboards, and point-scoring mechanisms, to enhance engagement and participation in non-gaming activities. The primary goal of gamification is to inspire and motivate users to play an active role in their learning or other activities by making them more enjoyable and rewarding. By leveraging our innate desire for competition, achievement, and recognition, gamification has become a potent tool for enhancing user motivation and driving better outcomes across a wide range of scenarios [2], [3]. Gamification uses technology to create interactive and immersive learning experiences. Gamification has recently gained significant attention in the education sector because of its potential to enhance students' learning outcomes. According to a study conducted by Dogan [4], the use of computers and information technology in the learning process has a positive impact on students' perceptions

of subject matter. In addition, a study by Puspitarini and Hanif [5] found that students exhibited more interest and enthusiasm towards the learning process when teachers incorporated computer technology into the curriculum, as opposed to traditional textbooks. This finding highlights the potential of digital media to enhance educational experiences and motivate learners to actively engage with the subject material. By leveraging technology in the classroom, educators can create a dynamic and interactive learning environment conducive to student success.

Gamification has also been shown to enhance user engagement and immersion. Employing strategies such as point scoring, progress tracking, and reward systems, gamification has been harnessed in diverse areas such as education, marketing, and employee training to drive user motivation and productivity. Research has shown that gamification can offer a rich and interactive learning experience, leading to improved information retention and recall of information [6]. Gamification is a pedagogical approach that utilizes game aesthetics and elements to enhance students' engagement and motivation. The primary goal is to apply these elements to stimulate students' intrinsic motivation to learn [7]. Gamification has been found to be successful in increasing user engagement [8], [9]. However, its effectiveness and suitability for different contexts and learners remains a matter of ongoing debate among educators and researchers.

Numerous studies have explored the potential of gamification as a learning tool, yielding mixed results across age groups and individuals. Kim's [9] research suggested that gamification can enhance student engagement, while Buckley and Doyle [10] found that gamification can increase intrinsic motivation. Furthermore, gamification can create a fun and effective learning environment [11]. However, other studies contradicted these findings. For example, Mekler *et al.* [12] found that points, levels, and scoreboards might hinder students' internal motivation, leading to complacency.

The efficacy of gamification in stimulating student engagement and fostering learning outcomes remains a subject of ongoing research. Nevertheless, it is widely accepted that motivation plays an essential role in the learning process and can be influenced by both intrinsic and extrinsic factors [13], [14]. Therefore, it is crucial to understand how gamification elements can be leveraged to promote motivation and enhance student engagement, especially considering the growing interest in gamification to improve learning outcomes. For educators, it is imperative to employ appropriate learning methods and media to foster motivation. The effectiveness of learning methods is closely related to the media used to complement them. To enhance the quality of learning, teaching media should be crafted to capture attention, stimulate motivation, and improve concentration during learning [15].

The integration of gamification in education has gained significant traction with several learning media platforms, such as Kahoot! Quizziz and Duolingo adopted this approach. This has led to a growing need for insight into the impact of gamification on education. Nevertheless, it remains unclear which elements of gamification enhance or weaken student motivation. As a result, further research is required to provide a detailed understanding of the influence of gamification on education and to identify the specific factors that can impact student motivation positively or negatively. This study aims to conduct a detailed analysis of the academic literature that discusses the use of gamification in education, focusing on the integration of gamification elements in educational resources and their influence on students' motivation. The review primarily considers journals published between 2018 and 2023. The principal aim of this review is to establish robust groundwork for creating successful gamification-based educational materials.

## 2. METHOD

### 2.1. Database search process

The objective of this review is to examine the impact of gamification on student motivation and ascertain which gamification elements are most frequently utilized and efficacious in educational contexts. To conduct the review, the researchers used five databases: Emerald, Scopus, Sage, Garuda, and Google Scholar. The researchers executed searches using the keywords 'gamification', 'gamification element,' 'motivation,' and 'learning method' to acquire pertinent literature.

### 2.2. Search analysis and criteria

This review adhered to the preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) guidelines for conducting scoping reviews. The research team established specific criteria for including and excluding literature from their search results. To be considered for this review, studies were required to meet the following criteria: publication date within the past five years, availability in English, and no restrictions on geographical origin.

### 2.3. Article selection and data extraction

The search for articles in the database based on the PRISMA protocol is shown in Table 1, and the obtained articles were extracted from the data. The article selection process based on the criteria can be seen in the PRISMA-ScR diagram flowchart in Figure 1. The relevant articles are summarized in Table 2.

Table 1. List of articles used in reviews

| No | Author (Year) | Journal | Setting | Place | Method |
|---|---|---|---|---|---|
| 1 | Jaskari and Syrjälä (2023) [16] | Journal of marketing education | Social Science | Finland | Mixed |
| 2 | Imran (2023) [17] | Journal of educational computing research | STEM* | Canada | Mixed |
| 3 | Zeng (曾成) and Fisher (2023) [18] | Ecnu review of education | Language Education | United Kingdom | Mixed |
| 4 | Gündüz dan Akkoyunlu (2020) [19] | Sage open | N/A** | Turkey | Mixed |
| 5 | Facey-Shaw *et al.* (2020) [20] | Journal of simulation and gaming | STEM | Jamaica | Quantitative |
| 6 | Freiermuth and Ito (2022) [21] | Journal of simulation and gaming | Language Education | Japan | Qualitative |
| 7 | Yu (2023) [22] | Sage open | Language Education | China | Mixed |
| 8 | Liman Kaban and Karadeniz (2021) [23] | Sage open | Language Education | Turkey | Quantitative |
| 9 | Tasiran (2019) [24] | Journal of e-learning and digital media | Language Education | Turkey | Quantitative |
| 10 | Malahito and Quimbo (2020) [25] | Journal of e-learning and digital media | STEM | Philippines | Quantitative |
| 11 | Razali *et al.* (2022) [26] | Iop conference series. Materials science and engineering | STEM | Malaysia | Mixed |
| 12 | Rahayu *et al.* (2022) [27] | Sustainability | Social Science | Indonesia | Quantitative |
| 13 | T. Alshammari (2020) [28] | Tem journal | Language Education | KSA*** | Quantitative |
| 14 | Soepriyatna and Pangaribuan (2022) [29] | International journal of information engineering and electronic business | N/A | Indonesia | Quantitative |
| 15 | Park and Kim (2021) [30] | Sustainability | STEM | South Korea | Quantitative |
| 16 | Ismail *et al.* (2018) [31] | Journal of physics: conference series | STEM | Malaysia | Quantitative |
| 17 | Palaniappan and MdNoor (2022) [32] | International journal of emerging technologies in learning (online) | STEM | Malaysia | Quantitative |
| 18 | Puig *et al.* (2023) [33] | Applied sciences | N/A | Spain | Quantitative |
| 19 | Chen *et al.* (2023) [34] | Journal of baltic science education | STEM | Taiwan | Quantitative |
| 20 | Wan Hamzah *et al.* (2023) [35] | International journal of emerging technologies in learning (online) | N/A | Malaysia | Quantitative |
| 21 | Peter *et al.* (2019) [36] | Journal of physics: conference series | Language Education | Malaysia | Qualitative |
| 22 | Chans and Portuguez Castro (2021) [37] | Computers | STEM | Mexico | Quantitative |
| 23 | Santos *et al.* (2021) [38] | Revista de gestão | Social Science | Brazil | Mixed |
| 24 | Bitrian *et al.* (2020) [39] | European journal of management and business economics | Sport Science | Spain | Quantitative |
| 25 | Na and Han (2023) [40] | Internet research | Social Science | South Korea | Quantitative |

*STEM (Science, Technology, Engineering, and Mathematics); **N/A (Not Mentioned); ***KSA (Kingdom of Saudi Arabia)

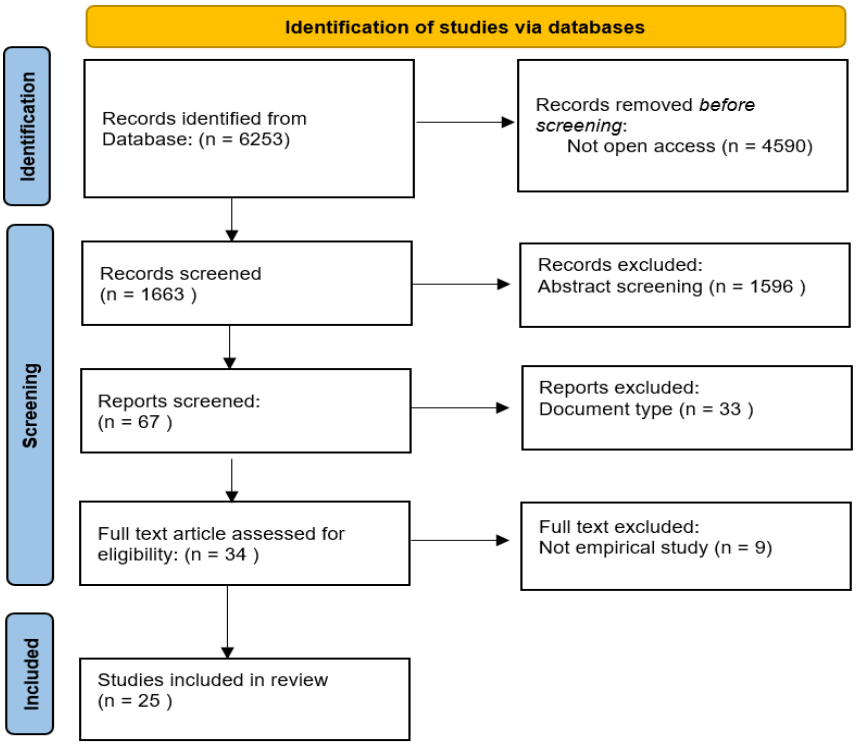


Figure 1. PRISMA diagram flowchart

Table 2. Game elements, motivational outcomes, and learning result

| Author (year) | Game elements | Motivational outcomes and learning result |
|---|---|---|
| Jaskari and Syrjälä (2023) [16] | Point, leaderboards, time pressure, and competition | – Students become more competitive.<br>– Different gamification elements motivated students at different times. |
| Imran (2023) [17] | Badges | – The level of gamification was a strong indicator of performance. |
| Zeng (曾成) and Fisher (2023) [18] | Leaderboards and rewards | – The majority of participants had an increased internal motivation after using gamification. |
| Gündüz dan Akkoyunlu (2020) [19] | Point, level, and leaderboards | – Gamification increases student participation in activities.<br>– The course is more motivating and exciting compared to non-gamified courses<br>– Students' performance improved as a result of gamification. |
| Facey-Shaw *et al.* (2020) [20] | Badges | – The intrinsic motivation scores were not significantly raised by using badges.<br>– Badges were accepted more favorably on average |
| Freiermuth and Ito (2022) [21] | Competition/battle | – Some students developed a greater enjoyment of learning activities. |
| Yu (2023) [22] | N/a | – Students are substantially more motivated when learning through gaming than without gaming.<br>– Students' learning outcome from gamified learning are noticeably superior to those from non-gamified learning. |
| Liman Kaban and Karadeniz (2021) [23] | Rewards | – No significant difference in students' reading comprehension levels between control and experimental groups.<br>– Students' performance in learning has not improved. |
| Tasiran (2019) [24] | N/a | – AR technology brought excitement, enthusiasm, and motivation to English language classes. |
| Malahito and Quimbo (2020) [25] | Leaderboards, status, experience, level, currency and shop, achievements, rewards and challenges | – Students are more engaged in the learning process in gamification classrooms. |
| Razali *et al.* (2022) [26] | Points, reward, difficulty, and avatar | – Gamification elements are the most significant components of the student's motivation. |
| Rahayu *et al.* (2022) [27] | Points, leaderboards, badges, and tests | – The gamified test, badges, leaderboard, and points are students' most significant gamification elements. |
| Alshammari (2020) [28] | Points, time pressure, levels, badges, rewards, feedback and leaderboards | – Gamification positively enhances students' learning motivation.<br>– Gamification positively improves learning outcomes. |
| Soepriyatna and Pangaribuan (2022) [29] | Rewards, immediate feedback | – Learning engagement was positively correlated with gamification's perceived ease of use and mediated by learning goal orientation. |
| Park and Kim (2021) [30] | Point and leaderboards | – Motivation, self-determination, learners' comprehension, career motivation, and self-efficacy are all positively impacted by gamification. |
| Ismail *et al.* (2018) [31] | Point and leaderboards | – Students' attitudes, motivation, and perceptions are all positively impacted by gamification.<br>– Students in vocational colleges are receptive to the concepts of gamification. |
| Palaniappan and MdNoor (2022) [32] | Points, leaderboards, and badge | – Learners' self-directed learning is positively supported by gamification.<br>– Gamified learning can improve students' performance and self-direction toward a meaningful learning experience. |
| Puig *et al.* (2023) [33] | Point, rewards, and badge | – Compared to the static group, the dynamic group's students showed greater engagement with the game elements. |
| Chen *et al.* (2023) [34] | N/A | – Gamified educational robots can potentially improve students' motivation to learn and their creativity.<br>– Creativity is greatly impacted by learning motivation, and highly motivated students exhibit superior creative performance. |
| Wan Hamzah *et al.* (2023) [35] | Points, levels, challenges, virtual goods, leader-boards, badges, gifts, and charity | – The use of gamification in e-learning applications positively impacts students' motivation. |
| Peter *et al.* (2019) [36] | Point, badge, and leaderboards | – Gamification elements (points, leaderboard, and badges) positively impact intrinsic motivations. |
| Chans and Portuguez Castro (2021) [37] | Point and rewards | – Gamification enhanced student engagement and motivation, enhanced attitudes, and encouraged students' positive behaviors |
| Santos *et al.* (2021) [38] | Ranking (leaderboards) | – Students' engagement and motivation increased by gamification. |
| Bitrian *et al.* (2020) [39] | Ranking (leaderboards) | – Interaction with a specific game element satisfied the needs for competence, autonomy, and relatedness. Satisfaction with the need for autonomy and relatedness is crucial to experiencing autonomous motivation. |
| Na and Han (2023) [40] | Leaderboards | – High positions in leaderboards encouraged complacent choices of behavior to maintain position.<br>– Participants with low ranks were more motivated to stick to the correct procedure and neither of the motivations was intrinsic. |

## 3. RESULTS AND DISCUSSION

This review is based on 25 articles that gather information on the research methods, research settings, gamification definitions, and gamification elements used. Table 1 summarizes the features of the selected articles. Articles were classified as determinant studies (n=10) or intervention studies (n=15). Determinant studies have used correlational and causal methods to test which gamification elements are related to student motivation. On the other hand, intervention studies test how gamification can increase student motivation.

In this review, a total of 16 articles were evaluated using quantitative methods, while two (2) articles used qualitative methods, and seven (7) articles used mixed methods. The reviewed articles covered the educational settings of science, technology, engineering, and mathematics (STEM; n=9), social sciences (n=4), linguistics (n=7), sports (n=1), and not mentioned (N/A; n=4). The study participants included all levels of education, from elementary to tertiary. The reviewed articles were published in scientific journals from various countries (Table 1). The review included studies from Europe (n=7), North America (n=2), South America (n=2), East Asia (n=5), Southeast Asia (n=8), and the Middle East (n=1). The explanations of the game elements, motivational outcomes, and learning results for each article are displayed in Table 2.

### 3.1. Definition of gamification

The consensus shared among the articles is that gamification entails the integration of game mechanics into non-game situations [2]. The eight articles included in this review incorporated and referenced this concept. While other studies did not explicitly mention this research, they aligned with the same interpretation of gamification. The research presented in this journal highlights gamification's objective of enhancing student engagement, interaction, motivation, and behavior across diverse settings.

### 3.2. Theory of motivation

The majority of the articles reviewed lacked a detailed description of the motivational theories used as a foundation for their research. While some studies highlight the significance of motivation and differentiate between intrinsic and extrinsic motivation, they fail to elucidate the theory employed. Of the six articles that utilized intrinsic and extrinsic motivation techniques, not all integrated gamification elements linked them. Notably, among the six articles that expounded upon the framework of motivation theory, only three articles based their arguments on self-determination theory. This information has academic significance as it highlights the limited adoption of self-determination theory in the literature on motivation theory [18], [39], [40].

Sailer's research findings suggest that self-determination theory offers a comprehensive and detailed understanding of the impact of gamification [41]. This theory emphasizes the importance of autonomy, competence, and relatedness, which can significantly influence an individual's motivation and engagement levels when participating in gamified activities [42]. Moreover, self-determination theories can explain intrinsic and extrinsic motivation, and the relationship between gamification elements and a person's basic psychological needs and learning outcomes. Overall, the research highlights the potential of incorporating self-determination theory into the design and implementation of gamification strategies to enhance user experience and achieve desired outcomes.

### 3.3. Impact on students' motivation

Three principal outcomes warrant attention in light of 25 peer-reviewed articles: motivation, engagement, and learning outcomes. It is noteworthy that a few studies do not assess motivation as being affected by gamification [19], [25], [29], [33], [38]. There has been a discernible increase in student motivation towards subjects that employ gamification, as evidenced by numerous studies. Certain studies have explicitly stated that gamification, specifically the use of element points, can bolster both intrinsic and extrinsic motivation among students [26].

In addition to motivation, a synthesis of the literature revealed common themes. The review results also show that gamification can increase engagement [25], [29], [33], [37], [38] and student learning outcomes [17], [19], [22], [28], [32]. Using gamification makes students more interested in engaging in learning, spending more time learning, and improving their academic achievements. However, there are differences in the research results related to intellectual improvement of students who use gamification. Some studies have found that increased student motivation is followed by increased academic achievement [17], [19], [22], [28], [33]. However, another study mentioned that, although there was an increase in student motivation and involvement in learning, it did not necessarily increase their understanding of the subject matter [23].

This needs to be a concern in gamification because students may not be interested in understanding the material further, but are more interested in using gamification applications because of many exciting features and feel challenged to complete tasks in the gamification method. In addition, when it comes to goal orientation, students with performance goals will use various ways to maintain their position on leaderboards and have the most points [40].

### 3.4. Elements of gamification

Gamification is the application of one or more game design elements in contexts other than games. The results from previous studies show that there is no agreement on how each element of gamification affects learning outcomes [43]. Therefore, a review of gamification elements is essential. Figure 2 shows the various gamification elements used in the educational settings. Based on Figure 2, leaderboards, badges, and points are the most widely used gamification elements in academic and learning environments.

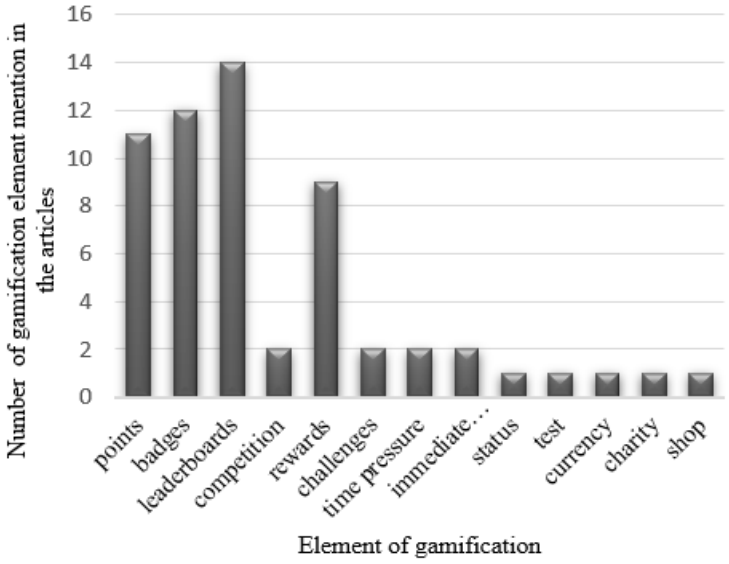


Figure 2. Elements of gamification employed in the studies

Leaderboards rank players based on their successful performance of tasks and measure success based on specific criteria [44]. Thus, leaderboards can determine who performs best [45] and is a comparison between the performance of one user and others. Leaderboards can generate competence among learners [18], [27]. A study by Landers *et al.* [46] stated that leaderboards applied to encourage competition between participants can be considered goals. He also suggested that the participants must get a challenge that is quite difficult for leaderboards to function effectively. Moreover, leaderboards can also be explained using social comparison theory, where people are more motivated when comparing themselves to others who have similar characteristics [42].

Badges represent achievements earned, collected, or achieved by a person during gamification [47]. Badges symbolize a person's achievements in playing game [48]. In gamification, badges have several functions, namely as goals and as status symbols, and become pride among other players [27], [47], [49]. There were varying results regarding the use of badges in this review. Facey-Shaw *et al.* [20] found that despite getting a positive response from students, badges could not increase students' intrinsic motivation. This result contradicts the research of Razali *et al.* [26] who stated that rewards in the form of levels, badges, and avatar replacement can increase internal motivation [17]. In terms of motivation, gamification that employs several smaller and less difficult tasks can increase students' self-efficacy in learning, which can also increase students' motivation [42].

Points are a basic element of gamification [49]. Points are given as rewards when someone succeeds in achieving a certain activity, and also serve to show participants' progress quantitatively [47], [50]. In this review, we found that points can specifically increase intrinsic motivation [26], [27] by serving as a reward for the efforts made by students in learning. Earning points can be an effective way to provide students with feedback on their activities [42]. When students complete a task without any mistakes, they can earn the maximum possible number of points. However, if they make mistakes, they may have points deducted from their totals. This system encourages students to strive for accuracy and helps them to understand where they can improve their learning.

Based on the analysis conducted on gamification elements, it was found that gamification elements based on rewards affected student motivation more than other elements. This is in line with research conducted by Jaskari and Syrjälä [16] who put the same thing forward. Reward-based systems are a type of motivation system that provide rewards or incentives to encourage people to engage in certain activities or

behaviors [51]. These systems have been found to be particularly effective in engaging people in short-term activities and teaching them valuable skills. In short-term activities such as tasks or projects that can be completed within a few hours or days, reward-based systems can provide an additional level of motivation for individuals to complete the task at hand. This can be achieved by offering rewards, such as points, badges, or other tokens of recognition that can be redeemed for tangible or intangible rewards. Similarly, in the context of skill development, it is beneficial to utilize reward-based systems to incentivize individuals to actively engage in learning and practicing new skills. By offering rewards for achieving specific milestones or demonstrating mastery of a particular skill, individuals are more likely to engage in the learning process and remain motivated. Overall, reward-based systems can be effective tools for engaging and motivating individuals in learning and skill development.

## 4. CONCLUSION

In this study, we conducted a scoping review to investigate the application of gamification in education, spanning a period of five years from 2018 to 2023. The findings of our review have provided invaluable perspectives, significantly enhancing the existing body of literature in multiple aspects. First, the implementation of gamification applications at various educational levels has exhibited an increasing trend. It is important to note that their significance and impact are substantial for student motivation.

Moreover, this study successfully identified the key gaming elements currently employed in education, namely, leaderboards, badges, and points. The implementation of a competitive environment may be deemed controversial; nevertheless, it is widely used to counteract students' adverse emotions and experiences, consequently enhancing learning outcomes. The primary areas influenced by this approach were motivation, engagement, and academic achievement.

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