Expectancy-Value Theory and Student Engagement in Educational Psychology: A Survey

Abstract

Expectancy-Value Theory (EVT) is a cornerstone in educational psychology, providing a framework for understanding student motivation and engagement. This survey explores EVT's application across various educational contexts, highlighting its role in influencing students' academic motivation through expectancy of success and subjective task value, which includes interest, utility, and perceived importance. The paper synthesizes findings from diverse studies, emphasizing the theory's relevance in language education, technology-enhanced learning, and culturally responsive teaching. Key insights reveal that EVT-informed interventions, such as gamification and AI-driven analytics, significantly enhance student engagement by aligning educational tasks with students' intrinsic and extrinsic motivations. The research underscores the importance of psychosocial constructs, such as self-efficacy and a sense of belonging, in shaping motivational dynamics. Additionally, the survey identifies challenges in EVT application, including reliance on self-reported measures and the need for longitudinal studies to capture motivational shifts over time. Future research directions propose exploring sociocultural and demographic factors to refine engagement strategies and extend EVT's applicability. By integrating EVT principles, educators can design dynamic learning environments that foster motivation, engagement, and academic success across diverse educational settings.

1 Introduction

1.1 Importance of Understanding Student Motivation and Engagement

Understanding student motivation and engagement is vital for creating effective educational environments and improving academic outcomes. Motivation significantly influences students' willingness to engage with academic tasks, thereby affecting their overall engagement and success rates [1]. In second or foreign language education, grasping how motivation impacts learners' performance is crucial for developing curricula and pedagogical strategies [2]. The interaction between motivation and self-control, often characterized by conflicting motivations, adds complexity to engaging students in educational settings [3].

In physics education, particularly during laboratory activities, student engagement is a key determinant of learning outcomes [4]. The difficulty of complex mathematical and physical concepts can hinder learning, especially for students with median or below-average grades [5]. The impact of task difficulty, especially in AI-assisted education, on students' performance, motivation, self-efficacy, and perceived task value further highlights the intricate relationship between motivation and educational outcomes [6].

The integration of social media platforms like Twitter in academic contexts has been investigated for its potential to enhance learning outcomes and foster community among students [7]. Moreover, continuous assessment strategies in physics courses correlate with improved academic performance, underscoring the significance of sustained engagement in educational success [8]. By leveraging
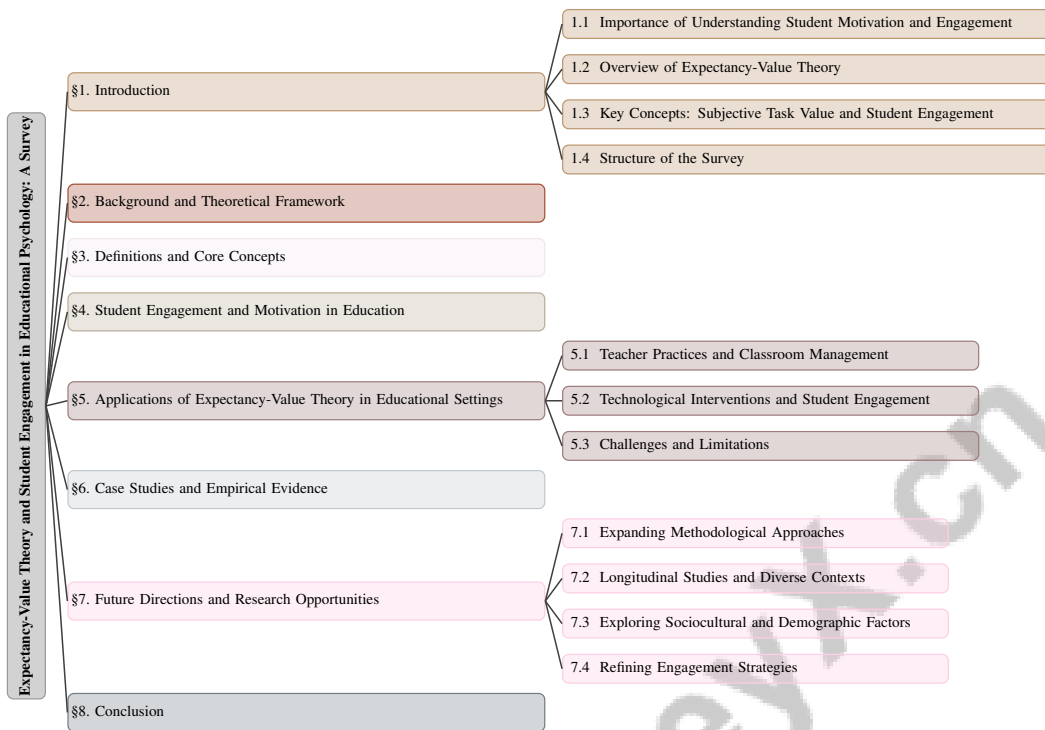
Figure 1: chapter structure

insights from these diverse studies, educators can create dynamic learning environments that promote engagement and motivation, ultimately enhancing educational outcomes across various contexts.

1.2 Overview of Expectancy-Value Theory

Expectancy-Value Theory (EVT) is a foundational framework in educational psychology that elucidates student motivation and engagement. Central to EVT is the idea that a student's motivation is shaped by their expectancy of success and the subjective value they attribute to a task, which includes aspects such as interest, utility, and perceived importance [2]. This model distinguishes between internal and external dimensions of motivation, with external factors like family support being particularly influential in online learning environments [1].

EVT is applicable across various educational settings, including language education, where it helps decode learners' motivations and behaviors [2]. Its relevance extends to technology-enhanced learning environments; for example, Novel Observations in Mixed Reality (NOMR) labs have been shown to improve students' epistemological understanding, self-efficacy, and engagement in experimental physics, demonstrating EVT's applicability in contemporary educational practices [4].

Additionally, EVT sheds light on the complex relationship between self-control and academic outcomes, framing self-control as a value-based choice where decisions are influenced by subjective values [3]. The incorporation of tools such as spreadsheets in science and mathematics education has been linked to increased engagement among students facing initial mathematical challenges, highlighting the practical implications of EVT [5].

Furthermore, the use of social media platforms like Twitter in educational activities has been explored for its potential to enhance academic performance and engagement, illustrating EVT's diverse applications in promoting student motivation [7]. The theory is enriched by elements of behavioral economics and choice architecture, which can positively influence student behavior and engagement, particularly in mathematics education [8].

EVT is essential for understanding the dynamics of student motivation and engagement, as it clarifies how students' expectations for success and the value they place on tasks shape their learning choices, persistence, and overall academic performance. By incorporating insights from EVT, educators and

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researchers can devise more effective strategies to enhance educational experiences and outcomes, especially in varied contexts such as second language acquisition and other academic domains. This theory emphasizes the importance of fostering positive expectations and task values, providing a foundation for designing motivating learning environments that cater to diverse learner needs [1, 2, 9, 10].

1.3 Key Concepts: Subjective Task Value and Student Engagement

Subjective task value, a fundamental aspect of Expectancy-Value Theory (EVT), is crucial for understanding student motivation and engagement in educational contexts. It encompasses the perceived importance, utility, and intrinsic interest that students attribute to academic tasks, significantly influencing their motivation and engagement levels [4]. Recognizing the value of a task is vital for fostering cognitive and emotional engagement, enabling students to find meaning and relevance in their academic pursuits, thus enhancing their learning experiences and outcomes.

Student engagement can be categorized into behavioral, emotional, and cognitive dimensions, all contributing to academic success. Traditional teaching methods may not always effectively stimulate students' interest or cognitive engagement, potentially resulting in suboptimal academic performance. Innovative pedagogical strategies, such as game-based learning and motivational theories, have been shown to enhance student engagement, particularly in complex subjects [7].

Technology plays a pivotal role in facilitating student engagement. For instance, virtual reality applications in physics education have been demonstrated to enhance students' epistemological understanding, self-efficacy, and engagement, showcasing technology's potential to transform educational experiences [4]. Additionally, social media platforms like Twitter have been examined for their ability to boost academic performance and engagement by providing new avenues for interaction and learning [7].

A comprehensive understanding of how subjective task value interacts with student engagement is essential for designing effective educational strategies. Established theories such as EVT link students' motivation to their perceptions of task relevance and expected success. By synthesizing existing research on personal relevance and its implications for motivation, educators can develop targeted interventions that enhance student engagement and improve academic outcomes across various learning contexts [9, 11, 12, 10]. Leveraging insights from EVT and incorporating technological advancements enables educators to create dynamic learning environments that motivate and engage students, ultimately leading to improved academic outcomes.

1.4 Structure of the Survey

This survey is meticulously structured to provide a thorough exploration of Expectancy-Value Theory (EVT) within educational psychology, focusing on its implications for student motivation and engagement. The paper begins with an introduction that emphasizes the importance of understanding student motivation and engagement, followed by an overview of EVT and its relevance to educational settings. Key concepts such as subjective task value and student engagement are introduced to establish a foundational understanding for subsequent discussions, highlighting their critical roles in educational motivation and the synthesis of various theoretical frameworks, including EVT and self-determination theory, essential for enhancing students' learning experiences and outcomes [9, 13, 12, 10].

The second section delves into the background and theoretical framework of EVT, detailing its origins and key components. This section examines the role of subjective task value, including interest, utility, and perceived importance, in shaping academic motivation and discusses the integration of psychosocial constructs within EVT.

The third section defines core concepts such as 'expectancy', 'subjective task value', 'student engagement', and 'academic motivation', elucidating their interrelations within the EVT framework. It differentiates between intrinsic and extrinsic motivation and discusses the concept of cost in EVT.

The fourth section explores the relationship between student engagement and motivation, applying EVT to understand various dimensions of engagement, including behavioral, emotional, and cognitive aspects. The role of technology and gamification in enhancing engagement, as well as environmental and contextual influences, are also discussed.

The fifth section examines the applications of EVT in educational settings, highlighting practical implications for educators and strategies to enhance the expectancy and value components among students. Challenges and limitations in applying EVT are also addressed.

The sixth section presents case studies and empirical evidence demonstrating the application of EVT in educational psychology. This includes interdisciplinary studies and research on integrating technology with EVT to enhance learning.

The penultimate section identifies gaps in the current literature and proposes future research directions, suggesting new methodologies, the need for longitudinal studies, and the exploration of sociocultural and demographic factors in EVT research.

The conclusion provides a comprehensive overview of the study's key findings, emphasizing the significant role of Expectancy-Value Theory (EVT) in fostering student motivation and engagement. It highlights how EVT can serve as a valuable framework for understanding the cognitive processes influencing learners' academic performance, particularly in language education. The discussion reiterates EVT's potential to inform and enhance educational practices and policies, suggesting that integrating its principles could lead to improved student outcomes and more effective teaching strategies in diverse educational settings [1, 2, 9, 10].The following sections are organized as shown in Figure 1.

2 Background and Theoretical Framework

2.1 Origins and Key Components of Expectancy-Value Theory

Expectancy-Value Theory (EVT) is a pivotal framework in educational psychology, offering insights into student motivation and engagement by integrating cognitive perspectives with task valuation. The theory comprises two primary components: expectancy, which pertains to an individual's belief in their ability to succeed, influenced by past experiences, task difficulty, and self-efficacy [1], and value, which includes intrinsic motivation, identified regulation, introjected regulation, external motivation, and demotivation, all crucial for task engagement and academic success [7].

EVT's development has been enriched by diverse educational applications, such as Novel Observations in Mixed Reality (NOMR) labs, which enhance understanding of scientific processes in physics [8], and the Personalized Behavioral Feedback Intervention (PBFI) method, which combines human feedback with analytics to boost engagement. However, EVT faces challenges in culturally responsive education, particularly for students of color, necessitating further research to broaden its applicability [1]. Additionally, differences in motivation and outcomes between online and face-to-face students highlight the significance of environmental factors within EVT [7].

2.2 Subjective Task Value: Interest, Utility, and Perceived Importance

Subjective task value, a core element of EVT, significantly affects student motivation and engagement through its components: interest, utility, and perceived importance. Interest, or intrinsic enjoyment, is vital for fostering motivation, especially in STEM fields [2]. The use of virtual reality in education exemplifies how self-efficacy and epistemology enhance motivation through immersive experiences [4]. Utility value, the perceived usefulness of a task for future goals, aligns academic activities with aspirations, enhancing motivation [2]. This alignment is crucial in subjects like mathematics, where engagement is necessary to overcome challenges [5]. Perceived importance, based on personal or societal values, shapes motivation and influences engagement with educational content [3].

Innovative strategies to integrate subjective task value into educational environments are essential for enhancing engagement. AI-driven interface designs in Intelligent Tutoring Systems (ITS) and the use of spreadsheets in science and mathematics education have been shown to increase engagement, particularly among students facing initial difficulties [14, 5]. Understanding and leveraging interest, utility, and perceived importance enable educators to align educational practices with students' intrinsic values, fostering dynamic learning environments that enhance performance [10, 1, 13, 9, 15].

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2.3 Psychosocial Constructs and EVT

Incorporating psychosocial constructs into EVT provides a comprehensive perspective on student motivation and engagement. Constructs such as self-efficacy, emotions, sense of belonging, and well-being are pivotal in shaping motivational dynamics. Self-efficacy enhances expectancy of success and engagement [1], while emotions influence motivation and willingness to engage with tasks. A sense of belonging, crucial in diverse contexts, is particularly significant in online learning, where lack of interaction can affect performance [16]. Community-building strategies can enhance belonging and engagement.

Well-being, encompassing psychological and physical health, sustains long-term motivation and engagement. Gamification and interactive learning strategies enhance well-being by creating enjoyable educational experiences, improving engagement, and reducing dropout rates [17, 18, 19]. The interplay of psychosocial constructs with cultural and demographic factors complicates the motivational landscape, highlighting the need for culturally responsive practices. Advanced technologies, such as AI-driven learning analytics, offer new opportunities for understanding and enhancing engagement [1].

By leveraging these constructs, educators can develop effective strategies to foster motivation and engagement, leading to improved outcomes. The integration of expectancy and subjective task value constructs within EVT offers insights into student motivation complexities, particularly in second language learning. Understanding how expectations for success and task value influence engagement enables the creation of supportive learning environments, enhancing performance and providing practical strategies for optimal learning conditions [2, 10].

3 Definitions and Core Concepts

3.1 Intrinsic and Extrinsic Motivation

Intrinsic and extrinsic motivation are central to Expectancy-Value Theory (EVT), each playing a crucial role in shaping student engagement and academic outcomes. Intrinsic motivation, driven by an inherent interest in activities, is essential in contexts like online language learning, where it enhances satisfaction and persistence in tasks such as collaborative writing and speaking, thereby influencing the intention to use language learning technologies [1, 20, 2, 9]. This form of motivation is closely tied to subjective task value, particularly the interest component, promoting deeper engagement and creativity in academic exploration.

In contrast, extrinsic motivation, motivated by external incentives such as rewards and grades, relates to the utility and perceived importance components of subjective task value within EVT. It effectively enhances task completion and performance when aligned with personal goals, as demonstrated by studies on the reciprocal relationship between motivation and academic achievement [1, 2, 20, 21].

The interaction between intrinsic and extrinsic motivation is significant, as both influence students' expectations of success and engagement. While intrinsic motivation is often linked to positive educational outcomes, extrinsic motivation can complement it, especially when intrinsic interest declines. However, reliance on self-report measures limits the understanding of these constructs, and there is a gap in research on the 'perceived cost' component of EVT, which could clarify how intrinsic and extrinsic motivations jointly affect engagement [22].

Educators should balance intrinsic and extrinsic motivational strategies to optimize student engagement. By fostering intrinsic motivation through personal relevance and providing meaningful extrinsic incentives, educators can improve academic performance. This balanced approach, rooted in expectancy-value theory, underscores the significance of students' success expectations and task value perceptions in fostering persistence and achievement. Integrating these motivational constructs can enhance educational outcomes across diverse contexts, leading to more effective and sustained learning experiences [9, 10].

3.2 Cost and Academic Motivation

Within the Expectancy-Value Theory (EVT), the concept of cost represents a critical yet underexplored dimension of academic motivation. Cost involves perceived negative aspects or sacrifices associated

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with task engagement, such as effort, opportunity costs, and emotional strain. These perceived costs can significantly influence a student's decision to engage or withdraw from educational activities, impacting motivation and outcomes. Research highlights costs as predictors of avoidance goals, negative classroom experiences, and academic performance, especially in subjects like mathematics [16, 12].

In educational settings, cost perception is often balanced against potential task benefits, dynamically shaping student motivation. For instance, in online learning environments, students may perceive higher costs due to the absence of immediate feedback and increased self-regulation demands, which can reduce motivation and engagement [1]. Additionally, mastering complex subjects can be seen as costly, particularly for students with lower self-efficacy or those facing academic challenges [5].

Individual differences and contextual factors, such as cultural background and prior experiences, further affect cost perception. Students from underrepresented groups or those lacking support systems may perceive higher costs, impacting their motivation and engagement [1]. Innovative pedagogical strategies, like gamification and technology-enhanced learning, can mitigate perceived costs by increasing task enjoyment and reducing cognitive load [4].

A comprehensive understanding of perceived cost within the EVT framework is vital for educators aiming to enhance motivation and engagement. Research shows that perceived costs significantly affect students' motivation, goal adoption, and achievement. By integrating expectancy, task value, and cost constructs, educators can better predict and promote positive academic outcomes. Addressing perceived costs in academic tasks enables the development of targeted interventions to reduce engagement barriers, support students in achieving educational goals, foster inclusive learning environments, and improve outcomes across diverse contexts [23, 10, 12, 2, 24].

Figure 2 illustrates the key aspects of perceived costs within the Expectancy-Value Theory framework, focusing on their impacts on academic motivation, factors affecting cost perception, and strategies to mitigate perceived costs. This visual representation reinforces the importance of understanding cost dynamics in educational contexts and provides a framework for developing effective interventions to enhance student motivation.
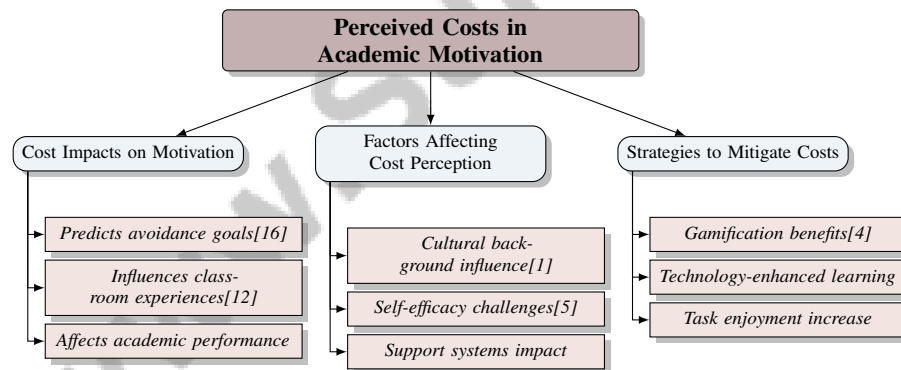

Figure 2: This figure illustrates the key aspects of perceived costs within the Expectancy-Value Theory framework, focusing on their impacts on academic motivation, factors affecting cost perception, and strategies to mitigate perceived costs.

4 Student Engagement and Motivation in Education

Understanding the intricate relationship between student engagement and motivation is essential for educators aiming to enhance student experiences and outcomes. This section examines three primary dimensions of student engagement—behavioral, emotional, and cognitive—each significantly influencing the educational experience through the lens of Expectancy-Value Theory (EVT).

4.1 Dimensions of Student Engagement

Student engagement is crucial for educational success and is closely tied to EVT, encompassing behavioral, emotional, and cognitive dimensions. Behavioral engagement involves active participation

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in academic tasks, such as attendance and assignment completion. Enhancing this dimension can be achieved through strategic interventions that boost confidence and participation, such as targeted communication and peer attendance comparisons [25, 26].

Emotional engagement reflects students' affective responses, including interest and belonging, which are fundamental for fostering intrinsic motivation. Supportive interactions and culturally responsive education enhance emotional engagement, creating inclusive environments that support diverse student needs [11, 13].

Cognitive engagement pertains to mental effort and self-regulation in learning. Personalized educational content and strategic thinking enhance cognitive engagement by aligning with EVT's utility component, facilitating long-term goal achievement [27, 5]. Technological advancements, such as AI-driven interfaces and BoW-based models, provide new insights into engagement without relying on event sequences [14, 28].

By understanding and applying these dimensions, educators can design interventions that address both intrinsic and extrinsic motivational factors, fostering dynamic and inclusive learning environments that enhance engagement and promote academic success [9, 13].

4.2 The Role of Technology in Enhancing Engagement

Technology's integration in education has significantly impacted student engagement across behavioral, emotional, and cognitive dimensions. A structured framework categorizes technology's influence, offering a guide for enhancing engagement in alignment with EVT [18, 29].

Behavioral engagement is enhanced through interactive platforms and digital games, fostering dynamic learning environments that improve academic performance [7, 18, 30, 31, 29]. Emotional engagement benefits from multimedia and interactive content, which enhance intrinsic motivation and course satisfaction [20, 1, 32, 9, 33].

Cognitive engagement is supported by technologies that facilitate self-regulated learning and strategic thinking, such as ITS and AI-driven analytics, providing personalized experiences and reflective practices [34, 11, 18, 35]. Tools like Stungage assess engagement in real-time, allowing dynamic teaching adjustments [36].

The intersection of technology and EVT offers promising avenues for enhancing engagement by addressing motivational factors, creating dynamic and inclusive learning environments that sustain engagement and promote academic success.

4.3 Gamification and Student Engagement

Gamification, aligning with EVT principles, enhances student engagement by integrating game-like elements into education. It capitalizes on intrinsic motivation and subjective task value, transforming learning into interactive activities. Studies show gamification significantly elevates engagement and performance, as seen in software testing and flipped learning environments [37, 38].

In science education, gamification fosters curiosity and deepens understanding, improving learning outcomes and attitudes towards subjects. Gamified response systems like Kahoot! enhance motivation and reduce anxiety in language learning, contributing to positive learning environments [33, 39, 40].

Innovative methods, such as the BoS approach, optimize engagement detection, demonstrating gamification's effectiveness in enhancing student engagement [28]. This strategy fosters sustained engagement and improves academic outcomes across disciplines, benefiting educators and learners in diverse contexts [33, 41].

4.4 Environmental and Contextual Influences

Environmental and contextual factors significantly influence student engagement and motivation, interacting with EVT principles. The learning environment, both physical and digital, shapes motivation by enhancing or constraining access to resources and opportunities for interaction. Research highlights technology's role in influencing engagement dimensions and academic performance [7, 18, 15].

In traditional classrooms, physical elements like seating arrangements impact motivation and engagement, fostering supportive atmospheres that legitimize diverse cultural backgrounds [42, 13, 21, 10]. Digital learning environments offer flexibility but may challenge engagement due to isolation; however, technology enhances motivation through interactive and personalized experiences [1, 4].

Cultural and socio-economic factors also influence engagement, as diverse backgrounds affect motivational dynamics. Culturally responsive teaching enhances engagement by making learning relevant and meaningful [13]. Addressing disparities through targeted interventions fosters equitable learning environments, enhancing engagement and recognizing diverse backgrounds [13, 11, 18].

Understanding these influences is essential for creating inclusive learning environments. By addressing EVT components, educators can develop strategies that enhance engagement and motivation, fostering dynamic and supportive educational settings [2, 23, 10].

In exploring the application of Expectancy-Value Theory within educational contexts, it is crucial to understand the various dimensions that influence student engagement and motivation. Figure 4 illustrates the hierarchical structure of environmental and contextual influences on student engagement and motivation, highlighting categories such as learning environments, cultural and socio-economic factors, and educational strategies. Each category is further delineated into specific elements, thereby providing a comprehensive framework for understanding how these influences interact with EVT principles to shape student engagement.
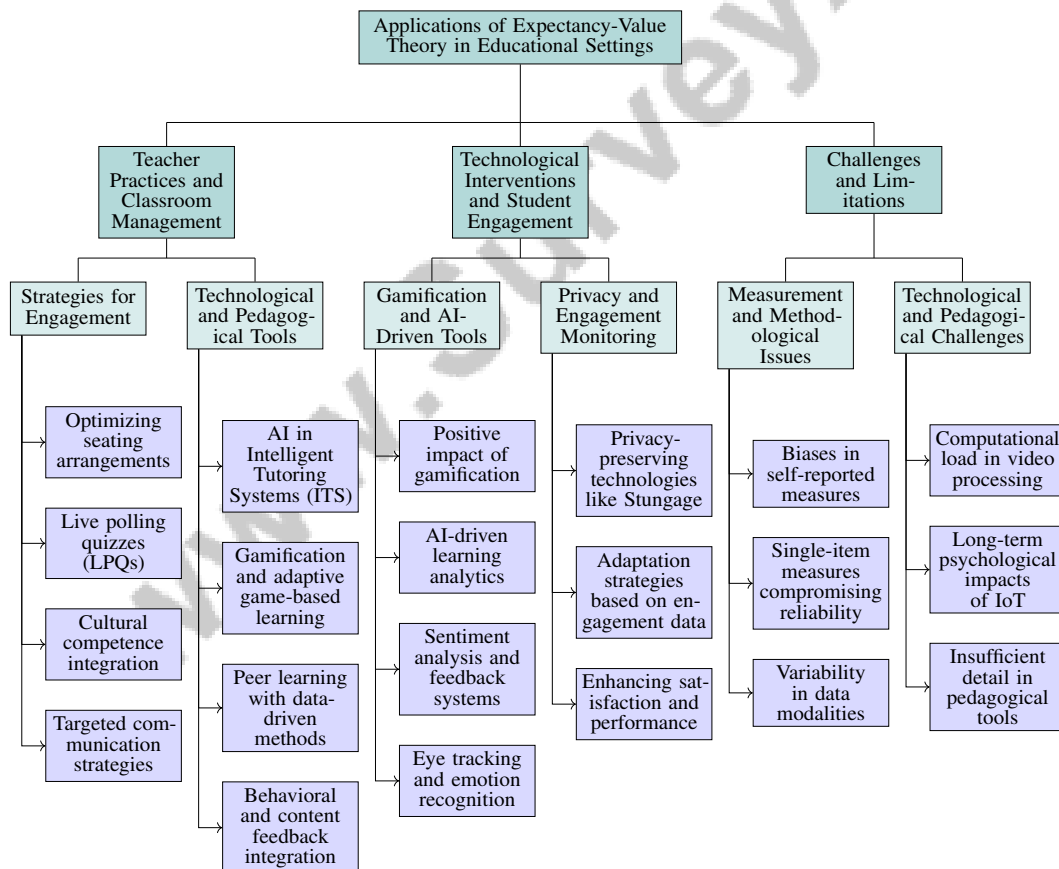

Figure 3: This figure illustrates the hierarchical structure of applying Expectancy-Value Theory in educational settings, highlighting key categories such as teacher practices, technological interventions, and challenges. Each category is further divided into strategies, tools, and issues that contribute to student engagement and motivation.
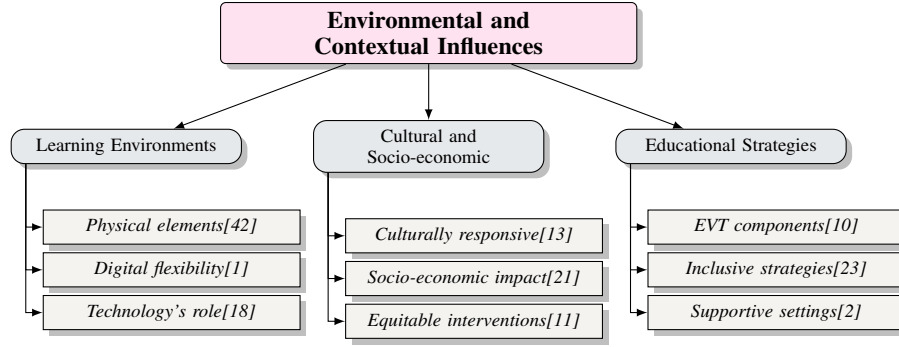
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5 Applications of Expectancy-Value Theory in Educational Settings

5.1 Teacher Practices and Classroom Management

Teacher practices and effective classroom management are pivotal in leveraging Expectancy-Value Theory (EVT) to boost student engagement and motivation. By aligning strategies with EVT, educators can enhance students' perceptions of task value and expectancy of success, thus creating more engaging educational experiences [2]. Optimizing seating arrangements fosters interaction and collaboration, thereby improving engagement [42]. Live polling quizzes (LPQs) offer valuable formative assessment insights but require clear instructions to maintain motivation [43].

Cultural competence is crucial for motivation and achievement; incorporating students' cultural backgrounds enhances their sense of belonging and motivation [13]. Targeted communication strategies significantly boost self-efficacy and belonging [25]. The integration of AI in Intelligent Tutoring Systems (ITS) provides personalized learning experiences, with AI-driven interfaces offering feedback that enhances motivation and engagement [14]. Gamification emerges as an effective strategy, with adaptive game-based learning improving engagement and outcomes [37, 44].

Peer learning, facilitated by data-driven methods like the PICADA framework, enhances collaborative learning by pairing students based on complementary knowledge [45]. Integrating behavioral feedback with content feedback further enhances engagement [11].

5.2 Technological Interventions and Student Engagement

Technological interventions enhance student engagement by aligning with EVT principles to create personalized learning experiences. Extensive literature highlights gamification's positive impact on motivation and learning across educational contexts [38]. Gamification, incorporating game-like elements, boosts motivation and engagement, especially in medical and public health education [38]. Platforms like Kaizen-Education exemplify successful gamified applications, reinforcing EVT's relevance.

AI-driven learning analytics provide real-time engagement insights, enabling tailored interventions that enhance motivation and outcomes. These tools facilitate adaptive, data-driven educational strategies, integrating human feedback and analytics to deepen student involvement [10, 11, 46, 24, 47]. Sentiment analysis and feedback systems enhance engagement by offering timely insights into students' emotional and cognitive states. Techniques like eye tracking and emotion recognition yield comprehensive engagement measures, allowing educators to understand attentional focus. Systems like Stungage monitor engagement during virtual classes, improving educational material design [48, 49, 36].

Privacy-preserving technologies like Stungage assess engagement without compromising privacy, enabling educators to adapt strategies based on engagement data, enhancing satisfaction and perfor-

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mance in virtual environments [48, 34, 49, 50]. Technological interventions are crucial in applying EVT to enhance engagement through personalized, interactive learning. By leveraging AI and learning analytics, educators can foster vibrant environments that promote engagement, motivation, and success across diverse contexts, providing insights into behaviors and emotional states for tailored instructional strategies [51, 13].

5.3 Challenges and Limitations

Applying Expectancy-Value Theory (EVT) in education faces challenges that may affect its effectiveness and generalizability. A key issue is reliance on self-reported measures, which can introduce biases and fail to capture temporal changes in motivation and engagement [1]. This reliance can skew results, especially in voluntary participation scenarios where faculty support varies [7]. The focus on academic self-concept complicates establishing causal relationships in EVT applications [1].

Technological interventions face challenges like computational load and efficiency in video processing on handheld devices [14]. Integrating IoT technologies into education often overlooks the long-term psychological impacts and data quality variability due to environmental noise [3]. Studies frequently use single-item measures for constructs like flow and frustration, compromising reliability and depth [38].

Variability in data modalities and insufficient annotator training hinder accurate engagement measurement, leading to inconsistencies in defining engagement constructs [5]. The timing of gamified activities may not significantly reduce exam anxiety, and insufficient detail in pedagogical tools' implementation can lead to misapplication [6]. The model's flexibility in defining value attributes complicates behavior predictions in specific contexts [3].

Small class sizes in studies may limit variability and effectiveness in pairing students, constraining generalizability [5]. The underexploration of cost components in research results in a lack of understanding of their unique impact compared to expectancy and task value [1]. Research often focuses on short-term outcomes, neglecting factors like self-regulated learning crucial for long-term success [7].

Addressing these challenges is essential for advancing EVT application in education, as these factors significantly influence motivation, engagement, and outcomes [10, 2, 24, 47, 9]. By refining measurement models, expanding methodologies, and considering ethical and infrastructural factors, researchers and educators can enhance EVT-based interventions' effectiveness and applicability to improve motivation and engagement.

6 Case Studies and Empirical Evidence

6.1 Empirical Evidence from Interdisciplinary Studies

Interdisciplinary research provides substantial empirical support for Expectancy-Value Theory (EVT) across various educational contexts, highlighting its effectiveness in enhancing student engagement and motivation. Gamification emerges as a significant area, demonstrating positive impacts on engagement and motivation, albeit with some mixed results [38]. This indicates that gamification aligns well with EVT by enhancing the perceived value and enjoyment of academic tasks. Contextualizing educational content to resonate with student interests further underscores EVT's principles. For instance, the TutorShop framework, which uses GPT-4 to tailor problem sets according to student preferences, underscores the importance of aligning educational content with learner interests to boost engagement and motivation [27]. This approach enhances the subjective value component of EVT, increasing the relevance of academic tasks.

The Relative Attendance Index (RAI) has proven to be a valuable metric for assessing student engagement, showing a stronger correlation with academic performance (GPA) than traditional attendance metrics, suggesting that peer-based measures offer deeper insights into engagement and its effects on academic outcomes [26]. Furthermore, educational interventions based on EVT principles have demonstrated tangible benefits, with a survey reporting an 8% increase in pass rates and a 10% rise in progression rates following specific educational practice changes [8].

These interdisciplinary studies robustly support EVT's role in fostering student engagement and motivation across diverse educational contexts. A meta-analysis reveals a significant positive correlation

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between student engagement—encompassing behavioral, emotional, and cognitive dimensions—and academic performance. EVT explains how learners' expectations regarding task outcomes and the perceived value of their educational goals enhance motivation, facilitating greater participation and success in learning activities [1, 17, 2, 9]. By integrating innovative strategies and technologies, these studies deepen the understanding of motivational dynamics, supporting the development of effective interventions to promote student success.

6.2 Integration of Technology in Educational Settings

The integration of technology in educational settings significantly transforms learning experiences, aligning with Expectancy-Value Theory (EVT) principles by fostering personalized and engaging environments that cater to diverse student needs. A study on automatic assessment tools for programming exercises demonstrates technology's positive impact on student performance, streamlining assessment processes and providing immediate feedback, thereby enhancing students' expectancy of success and motivation [52].

Innovative applications like Stungage, designed to assess student engagement during online classes, have shown effectiveness in providing real-time insights into engagement levels compared to traditional methods. Evaluations, including a lab-scale study and an in-the-wild study, highlight its potential in enhancing engagement [36]. Technologies like these align with EVT by increasing the perceived value of educational tasks through interactive and responsive learning environments.

Automatic recognition of student engagement through performance metrics such as classification accuracy, F1 measure, and AUC offers a robust framework for assessing technological interventions in capturing and enhancing engagement [34]. By leveraging these tools, educators gain deeper insights into student behavior and motivation, enabling more targeted and effective strategies.

Technological integration presents promising opportunities for applying EVT to enhance learning. By combining personalized feedback from human instructors and analytics, along with real-time engagement assessments and efficient evaluation processes, these technologies improve motivation and academic performance in reflective writing tasks and other activities, particularly in diverse online learning environments. Research indicates that such feedback approaches significantly enhance engagement, especially for students with lower self-regulated learning skills, allowing for adaptive teaching strategies based on real-time responses, ultimately fostering a more effective and satisfying learning experience [20, 11, 47].

7 Future Directions and Research Opportunities

7.1 Expanding Methodological Approaches

Innovative methodological approaches are crucial for deepening our understanding of student motivation and engagement through Expectancy-Value Theory (EVT). Longitudinal studies should be prioritized to explore the dynamic nature of expectancy and value beliefs, especially in language learning contexts, to assess their long-term effects on motivation [2]. Evaluating tools that align educational content with student interests across diverse settings is essential for understanding their impact on learning outcomes [27].

The integration of technology in education offers avenues for enhancing engagement by optimizing technology use and teaching methods, with a focus on AI-driven systems that assess task difficulty. Controlled experiments should explore gamification, considering individual differences in learning styles and demographics [38]. Enhancing engagement detection technologies through advanced systems incorporating sensors for 3D facial expression detection can improve accuracy [49]. This should be complemented by research on the long-term effects of feedback interventions to provide insights into sustained impacts on motivation and engagement [11].

Further research should examine the influence of prior online learning experiences and self-regulated learning strategies on online education dynamics, particularly concerning associated costs [16]. Understanding these dynamics can inform interventions aimed at reducing cost perceptions and improving academic outcomes. Refining data capture techniques and strategies for engaging non-responsive students are critical areas for future inquiry [8].

Educational data mining techniques, such as analyzing student interactions on platforms like Twitter, can offer insights into broader impacts on learning and engagement [7]. By embracing these methodological advancements, researchers can enhance EVT applications in educational psychology, leading to more effective strategies for fostering student motivation and engagement.

7.2 Longitudinal Studies and Diverse Contexts

Longitudinal studies are vital for understanding the causal relationships and indirect effects of student engagement and emotions on academic achievement through Expectancy-Value Theory (EVT) [17]. These studies track motivational dynamics over time, informing effective educational practices [21]. Exploring diverse educational contexts extends EVT's applicability across cultural and educational settings, examining how cultural values and systems influence motivational dynamics [53]. This approach clarifies mixed findings and investigates the impact of technologies like LinkedIn and mobile apps on student engagement and motivation [18].

Rigorous quantitative studies should assess culturally responsive practices' effectiveness across diverse contexts and groups [13]. Integrating cultural considerations into EVT research fosters inclusive learning environments catering to all students' needs. By focusing on personal relevance, cultural context, and motivation-achievement relationships, researchers can significantly enhance motivational theories' effectiveness, improving academic outcomes and creating inclusive learning atmospheres that value students' backgrounds [1, 25, 13, 9, 17].

7.3 Exploring Sociocultural and Demographic Factors

Investigating sociocultural and demographic factors within Expectancy-Value Theory (EVT) is crucial for understanding influences on student motivation and engagement across diverse contexts. Factors such as identity, cultural background, age, gender, and ethnicity shape students' perceptions of task value and expectations for success, affecting motivation and performance. EVT posits that beliefs about task importance and self-efficacy influence engagement and persistence in learning. Culturally relevant pedagogy enhances competence and autonomy, impacting academic outcomes and satisfaction [13, 54, 10].

Identity and cultural factors shape motivational processes, contributing to self-concepts and educational aspirations. In second language (L2) learning, identity and cultural influences are critical for understanding motivation and engagement [10]. Further exploration of cultural identity's interaction with EVT components is needed to influence educational experiences.

Demographic factors like age and gender may moderate motivation-education outcome relationships, including dropout intentions [55]. Understanding these moderating effects informs targeted interventions for diverse student populations. Career aspirations' influence on academic motivations highlights the importance of considering diverse populations and domains in EVT research [56].

Gamification's impact across educational contexts emphasizes exploring sociocultural and demographic factors [57]. By examining these factors in gamified environments, researchers gain insights into gamification strategies' effectiveness for diverse groups.

Demographic factors like gender and ethnicity influence perceptions and outcomes, necessitating deeper understanding in EVT research [58]. This understanding guides culturally responsive educational practices catering to students' unique needs.

Incorporating sociocultural and demographic factors into EVT research enriches understanding of motivational dynamics, highlighting how cultural backgrounds, personal beliefs, and contextual influences shape expectations and values regarding academic tasks, affecting engagement, achievement, and learning experiences [2, 13]. Addressing these factors leads to strategies enhancing motivation and engagement, improving outcomes across varied contexts.

7.4 Refining Engagement Strategies

Refining engagement strategies involves integrating Expectancy-Value Theory (EVT) insights with educational technology and analytics advancements. Future research should enhance interface designs and explore AI features to improve engagement, creating interactive and personalized learning

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environments [14]. AI-driven analytics provide insights into behavior and motivation, enabling targeted interventions.

Exploring adaptive support systems' effects on diverse populations is promising. Studies should assess flow and self-efficacy measures in varied contexts to optimize adaptive environments. This approach incorporates culturally relevant content and personalized strategies to address diverse needs, fostering engagement and improving performance [59, 11, 13, 9, 15].

Incorporating physiological signals and course attributes into strategies provides a comprehensive understanding of physiological responses' impact on engagement. Future research should explore additional signals to enhance understanding and refine data collection for accuracy and reliability [3].

Advanced gamification techniques present a promising strategy for boosting engagement, supported by research indicating gamified environments enhance motivation, knowledge acquisition, and performance across disciplines [60, 38, 33, 41]. Future research should refine these techniques and assess long-term impacts on outcomes and effectiveness. Examining gamified platforms' effects across educational levels and groups provides insights into broader applicability and effectiveness.

Future research should explore methods to manipulate value attribute weights to enhance self-control and investigate neural mechanisms underlying these processes. Understanding these mechanisms informs strategies leveraging EVT principles for sustained engagement and success [3].

By integrating EVT insights and educational technology advancements, educators can develop tailored engagement strategies addressing diverse needs. These strategies, including structured designs, digital tools, and supportive relationships, enhance engagement and improve outcomes across environments, fostering inclusive and effective educational experiences [11, 18, 30, 24, 29].

8 Conclusion

The investigation into Expectancy-Value Theory (EVT) within educational psychology underscores its pivotal influence on student motivation and engagement. The theory elucidates how both intrinsic and extrinsic motivational factors, alongside psychosocial and contextual elements, shape student engagement. EVT's applicability across diverse educational contexts highlights its potential to guide the development of pedagogical strategies that enhance academic outcomes. Empirical studies validate the effectiveness of EVT-based interventions, such as gamification and technology integration, in boosting student motivation and engagement. The implementation of mobile technologies and adaptive learning platforms has proven successful in delivering personalized educational experiences tailored to individual student needs. Additionally, research on classroom management, including seating arrangements, reveals significant effects on students' engagement levels, illustrating EVT's practical applications in educational settings. The importance of culturally responsive teaching practices is emphasized, advocating for the inclusion of cultural relevance in motivational studies to advance educational outcomes for underrepresented groups and foster equity. Furthermore, the comparison between online and traditional learning environments highlights the need for customized approaches to address the distinct challenges and opportunities of digital education, as online learners often face lower academic performance despite comparable motivation levels.

References

[1] TuongVan Vu, Lucía Magis-Weinberg, Brenda RJ Jansen, Nienke van Atteveldt, Tieme WP Janssen, Nikki C Lee, Han LJ van der Maas, Maartje EJ Raijmakers, Maien SM Sachisthal, and Martijn Meeter. Motivation-achievement cycles in learning: A literature review and research agenda. *Educational Psychology Review*, 34(1):39–71, 2022.

[2] Qi Wang and Mengchen Xue. The implications of expectancy-value theory of motivation in language education. *Frontiers in Psychology*, 13:992372, 2022.

[3] Elliot T Berkman, Cendri A Hutcherson, Jordan L Livingston, Lauren E Kahn, and Michael Inzlicht. Self-control as value-based choice. *Current directions in psychological science*, 26(5):422–428, 2017.

[4] Jared P. Canright and Suzanne White Brahmia. Modeling novel physics in virtual reality labs: An affective analysis of student learning, 2023.

[5] George C. Cardoso. Method to study student engagement uniformity in a classroom, 2016.

[6] Yitzhak Spielberg and Amos Azaria. Revelation of task difficulty in ai-aided education, 2022.

[7] Smaragdi Loutou, Nikolaos Tselios, and Panagiota Altanopoulou. The effect of twitter-mediated activities on learning outcome and student engagement: A case study, 2018.

[8] M. M. Casey and S. McVitie. Academic performance student engagement in level 1 physics undergraduates, 2009.

[9] Stacy J Priniski, Cameron A Hecht, and Judith M Harackiewicz. Making learning personally meaningful: A new framework for relevance research. *The Journal of Experimental Education*, 86(1):11–29, 2018.

[10] Elizabeth KY Loh. What we know about expectancy-value theory, and how it helps to design a sustained motivating learning environment. *System*, 86:102119, 2019.

[11] Wannapon Suraworachet, Qi Zhou, and Mutlu Cukurova. Impact of combining human and analytics feedback on students' engagement with, and performance in, reflective writing tasks, 2022.

[12] Contents lists available at scie.

[13] Revathy Kumar, Akane Zusho, and Rhonda Bondie. Weaving cultural relevance and achievement motivation into inclusive classroom cultures. *Educational Psychologist*, 53(2):78–96, 2018.

[14] Byungsoo Kim, Hongseok Suh, Jaewe Heo, and Youngduck Choi. Ai-driven interface design for intelligent tutoring system improves student engagement, 2020.

[15] Abdallah Moubayed, MohammadNoor Injadat, Abdallah Shami, and Hanan Lutfiyya. Relationship between student engagement and performance in e-learning environment using association rules, 2020.

[16] The costs of online learning:.

[17] Hao Lei, Yunhuo Cui, and Wenye Zhou. Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality: an international journal*, 46(3):517–528, 2018.

[18] Laura A Schindler, Gary J Burkholder, Osama A Morad, and Craig Marsh. Computer-based technology and student engagement: a critical review of the literature. *International journal of educational technology in higher education*, 14:1–28, 2017.

[19] Chris A Boulton, Emily Hughes, Carmel Kent, Joanne R Smith, and Hywel TP Williams. Student engagement and wellbeing over time at a higher education institution. *PloS one*, 14(11):e0225770, 2019.

14

[20] Daniel Bailey, Norah Almusharraf, and Ryan Hatcher. Finding satisfaction: Intrinsic motivation for synchronous and asynchronous communication in the online language learning context. *Education and Information Technologies*, 26(3):2563–2583, 2021.

[21] Nitza Davidovitch and Ruth Dorot. The effect of motivation for learning among high school students and undergraduate students–a comparative study. *International Education Studies*, 16(2):117–127, 2023.

[22] Hui Xing Sin, Leonard Tan, and Gary E McPherson. A prisma review of expectancy-value theory in music contexts. *Psychology of Music*, 50(3):976–992, 2022.

[23] Hayley Franklin and Ingrid Harrington. A review into effective classroom management and strategies for student engagement: Teacher and student roles in today's classrooms. *Journal of Education and Training Studies*, 2019.

[24] Cecilia Ka Yuk Chan and Wenxin Zhou. Deconstructing student perceptions of generative ai (genai) through an expectancy value theory (evt)-based instrument. *arXiv preprint arXiv:2305.01186*, 2023.

[25] Debra Lewis. Increasing student engagement in math placement and preparation, 2019.

[26] Pan Deng, Jianjun Zhou, Jing Lyu, and Zitong Zhao. Assessing attendance by peer information, 2021.

[27] Gautam Yadav, Ying-Jui Tseng, and Xiaolin Ni. Contextualizing problems to student interests at scale in intelligent tutoring system using large language models, 2023.

[28] Ali Abedi, Chinchu Thomas, Dinesh Babu Jayagopi, and Shehroz S. Khan. Bag of states: A non-sequential approach to video-based engagement measurement, 2023.

[29] Melissa Bond and Svenja Bedenlier. Facilitating student engagement through educational technology: towards a conceptual framework. *Journal of Interactive Media in Education*, 2019(1), 2019.

[30] Géraldine Heilporn, Sawsen Lakhal, and Marilou Bélisle. An examination of teachers' strategies to foster student engagement in blended learning in higher education. *International journal of educational technology in higher education*, 18(1):25, 2021.

[31] Ella R Kahu and Karen Nelson. Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher education research & development*, 37(1):58–71, 2018.

[32] Shih-Yin Lin, John M. Aiken, Daniel T. Seaton, Scott S. Douglas, Edwin F. Greco, Brian D. Thoms, and Michael F. Schatz. Exploring university students' engagement with online video lectures in a blended introductory mechanics course, 2016.

[33] Julia Gressick and Joel B Langston. The guilded classroom: Using gamification to engage and motivate undergraduates. *Journal of the Scholarship of Teaching and Learning*, 17(3):109–123, 2017.

[34] Omid Mohamad Nezami, Mark Dras, Len Hamey, Deborah Richards, Stephen Wan, and Cecile Paris. Automatic recognition of student engagement using deep learning and facial expression, 2019.

[35] Youngnam Lee, Byungsoo Kim, Dongmin Shin, JungHoon Kim, Jineon Baek, Jinhwan Lee, and Youngduck Choi. Prescribing deep attentive score prediction attracts improved student engagement, 2020.

[36] Snigdha Das, Sandip Chakraborty, and Bivas Mitra. I cannot see students focusing on my presentation; are they following me? continuous monitoring of student engagement through "stungage", 2022.

[37] Raquel Blanco, Manuel Trinidad, Maria Jose Suarez-Cabal, Alejandro Calderon, Mercedes Ruiz, and Javier Tuya. Can gamification help in software testing education? findings from an empirical study, 2023.

[38] Jenni Majuri, Jonna Koivisto, and Juho Hamari. Gamification of education and learning: A review of empirical literature. *GamiFIN*, pages 11–19, 2018.

[39] Merve Sercanoğlu Öden, Yusuf İslam Bolat, and İdris Goksu. Kahoot! as a gamification tool in vocational education: More positive attitude, motivation and less anxiety in efl. *Journal of Computer and Education Research*, 9(18):682–701, 2021.

[40] Using gamification in a teaching.

[41] Open access.

[42] Nan Gao, Mohammad Saiedur Rahaman, Wei Shao, Kaixin Ji, and Flora D. Salim. Individual and group-wise classroom seating experience: Effects on student engagement in different courses, 2022.

[43] Xingyu Zhao. The impact of live polling quizzes on student engagement and performance in computer science lectures, 2023.

[44] Arif Rachmatullah, Frieda Reichsman, Trudi Lord, Chad Dorsey, Bradford Mott, James Lester, and Eric Wiebe. Modeling secondary students' genetics learning in a game-based environment: Integrating the expectancy-value theory of achievement motivation and flow theory. *Journal of Science Education and Technology*, 30:511–528, 2021.

[45] Steve Geinitz. Pica: A data-driven synthesis of peer instruction and continuous assessment, 2024.

[46] Cecilia Ka Yuk Chan and Wenxin Zhou. Deconstructing student perceptions of generative ai (genai) through an expectancy value theory (evt)-based instrument, 2023.

[47] Himali Aryal. A literature survey on student feedback assessment tools and their usage in sentiment analysis, 2021.

[48] Amanjot Kaur, Aamir Mustafa, Love Mehta, and Abhinav Dhall. Prediction and localization of student engagement in the wild, 2018.

[49] Prabin Sharma, Shubham Joshi, Subash Gautam, Sneha Maharjan, Salik Ram Khanal, Manuel Cabral Reis, João Barroso, and Vítor Manuel de Jesus Filipe. Student engagement detection using emotion analysis, eye tracking and head movement with machine learning, 2023.

[50] Ali Abedi and Shehroz S. Khan. Engagement measurement based on facial landmarks and spatial-temporal graph convolutional networks, 2024.

[51] Ramteja Sajja, Yusuf Sermet, David Cwiertny, and Ibrahim Demir. Integrating ai and learning analytics for data-driven pedagogical decisions and personalized interventions in education, 2024.

[52] Alberto Simões and Ricardo Queirós. On the nature of programming exercises, 2020.

[53] Jiesi Guo, Herbert W Marsh, Philip D Parker, Alexandre JS Morin, and Theresa Dicke. Extending expectancy-value theory predictions of achievement and aspirations in science: Dimensional comparison processes and expectancy-by-value interactions. *Learning and Instruction*, 49:81–91, 2017.

[54] Fernando Doménech-Betoret, Laura Abellán-Roselló, and Amparo Gómez-Artiga. Self-efficacy, satisfaction, and academic achievement: the mediator role of students' expectancy-value beliefs. *Frontiers in psychology*, 8:1193, 2017.

[55] Theresa Schnettler, Julia Bobe, Anne Scheunemann, Stefan Fries, and Carola Grunschel. Is it still worth it? applying expectancy-value theory to investigate the intraindividual motivational process of forming intentions to drop out from university. *Motivation and Emotion*, 44:491–507, 2020.

16

[56] Fani Lauermann, Yi-Miau Tsai, and Jacquelynne S Eccles. Math-related career aspirations and choices within eccles et al.'s expectancy–value theory of achievement-related behaviors. *Developmental psychology*, 53(8):1540, 2017.

[57] Michail Kalogiannakis, Stamatios Papadakis, and Alkinoos-Ioannis Zourmpakis. Gamification in science education. a systematic review of the literature. *Education sciences*, 11(1):22, 2021.

[58] Original paper.

[59] Philip M. Johnson, Carleton Moore, Peter Leong, and Seungoh Paek. Improving engagement, diversity, and retention in computer science with radgrad: Results of a case study, 2024.

[60] Wilk Oliveira, Juho Hamari, Lei Shi, Armando M Toda, Luiz Rodrigues, Paula T Palomino, and Seiji Isotani. Tailored gamification in education: A literature review and future agenda. *Education and Information Technologies*, 28(1):373–406, 2023.

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