



HOW DO ARAB STUDENTS IN HIGHER EDUCATION IN ISRAEL PERCEIVE THE IMPACT OF SMART LEARNING ON THEIR LEARNING OUTCOMES, ENGAGEMENT, MOTIVATION, AND ACHIEVEMENT?

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Abstract:

This study examines how Arab students in higher education in Israel perceive the impact of smart learning on their learning outcomes, academic engagement, and motivation. For this qualitative study, semi-structured interviews were used with 40 Arab students in Higher Education in Israel to identify perceptions of both opportunities and constraints associated with smart learning environments. Findings indicate that students perceive benefits of smart learning, including flexible learning, personalized learning, and real-time feedback to support their academic understanding and motivation. The findings also suggest that challenges remain, including digital fatigue, lack of emotionally meaningful connections with peers and with instructors, and the continuing cycle of inequitable access to technology. The study concluded that smart learning is best supported as part of an overall strategy for sustainable equity, which includes digital infrastructure and pedagogy that reinforces inclusion. Implications suggest that institutions address how they employ human-centered practices in digital education, including in education programming, and support equitable access to smart learning devices. Theoretically, this study develops an understanding of how technology, equity, and learning intersect, while practically providing suggestions to enhance the smart learning experience in diverse higher education contexts.

Keywords: smart learning, Arab students, higher education, learning outcomes, student engagement, academic motivation, academic achievement, digital education, personalized learning, adaptive learning technologies, qualitative research, Israel, educational equity, digital infrastructure

1. Introduction

This study examines Arab student perspectives in more nuanced ways on the new opportunities for learning offered by smart learning environments. Research objectives were to learn about students' experiences with smart learning environments as well as to

explore aspects of their academic journey which are affected by the use of digital learning tools. The study is framed around five research questions that focus on students' perceived impacts of smart learning on their academic performance, motivation, engagement, learning outcomes and challenges along the way. The study employed a qualitative approach using semi-structured interviews with 40 Arab students in Higher Education in Israel. In general, students had a positive impact of learning in smart learning environments, such as flexibility in their own time, personalized learning and academic support. Greater concerns included digital fatigue, human connection, and unequal access to tools and resources.

Smart learning refers to the use of technology, specifically AI, big data analytics, and adaptive technologies to deliver personalized and flexible learning used in education (Steehler *et al.*, 2022; Das *et al.*, 2023), which will alter the learning experience based on student need (i.e., personalized), provide feedback in real-time (i.e., instant communication) and stimulate collaborative engagement (e.g., digital collaboration) (Maghsudi *et al.*, 2021; Guoqing *et al.*, 2023). Four key constructs explored in this study include learning outcomes as measurable skills and competencies achieved from education (González *et al.*, 2024), student engagement which may be defined as emotional, behavioral, and cognitive involvement (Wang, 2025) in learning, motivation which can be defined as intrinsic and extrinsic determinants of learning behavior (Fuertes *et al.*, 2023; Mustamin *et al.*, 2025), and academic achievement which refers to performance, retention, and growth (Mahjabeen *et al.*, 2024; Ozcan, 2021). The boundaries of this study include practices in digital learning at Israeli higher education institutions regarding Arab sector students.

This study is important as it considers a marginalized population in an increasingly digital academic environment. It adds to the growing landscape of research on digital transformation in education by providing a culturally and contextually specific contribution. Importantly, the findings that smart learning can confer a number of academic benefits will also require consideration for equitable implementation in order to foster engagement and access for all students. Based on the findings of this study, the authors recommend investing in equitable digital infrastructure, including human interaction in digital spaces, and using smart tools together with supporting pedagogy. These recommendations are important for policymakers, educators, and institutions who are committed to making smart learning increasingly meaningful and effective for diverse contexts in higher education.

2. Literature Review

2.1 Smart Learning in Higher Education:

Smart learning means the incorporation of modern technologies and data-informed approaches as part of educational practices (Steehler *et al.*, 2022). Smart learning environments combined tools such as artificial intelligence (AI), big data analytics, and adaptive learning technologies to provide personalized learning experiences to address

the students' needs and preferences. Das and colleagues (2023) argue that these technologies allow for the collection and analysis of extensive data related to student performance and to create personalized instructional content while also providing real-time feedback. This personalization not only improves learning efficiency but also increases student engagement and motivation by connecting learning activities with their interests and learning styles (Maghsudi *et al.*, 2021).

The use of smart learning tools in higher education has also been associated with improved academic performance and outcomes (Contrino *et al.*, 2024). For example, the use of intelligent tutoring systems and adaptive learning platforms allows for differentiated instruction that addresses the diverse learning paces and capabilities of students (Maghsudi *et al.*, 2021). A study by Verma and colleagues (2023) showed that students who engage with these adaptive systems often show better academic performance and retention rates compared to those in traditional learning environments. The ability of smart learning technologies to provide immediate and actionable feedback helps students identify and address their knowledge gaps promptly, thereby fostering a more effective and continuous learning process (Gligorea *et al.*, 2023).

Additionally, smart learning technologies hold promise to foster collaborative learning and improve collaboration and community among students. With our smart learning technologies, tools like virtual classrooms, discussion forums, and collaborative software enable students to interact and collaborate with their peers and teachers, without geographical barriers (Vali, 2023). Essential components of developing critical thinking and problem-solving skills are interaction and connectivity with others. A study by Guoqing *et al.* (2023) found that students who studied in smart learning environments reported more engagement and satisfaction than traditionally taught students; participants in the smart learning technology stated their engagement and satisfaction with their learning was the result of the interactive and collaborative use of technologies involved. So, using smart teaching and learning tools encourages individual learning and promotes a more connected and collaborative student community (Oskarita & Arasy, 2024).

2.2 Learning Outcomes

Learning outcomes function like a GPS system for education. Learning outcomes direct students to the end goals of a course. They point both students and teachers in the direction of the road to follow and clarify what students will have completed at the conclusion of the course. Learning outcomes guide teachers and students to understand what checkpoints must be completed to reach their destination (Mahajan & Singh, 2017). Learning outcomes for students are established knowledge, skills, attitudes, and competencies that students are expected to learn during or as a result of their educational experience (González *et al.*, 2024). Learning outcomes are concrete objectives for teaching and assessment, which ensure that educational programs are aligned with educational goals. Learning outcomes reflect the holistic development of pupils in multiple areas of learning, including cognitive, emotional, and psychomotor domains (García, 2021). They

set a standard for academic achievement and provide a framework for assessing student progress and program effectiveness. Establishing and assessing learning outcomes is important for ensuring educational ventures demonstrate excellence and accountability in elementary and higher education (Owan, 2023).

2.3 Students' Engagement

Student engagement in the learning process is the amount of attention, intrigue, interest, excitement, and passion that students exhibit. Engagement also refers to students' desire for success and motivation to learn (Apiku & Asiimwe, 2023). Student engagement can be complicated since it includes behavioral aspects related to involvement, affective responses (emotional involvement), and commitment or use of sophisticated learning properties (cognitive engagement) (Fasco *et al.*, 2024). For example, behavioral engagement includes students' participation not only in curricular activities, but also engagement in extra-curricular activities while making decisions about attendance and effort to participate in a learning activity (Daniels *et al.*, 2016). Emotional involvement refers to students' affective responses, such as attentional engagement, positive psychological outcome engagement (enjoyment), and social engagement (belonging). Cognitive engagement refers to students being committed or any involvement at all, and using sophisticated learning properties such as self-regulatory skills (Wang, 2025). Recent studies have shown that increasing student involvement potentially involves increased student involvement to both enhance academic performance, such as better grades, improved retention, and increased positive affect in the learning (Fredricks *et al.*, 2004).

2.4 Students' Motivation

Motivation is one of the key components of students' educational experience and a vital factor towards student success (Sejdiu-Shala *et al.*, 2024). Motivation can occur in two ways: intrinsic or extrinsic (Reena & Bonjour, 2010). Intrinsic motivation comes from the desire to engage in the activity simply because it is interesting or enjoyable. Extrinsic motivation means students engage in the activity to pursue a reward or to avoid an undesired outcome (Pandya, 2024). Research has shown that strong correlations exist in students who are intrinsically motivated, have more engagement, a much deeper approach to learning, and higher academic success. More specifically, students who are intrinsically motivated are more willing to participate in challenging activities, have more persistence in the face of setbacks, and have a greater degree of creativity and critical thinking (Fuentes *et al.*, 2023).

2.5 Students' Achievement

Student achievement, a critical determinant of educational effectiveness, encompasses many aspects, including academic performance, personal growth, and future career endeavors (Ozcan, 2021). Hattie (2009) claims that visible learning is a key component of understanding the effects of different influences on student progress. Hattie's extensive review of the literature underscores the importance of quality teacher-student

relationships, quality feedback, and quality student self-efficacy as having measurable effects on their academic achievement. Additionally, Mahjabeen and colleagues (2024) acknowledge the importance of instructional style and classroom organization for enhancing student achievement, and they emphasize that students are likely to benefit from environments that are orderly and methods of teaching where goals and expectations are shared with the student. This reinforces that student achievement is complex and multifaceted, reinforcing the need for a comprehensive lens in education methods.

Recent studies have used reconceptualizing approach to identify the factors associated with students' academic achievement, dividing them into four main domains: personal, family, school, and social factors (Gilar-Corbi *et al.*, 2019).

Personal factors entail demographic factors such as gender and age (Tsaousis & Alghamdi, 2022), lifestyle factors such as health and sleep (Zhang *et al.*, 2022), and psychological factors such as self-concept, self-regulation of emotions, and motivation (Cheng, 2023). Family factors consist of socioeconomic status, family structure, parental education, and parental engagement and support (Nunes *et al.*, 2023).

School factors such as teaching practices, the quality of the curriculum, school climate, and teacher-student ratios show a diverse level of effect on achievement outcomes (Spreitzer & Hafner, 2023) in an educational context. A supporting school climate particularly influences student engagement and achievement (Zysberg *et al.*, 2021). Risk and resilience factors such as the community and social context of students, including the quality of the neighbourhood they live in or in which their school is situated, school culture, and the type of area they live in, externally relate to academic outcomes (Hansen *et al.*, 2022).

3. Material and Methods

This study employed qualitative research methodology to examine how Arab students in higher education in Israel perceived the influence of smart learning on academic performance, engagement, motivation, and achievement. Qualitative methodology was chosen because it can provide deeper and wider insights into the particular participants' own experiences and articulated perspectives, which relate fundamentally to the aims of the study (Sileyew, 2019). Given that smart learning is a new phenomenon in higher education, especially for the Arab sector in Israel, in relation to smart learning, qualitative methodology could also help to know about students' interpretation and experience of smart learning, contextualized in their educational situation. Moreover, qualitative research is valuable for researching complex phenomena that include an interconnected array of factors—personal, technological, and institutional—which influence students' academic development (Timans *et al.*, 2019).

To collect data, the researcher used interviews, specifically semi-structured interviews, as the primary data collection tool. Semi-structured interviews allowed participants to freely articulate their views while enabling the researcher enough latitude

to follow up on important issues and ensure engagement with the research aims (Negussie *et al.*, 2025). Semi-structured interviews allowed flexibility in the questioning, while allowing consistencies across interviews for comparative purposes (Kiger & Varpio, 2020). The questions were placed around understanding student perceptions of the smart learning technologies engagement with their learning outcomes, engagement levels, triggers of motivation and academic success. The interview format elicited participants' responses regarding their direct experiences with the use of adaptive learning platforms, digital collaborative tools and immediate feedback.

The target population was Arab students in higher education in Israel. A purposive and snowball sampling strategy was used to select students. The snowball sampling method was particularly helpful in obtaining data from a diverse sample of Arab students in different disciplines and years in higher education, as it involved initial group members recommending other group members who met the inclusion criteria. 40 students participated in the study. The comprehensive backgrounds and levels of academic studies helped to represent different contexts in Israel's higher education on how smart learning technologies were perceived and experienced through various contexts.

Data collected from the interviews were analyzed using thematic analysis. Thematic analysis focuses on identifying, analyzing, and reporting themes or patterns within data. In this case, thematic analysis allowed the researcher to capture and record patterns related to insights of recurring themes based on how smart learning impacts students' educational experiences (Ahmed *et al.*, 2025). Thematic analysis is a suitable approach for qualitative research, particularly when the researcher intends to make sense of data in terms of the experiences, meanings, and interpretations of individuals (Kiger & Varpio, 2020). The identified themes facilitated the researcher to use it in consideration of the study's conceptual frame, which included definitions found in the literature regarding smart learning and development. The findings presented in this research study encompass the research questions and offer implications regarding the digital transformation of higher education and an Arab student population (e.g., students living in Israel).

4. Results

The findings of this study reveal a complex and multifaceted understanding of Arab students in higher education in Israel and their perceptions of smart learning in terms of its effect on their academic experiences. These findings come from a thematic analysis of qualitative interview data that identify five themes that encapsulate the positive and negative qualities of smart learning environments: perceived academic learning outcomes, enhanced student engagement, increased student motivation, increased academic achievements, and the challenges of obtaining services, barriers to access, and navigation barriers of smart learning systems.

- **Theme 1: Perceived Impact of Smart Learning on Academic Learning Outcomes**

Study participants provided feedback that smart learning greatly enhanced their ability to understand and retain information by providing more flexible and individualized learning pathways. One participant remarked, *"The videos and digital notes helped me study in my own time. I understood the material better because I could repeat things when I needed to."* Another added, *"Before smart learning, I had trouble keeping up in class, but now I can go back and review the lessons whenever I want—it really helps me feel more confident before exams."* These experiences speak to the findings of Das *et al.* (2023), who highlighted the power of adaptive learning systems that customize content based on individual learning needs and provide instantaneous feedback to enhance understanding. Likewise, Maghsudi *et al.* (2021) noted that smart learning environments improve the association between learning material and student preferences, resulting in improved learning. However, other participants noted they engaged in surface-level learning due to the lack of support, which is consistent with the position of Gligorea *et al.* (2023) that instructional design is central to maximizing the potential impact of smart learning.

- **Theme 2: Influence of Smart Learning Tools on Student Engagement**

Students often commented that smart learning tools were effective at keeping them engaged. They stated that digital features were particularly helpful in encouraging engagement and interactivity. One participant observed, *"We are using online forums and quizzes at the same time—catches my attention and gets me involved in the class."* Others noted that being able to interact with their peers and the lecturer generated a richer learning atmosphere than face-to-face interactions alone. Their impressions of being engaged and connected to the smart, collaborative learning environments echoed findings in Guoqing *et al.* (2023), which demonstrated higher engagement levels and satisfaction when the learning experience included elements of smart and collaborative environments. Despite this, a few students mirrored being 'disconnected' at times, stating, *"I miss the energy in in-person— sometimes it feels like a little more viewing than learning."* Vali (2023) acknowledged the benefits of technology for learning content, soft skills, and collaboration, but cautioned that the use of remote tools can reduce an individual's emotional connection through experience and conversations if human engagement and interaction is not intentionally part of the process.

- **Theme 3: Perceived Effects of Smart Learning on Student Motivation**

Most students reported increased motivation to learn due to wise education because of the self-direction and immediacy of feedback available. One participant commented, *"It feels good to see progress bars and instant results from quizzes—it motivates me to continue,"* which is consistent with the findings of Fuertes *et al.* (2023), who found that intrinsic motivation is enhanced when students are provided interactive tasks that also increase self-efficacy and the sense of being in control of their learning. The more autonomy and self-direction learners had in reporting movement in learning linked to

course content, the more empowered they felt through learner-specific navigation and personalized learning pathways. Others, however, felt their motivation declined when content became too digital and impersonal: *"When everything is automated, I start to lose interest. I want some human encouragement."* This is consistent with Mustamin and colleagues (2025), who found that while technology can add to students' extrinsic motivation to learn, intrinsic motivation through the students' social and emotional experiences can drive learning.

- **Theme 4: Impact of Smart Learning on Academic Achievement and Performance**

Participants generally indicated that smart learning had a positive relationship with their performance, as they indicated better management of time and access to learning materials. For example, one student indicated, *"I can plan my studies around work, which helps me stay on track. I think I am doing better than before."* This aligns with the findings of Verma *et al.* (2023) that adaptive platforms contributed to greater levels of academic performance as well as student retention rates. Participants also noted that they experienced smart tools to help enhance their self-directed learning, which mirrors the observations made by Contrino *et al.* (2024) regarding digital feedback loops to ensure academic responsibility. However, barriers were identified in subject areas that required hands-on application or gradation in thinking. As an example, one participant explained, *"Some topics were too difficult to learn independently; I need the teacher to explain."* This indicates the requirement, as emphasized by Mahjabeen *et al.* (2024), is to find the balance in using smart tools to balance human facilitation, as this is integral to academic success.

- **Theme 5: Challenges and Problems Associated with Smart Learning Approaches**

Despite many positives, participants identified many barriers to smart learning at their institutions. The barriers included internet connectivity, lack of technical training and digital fatigue. A respondent said, *"Sometimes the platform does not work, or the internet is slow. It is frustrating to keep up."* A respondent stated, *"Spending so many hours on the screen is tiring; it affects my focus and my health."* These challenges are similar to findings by Oskarita and Arasy (2024), who argue that without the right support systems and balance, smart learning can showcase the symptoms of overstress and disengagement. In addition, students raised issues around equity; some students did not have reliable devices or private spaces, reflecting the social and structural barriers described by Hansen *et al.* (2022). The findings imply a need for institutions to not just invest in technology; they must also invest in inclusive digital infrastructure and support.

5. Discussion

This study's findings provide insights into how Arab students in higher education in Israel perceive the impact of smart learning on different dimensions of their academic experience, learning outcomes, engagement, motivation, and achievement. With digital

transformation continuing to evolve educational practices, it is vital to understand students' perceptions.

A key finding of this study is that students perceived that their academic learning outcomes benefited from smart learning technologies. Students reported that through smart tools that allowed for repetition, self-determined pacing and contained personalized content, they achieved greater comprehension, flexibility, and retention. These outcomes resonate with the findings of Das *et al.* (2023), who found that adaptive technologies for learning that provided real-time feedback were more effective for learning efficiency and allowed students to close knowledge gaps quickly. Likewise, Maghsudi *et al.* (2021) noted that aligning digital content with students' preferences and learning styles will support more positive cognitive outcomes. The study did, however, identify that in some scenarios, the lack of structured support surrounding smart learning could result in students being shallowly engaged. This concern aligns with Gligorea *et al.* (2023), which emphasized that careful instructional design and planning are needed to benefit from student engagement in digital learning environments.

Another key finding relates to the role of smart learning tools in influencing student engagement. Most students preferred interactive elements, commonly found in smart learning, such as real-time quizzes, online forums, and collaborative tools, for improving student engagement levels. This finding supports Guoqing *et al.*'s (2023) findings that smart learning can result in greater engagement and satisfaction when students actively engage with content and peers. The inclusion of collaborative and social components in smart platforms appears to differentiate emotional and behavioral engagement. However, some students indicated feeling disconnected from the learning process, since there was no in-person interaction or feeling of emotional presence. This confirmation supports Valli's (2023) assertion that models of smart learning that include, and rely on, technology must also adopt human-centered approaches to facilitate emotional connectivity to support meaningful engagement.

In relation to motivation, the findings of this study highlighted how smart learning increases students' intrinsic motivation by providing choices and facilitating instantaneous feedback. These elements proposed ownership of student learning and allowed students to keep progressing. This finding supports the findings among Fuertes *et al.* (2023) regarding how self-efficacy and learner control are important in deep learning. While there were elements of motivation when learning environments of learners lacked a dimension of human encouragement, some found that their motivation was waning. This contradictory finding resonates with the literature related to motivation, especially Reena and Bonjour (2010), who described the difference between intrinsic and extrinsic motivational elements. While smart technologies will support extrinsic motivation, gaining attention through gamification and feedback loops, intrinsic motivation can only be maintained if psychosocial and emotionally responsive learning environments are present.

Students were hesitant to attribute academic achievement solely to smart learning. Generally, they believed smart learning contributed to improvement. Student

participants emphasized time management, accessing learning materials, and pacing their selves with their learning improved their academic learning efficiencies. Verma *et al.* (2023) found that students who use adaptive learning performed better and retained more. Contrino *et al.* (2024) found that smart learning tools have feedback loops to shore up academic ownership and goal-setting behavior.

Importantly, they noted two critical challenges with smart learning: the students felt disadvantaged in courses relying on practical applications or sophisticated theoretical learning, which illustrated that teacher presence is imperative to success. This dynamic justifies Mahjabeen *et al.*'s (2024) argument for continuing to incorporate smart learning while ensuring guided, structured learning integrates to support academic rigor and student success, supporting various subject area demands.

Finally, there are challenges to implementing smart learning in learning and development, particularly with the Arab student population studied in Israel. Technical barriers, including poor internet connectivity, no devices, and insufficient digital infrastructure, were indicated as significant barriers to smart learning. Students noted migrated digital fatigue, loss of focus, and pain from sitting in front of a screen. These challenges are not insignificant, although Oskarita and Arasy (2024) conducted a study claiming that without systems in place to support pedagogical constructs, digital environments can disengage students and result in psychological strain to students.

Further, the barriers to strategic engagement typically exist under overarching structural inequalities (Hansen *et al.*, 2022), indicating the smart learning tools positioned are less advantageous (in this case, further from equity) to already limited student groups who would engage with smart learning. Therefore, universities imagining themselves as a vehicle for the future facets of higher education need to consider how adopting advanced pedagogical tools must also align with institutionalizing included supports while taking students' well-being into account.

6. Conclusion

This research examined the perceptions of Arab students in higher education in Israel, regarding the impact of smart learning on their academic learning outcomes, engagement, motivation, and achievement. Overall, while students reported favorably on the impact of smart learning technologies as tools to build flexibility, self-directed learning, academic performance, and intrinsic motivation, the study also identified drawbacks. Students recognized the value of collaborative and interactive digital tools to enhance engagement, the lack of human connection and personal interaction and technical difficulties hindered engagement, and issues surrounding a lack of digital infrastructure are issues that may inhibit the benefits of smart learning from being experienced by all students.

Based on the responses in the study, participants made stronger associations with adaptive digital platforms and improvements in students' comprehension, management of time, and ability to have their own personalized learning path. The results of the

current study supported prior findings indicating that smart learning environments help improve both engagement and academic performance (Das *et al.*, 2023; Verma *et al.*, 2023; Maghsudi *et al.*, 2021). The findings also suggest emotion and social connections are important elements in promoting sustained motivation and engagement, echoing Fuertes and colleagues (2023) and Mustamin *et al.* (2025), who best argue for understanding, supporting, and leveraging both extrinsic and intrinsic motivation. The findings from the study support that smart learning tools are most beneficial when paired with supportive instructional design and equitable access to digital tools (Hansen *et al.*, 2022; Gligorea *et al.*, 2023).

While findings are promising, there are many challenges. Digital fatigue, emotionlessness, and accessing reliable technology to ensure the best learning experience still exist in a smart learning context. These issues warrant further exploration into the viability of human-centered teaching and learning for the digital platforms generally designed to serve those historically underserved. In particular, the post-secondary educational institution needs to develop its infrastructure in a way that broadens inclusive access and supports knowledge development and pedagogical practices that foster digital fluency and well-being. As post-secondary education moves towards being a different kind of digital entity altogether, the efficacy of smart learning will depend in significant part on the thoughtful, human-centered introduction of technology as a mode of learning, and the recognition of its restrictions when it comes to inclusivity and accessibility.

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Conflict of Interest Statement

The author declares no conflicts of interest.

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