Integrating Translation and Web-Based Learning into Higher Education: Challenges, Self-Esteem, and the Quest for Academic Excellence among Arabic-Speaking Students

Hana Ghazy Almakky iD
King Abdulaziz University

Abstract. This study investigated the nexus between translation challenges and web-based learning in higher education, with a particular focus on how these factors impact Arabic-speaking students' dissertation writing, engagement, and academic performance. Conducted in Saudi Arabia, the research employed a mixed-methods approach, blending quantitative data from a survey of 166 students, both male and female, with qualitative insights from interviews with 23 teachers and students. The study aim was to understand the effects of engagement strategies, interaction dynamics, and pedagogical design and the incorporation of emerging technologies, including virtual reality and artificial intelligence, on student outcomes. Preliminary findings highlight the crucial roles of engaging content, interactive learning environments, and comprehensive support systems in promoting academic excellence. Moreover, the study emphasizes the significance of leveraging advanced technologies and sound pedagogical practices to enhance the educational experiences and self-esteem of Arabic-speaking students. This research advocates for educational institutions to refine engagement strategies, improve support mechanisms, and continually update their learning initiatives to include innovative technologies and teaching methodologies, thereby optimizing the benefits of web-based learning for student engagement and academic success.

Keywords: academic performance; emerging technologies; student engagement; translation challenges; web-based learning

1. Introduction

The advent and expansion of web-based learning has significantly shaped the evolution of higher education, presenting both opportunities and challenges for non-native English speakers. In Saudi Arabian higher education, online materials are predominantly in English, requiring students to read English papers and communicate using English platforms. This reliance on English poses unique challenges for Arabic-speaking students navigating these materials

in a second language. This study aimed to investigate how web-based learning initiatives improve or hinder the academic performance and self-esteem of Arabic-speaking students in higher education. The challenges of translating English academic content can complicate students' educational progress and engagement, impacting their overall learning experience (Aizawa, 2024). Saudi Arabian students frequently encounter difficulties translating academic content when English serves as the medium of instruction (AlEnezi & Alkhaleefah, 2023). This research explores the role of digital technologies, pedagogical strategies, and content accessibility in shaping the educational experiences of Arabic-speaking students. By examining the intersection of translation challenges and digital learning environments, this study sought to provide insights into the complexities faced by these students as they navigate higher education in a second language.

Initial findings highlight the critical role of tailored engagement strategies, interactive and pedagogically sound design, and the integration of supportive technologies in improving academic outcomes. Mayer's (2021) cognitive theory of multimedia learning, which posits that multimedia resources can enhance understanding and retention of information, supports these findings. Furthermore, research by Liu et al. (2020) indicates that integrating various educational tools, such as interactive simulations and videos, not only engages students but also improves their academic performance. The study underscores the pressing need for educational institutions to adapt and innovate their web-based learning offerings to cater to the diverse linguistic and educational needs of their student body. By doing so, institutions of learning can promote inclusivity, engagement, and academic success in the digital age, ensuring that all students can fully benefit from the opportunities provided by web-based learning, regardless of their linguistic background.

1.1 Research Problem

In the rapidly evolving world of higher education, the intersection of web-based learning and the challenges faced by Arabic-speaking students in translating English academic content has become a focal point for enhancing academic engagement and excellence. In Saudi Arabian universities, as online materials are predominantly distributed in English, students are required to read English papers and communicate through English platforms, which is often difficult for non-native speakers. When students access materials in their native language, it not only boosts their comprehension and participation but also helps them feeling more comfortable with online learning. According to Wei et al. (2024), students who study translated materials tailored to their home language are less likely to encounter difficulties and enjoy a smoother, more effective learning experience. Jiménez-Crespo's (2013) findings support this, showing how translation significantly improves students' understanding of complex concepts, which enhances their overall academic performance and their comfort with using digital educational platforms.

The current state of web-based learning for Arabic-speaking students in Saudi Arabian higher education reflects a duality: While digital platforms offer unprecedented access to educational content, they also present unique

challenges due to language barriers. The Saudi Arabian education policy system has made strides in technology integration in the curriculum, but the predominant use of English remains a significant obstacle for many students. Efforts to incorporate more Arabic content and provide translation support are ongoing but insufficient, and this forms a critical area for improvement. This research investigates the complex interplay between digital educational platforms, pedagogical strategies, and the unique linguistic hurdles encountered by these students, particularly within the sociocultural context of Saudi Arabia. By examining the transformative potential of web-based learning initiatives alongside the intricacies of translation difficulties, this study aims to offer a comprehensive overview of how these factors collectively influence student outcomes and self-esteem.

This study broadens the traditional academic lens to embrace the evolving dynamics of educational technology's innovative methodologies and tools, such as virtual reality (VR) and artificial intelligence (AI). It seeks to uncover the nuanced factors that bolster student experiences and achievements, while also taking into account the impact of Saudi Arabia's sociocultural characteristics on the design and effectiveness of educational platforms. This research pays particular attention to the blend of traditional and modern educational practices, keeping a keen eye on the changing educational preferences and requirements of Saudi Arabian students, who increasingly gravitate toward digital learning environments.

The study also explores how sociocultural influences might shape user interface design and overall usability as it aims to elucidate the complex relationships between digital learning initiatives, translation challenges, student engagement, and academic success. In light of these elements, the study aims to answer specific research questions about the factors that affect student engagement and academic performance in web-based learning and translation difficulties, set against the background of Saudi Arabia's unique educational and cultural landscape.

This study, with its refined focus on the integration of digital learning platforms and the challenges of translation, has adapted its research questions to align with its overarching theme. These questions aim to uncover the key factors that influence Arabic-speaking students' engagement and academic success in web-based learning environments within Saudi Arabia's unique sociocultural context.

The research questions are as follows:
1. What are the primary factors in web-based learning environments that affect Arabic-speaking students' engagement and learning outcomes, particularly within Saudi Arabia's sociocultural context?
2. How do the educational goals and linguistic backgrounds of Arabic-speaking students shape their engagement and academic success in web-based learning environments?

3. What are the intricate relationships between student engagement, academic outcomes, and the translation of educational content in web-based learning settings for Arabic-speaking students in Saudi Arabia?
4. How can the insights from this study be leveraged to optimize the design and delivery of web-based educational content for Arabic-speaking students, ensuring its alignment with their educational needs and sociocultural contexts?

1.2 Study Aim and Objectives
This study aims to explore how the difficulties experienced by Arabic-speaking students impact their engagement and academic success within the context of Saudi Arabian higher education. The specific objectives guiding this exploration are as follows:
1. To examine how digital learning environments and translation issues affect student engagement and success in Saudi Arabia.
2. To understand how students' educational backgrounds and language challenges influence their engagement and performance online.
3. To determine the links between student engagement, translation of materials, and academic success in online learning.
4. To provide recommendations for improving online education to better support Arabic-speaking students.

These recommendations aim to meet the educational needs and preferences of Arabic-speaking students, with consideration of the cultural and social factors that influence how students interact with digital learning tools. By achieving these objectives, the study aims to reveal how web-based learning platforms and translation challenges impact these students to ultimately contribute to the enhancement of their educational experiences and outcomes.

2. Literature Review
Web-based learning in the modern world has become an influential educational tool that transcends geographical boundaries and provides remote learning opportunities through interactive digital environments. In Arabic countries, where most students speak Arabic, web-based learning facilitates the design and implementation of digital learning environments to foster online engagement that results in academic success (Tang & Calafato, 2021). As the future mode of education, online learning provides a wide selection of programs that optimize educational outcomes. Since web-based learning *promotes active and independent learning* by integrating VR and AI technologies, it offers novel approaches that overcome traditional barriers faced by the education system (Leitner et al., 2017). In recent years, the use of VR and AI technological frontiers in web-based learning has become an appropriate way for students to access immersive and beneficial adaptive learning experiences on a remote level. Because the Arabic language has a vast vocabulary with many words holding similar meanings, most Arabic-speaking students find it challenging to memorize English words and use them correctly in context. To cater to students' specific needs and challenges, literature has underscored the need for higher education institutions

to embrace flexible and innovative learning models. Solving language barriers and cultural nuances in content delivery is the most appropriate way of addressing the challenges Arabic-speaking students face to create a more compelling and inclusive educational environment.

Second, incorporating VR and AI technologies can also decrease language barriers and attune education more to cultural nuances (Hamdan et al., 2018). A combination of VR and AI in a learning environment creates an interactive and dynamic environment and offers new levels of realism. By applying the above solution to web-based learning, Arabic-speaking students will achieve the transformative potential of digital platforms, which is dependent on the thoughtful integration of technology and learning (Al-Shahrani & Cairns, 2015). The above relationship aligns with a broader discourse on the role of digital education in revolutionizing student-centered modes of learning in higher education and emphasizing the importance of adaptive learning environments.

Learning environments refer to places where people learn; an e-learning setting is a mode of Internet-based instructional delivery. An effective online learning environment comprises a discussion forum and individual and group activities that allow effective interaction between students, faculty, content, and instructors. According to Vallerand (2021), the psychological needs referred to in the self-determination theory should be addressed if students are to achieve academic success. Online learning as a self-determined type of motivation enhances student engagement and learning outcomes by offering opportunities for autonomy, interaction, and feedback (Chiu, 2021).

Recent research on the connection between online learning environments and student engagement shows that online learning has become popular, as evidenced by an increasing number of online education providers and student enrolments. In their research on how online learners engage and improve their satisfaction, Salta et al. (2022) found that online learning environments lower students' engagement levels. According to this research, the level of engagement in traditional classroom environments exceeds that in online learning. Notably, research conducted by the Canadian Digital Learning Research Association in 2019 proved that there is no difference between online learning and traditional classroom learning in terms of effectiveness.

According to Galikyan and Admiraal's (2019) research, online learning environments can effectively increase student engagement by allowing students to track their progress and improve their learning through constructive feedback and timely grading. Serrano et al.'s (2019) research showed that combining online and face-to-face instruction in a learning environment can enhance student engagement by increasing their attention on achieving their learning objectives. Emphasizing the above study findings, a study proved that online learning can positively impact a student's critical thinking and problem-solving abilities (Tathahira, 2020).

Student engagement is a vital concept that emerges from the drop-out prevention and school reform research traditions. It emphasizes the affiliation between online learning environments and learning outcomes. As the two modes of learning offer mixed results, it is worth examining the research on the connection between online learning and learning outcomes. For example, Müller and Mildenberger's (2021) study showed that online learning environments perform slightly better than traditional settings, urging students in the modern world to quit traditional classroom settings and comply with online learning. However, Dontre's (2020) research showed that the online traditional classroom environment affects students' engagement and learning more than in-person classes, because students in online learning environments perform worse than those in traditional classroom environments.

Some studies have shown that online learning is the most effective learning environment because it allows students to bear the responsibility of engaging with the course instead of simply showing up to class regularly. According to El-Sabagh (2021), the effectiveness of online learning is based on how it improves students' interaction, because its environment promotes active and collaborative learning. This allows the students to participate in online discussions and ultimately enhances their academic performance. Desai and Kulkami (2020) also posited that the implementation of engaging technology in online courses promotes student participation, which influences learning outcomes.

An environment of learning that promotes student-to-student interaction helps students to develop critical thinking, hold different viewpoints on issues, and analyze these issues by engaging their attention skills to find solutions. Gay and Bett (2020) and Nasir (2020) concluded that online learning encourages collaborative participation among students, making it the most effective environment for learning. Furthermore, these authors posited that students in online courses tend to perform better than their counterparts because they interact more with their classmates and instructors. Online forums, such as discussion forums, provide students with a perfect environment to seamlessly interact with peers and instructors.

The concept of learner autonomy is a crucial factor in learning outcomes, as evidenced by various educational institutions. When students are empowered to create and construct their ideas, they become more responsible and motivated, leading to improved learning and academic performance. Regmi and Jones (2021) highlighted the importance of increased student autonomy in online learning, noting that it significantly enhances the effectiveness of the learning process. The online learning environment, particularly its social and cultural context, also plays a role in improving student participation and learning performance (Damary et al., 2017). The socio-cultural context of e-learning has a profound impact on the effectiveness and impression of learning and development in online training programs.

The online learning environment, with its abundance of information in higher education, provides an excellent opportunity for students to develop research skills. As shown in the literature, the web-based learning environment is complex in terms of student engagement and e-learning outcomes because its activities are designed to cultivate students' abilities to search, analyze, interpret, and summarize information. Cultural and social contexts, contextual factors, institutional policies, and level of student autonomy make online learning more effective. In regions like Saudi Arabia, regardless of the various research contributions, there is a gap in the assessment of the effectiveness of online learning environments.

This study addresses the existing research gap by examining the online learning platform, translation, and learning challenges faced through these modes of learning. The study focuses on the effects of digital learning on Arabic students, their academic participation, and their success in higher levels of education. Improvement in the educational experiences and outcomes of Arabic students would need actionable strategies. Thus, this research suggests recommendations that can improve the model and delivery of online education, considering both the socio-cultural and linguistic elements in this region.

The dispensation of online learning in the global spectrum has improved the educational landscape, enabling students to have unlimited access to educational materials and flexible learning environments and processes. However, a significant challenge is that Saudi Arabian higher education students rely on the English language, especially in online learning. English is the focal means of instruction in many online classes, which poses challenges such as translation accuracy, usability, and learning comfort.

In Saudi Arabia, English is a second language in the educational system, which explains why most students exhibit different proficiency levels. Arabic is the country's primary and official language. Therefore, to many Arabic-speaking students, using the English language in online learning, with all learning materials written in English, is a challenge, and translating content into the Arabic language leads to inaccuracies and inconsistencies (Almusharraf & Bailey, 2023). Translations are fraught with issues such as contextual differences and misinterpretation. This affects the understanding of the students and ultimately impacts learning effectiveness. For example, in STEM subjects, it is difficult to convey concepts and terminologies in translated language, especially when language is a translation. Mistranslation hinders student learning, which leads to frustration and reduced motivation. Al Seghayer (2020) posited that when concepts are mistranslated or simplified, students must be assisted so that they can translate English accurately.

Since many online learning platforms are designed with an English-speaking user base in mind, they result in a less intuitive experience for non-native English speakers (Farrah & Al-Bakri, 2020). Therefore, in Saudi Arabia, language barriers affect the usability of online learning platforms. Since not all navigation menus, help resources, and interactive elements are accessible among non-native

English speakers, language barriers lead to increased cognitive load as students must comprehend additional content and simultaneously translate it (Farrah & Al-Bakri, 2020). When this added effort detracts from the actual learning process, it makes it harder for students to apply new knowledge and manage their learning.

Additionally, students' comfort level while learning is a critical factor impacted by the use of English in online education. When students are not satisfied with the language of instruction, their level of anxiety increases, hindering their ability to learn comfortably. This discomfort is commonly experienced in a virtual learning environment where immediate clarification and support from peers or instructors may not be readily available (Al-Jarf, 2021). Consequently, students end up feeling isolated and less confident in their academic abilities.

Literature on this topic highlights non-native English speakers' challenges in online learning environments. However, there are significant gaps in research addressing the experiences of Saudi Arabian students in higher education. Most studies have focused on general language barriers and their impacts on the cultural and linguistic landscape, with limited exploration of the specific context of the Saudi Arabian higher education system. Therefore, with the aim to fill the existing gap, this research analyzes the specific effects of English language usage on the online learning experiences of higher education students in Saudi Arabia.

This study focuses on translation challenges, student comfort, and usability issues to comprehensively elucidate the barriers students from Saudi Arabia face. The final findings will contribute to the broader discourse on improving online education for non-native English speakers, offering recommendations to enhance learning experiences among Saudi Arabian students. Providing solutions to challenges students face, regardless of their linguistic background, is crucial for ensuring they fully benefit from online education opportunities.

3. Research Methodology
This research employed a mixed-methods approach, combining both qualitative and quantitative methods to provide a more comprehensive understanding of the research topic.

3.1 Research Design
A mixed-methods design was employed to investigate the effects of digital learning environments and translation challenges on student engagement and academic achievement. For the quantitative component, students at King Abdulaziz University, Saudi Electronic University, and Umm Al-Qura University were the respondents of a survey used to acquire data. These universities were chosen to provide a truthful sampling of Saudi Arabia's higher education scene due to their vast range of student demographics and substantial online course availability. Statistical analysis was used to identify styles and interactions among those elements to determine the extent of translation problems and their connection to students' instructional involvement and consequences.

For the qualitative component, to delve deeper into the complicated experiences of Arabic-speaking college students, a qualitative case study of teachers who specialize in set online courses from the above universities was undertaken. This technique involved qualitative interviews with teachers, aiming to obtain comprehensive insights on the combination of pedagogical strategies, usage, and content delivery to fulfill the linguistic needs of students. Furthermore, it revealed instructors' observations on the level of scholar engagement and the effectiveness of translation resources provided in those courses. This mixed-methods research design enabled a holistic comprehension of the dynamics in primarily online-based learning environments for Arabic-speaking students. It facilitated an in-depth exploration of how digital structures can be optimized to support their academic journey amidst translation challenges.

3.2 Participants
The quantitative component in this research focused on students enrolled in an online course at their educational institution. The sample was chosen using a convenience sampling technique, which is not an unusual approach for this mode of study. This study involved 166 student respondents, aged 16 to 47, with a median age of 32. Among the respondents, 65.2% were female and 34.8% were male. The respondents had varying levels of experience with online-based learning. Participants rated their experience out of 5, with 1 being *not very good* and 5 being *very good*. Half of the respondents (50%) rated their preceding level as 5, 25.8% as 4, and 24.2% as 3 or less. The variety of online courses that the respondents had studied ranged from one to nine. Specifically, 36.4% of the respondents had studied three courses or less. A further 9% had studied four to six courses, and 22.7% had studied seven to nine.

The qualitative study included 15 teachers and 8 students as participants in the case study component. Of these, 18 were female and 5 males, and all were aged 28 and above and had had at least 5 years of experience in teaching at specific schools. These participants were chosen based on their experience on online courses and willingness to participate. The inclusion of these participants in the case study aimed to provide further context to online learning and its effectiveness in improving their engagement and learning outcome.

3.3 Research Instruments
The instruments for this study included a 33-item Likert scale questionnaire to acquire facts on the demographic statistics and layout elements of online learning environments, student characteristics, student engagement, and study outcomes. The survey was administered online. Furthermore, the case study involved carrying out semi-structured interviews with teachers and students, observations of online classes, and evaluations of the performances. The survey data were gathered through a web survey platform. The quantitative data from the survey were analyzed using descriptive statistics, including frequency distributions, means, standard deviations, and correlation and regression analyses. The qualitative data from the interviews were analyzed using thematic analysis.

3.4 Validity and Reliability

The validity of the survey questionnaire was tested through content and inner consistency. Regarding content validity, the questionnaire was adapted and presented to a panel of experts who provided suggestions to refine and enhance the instrument. This procedure helped to ensure that the questionnaire represented the content material that was measured. Additionally, the inner consistency validity of the questionnaire was tested by calculating correlation coefficients among the rating degree for every item and the entire score for the domain to which it belonged. The results of this analysis indicate excessive ranges of internal consistency in the questionnaire, with correlation coefficients from 0.610 to 0.989 and extensive at the 1% level.

The examiner used a comprehensive approach to ensure the reliability and validity of the research instrument and data. In all, 15 teachers and 8 students were interviewed and 166 students completed the questionnaire. The inner consistency of the instrument, measured by Cronbach's alpha, was used to assess the dependability of the study instrument. With a desirable reliability coefficient of 0.963 and Cronbach alpha values ranging from 0.837 to 0.991 for the unique domains of the instrument, the gathered data showed excellent degrees of reliability. Furthermore, independent researchers' assessment reinforced the dependability of the case study data, ensuring correctness and consistency. To confirm the accuracy and consistency of the collected data, the validity and reliability of the interviews were also validated with the aid of specialists evaluating the data. Overall, the examination employed rigorous methods to ensure the validity and reliability of the research instruments and the data gathered.

3.5 Ethical Considerations

This research adhered to ethical and institutional considerations for studies related to human subjects. The study observed the ethical review process with the desired documentation. All individuals who participated in the questionnaires and interviews were duly informed of the study purpose. They were also assured that their responses would be kept anonymous and confidential. In addition, the interview participants were informed that the interviews were to be recorded but that the recordings could be destroyed upon the successful completion of the evaluation. Informed consent was received from all participants, and all records were stored personally and anonymously.

4. Results and Analysis
4.1 Questionnaire Analysis

This section delves into the results and analysis of the questionnaire, focusing on the design elements of the online learning environment, student characteristics, student engagement, and learning outcomes as perceived by the student respondents.

4.1.1 Design elements of the online learning environment

Table 1 presents the descriptive statistics for the 10 items related to the design elements of the online learning environment. The item with the highest relative

importance index (RII) (i.e., 87%) was "Working at my own pace is invaluable", with a mean score of 4.35 out of 5 and standard deviation of 0.75. This underscores the importance of flexibility in online learning, which is particularly beneficial for Arabic-speaking students who may face additional challenges translating English academic content.

Conversely, the item with the lowest RII (i.e., 76%) was "Assessments are thoughtfully designed to assess understanding of the material", which had a mean score of 3.8 and standard deviation of 0.86. To accurately reflect students' understanding, these figures indicate a need for better assessment design, which is critical when considering the additional layer of translation for Arabic-speaking students. Overall, the design elements of the online learning environment received a high rating, with a mean score of 4.07, RII of 81.4%, and standard deviation of 0.72. This suggests that respondents generally found the design elements supportive, but it also highlights specific areas for improvement, especially in the context of translation challenges.

Table 1: Descriptive statistics for items related to the design elements of the online learning environment

No.	Item	M	SD	RII	R
1	The online course interface is intuitive and user-friendly, allowing easy location of materials relevant to my research	4.05	0.98	81.0%	7
2	Course materials are easily accessible, enabling focus on studies without unnecessary hurdles	4.09	0.96	81.8%	5
3	Working at my own pace is invaluable, allowing effective balancing of studies with other responsibilities	4.35	0.75	87.0%	1
4	The course design adapts to individual needs, making the learning experience more personalized and effective	4.20	0.73	84.0%	2
5	Interacting with other students provides diverse perspectives and enhances understanding of the subject matter	4.08	0.77	81.6%	6
6	Instructor guidance and feedback are instrumental in my learning journey	4.15	0.90	83.0%	3
7	Timely feedback on assignments helps track progress and identify areas for improvement	4.14	0.89	82.8%	4
8	Assessments are thoughtfully designed to assess understanding of the material	3.80	0.86	76.0%	10
9	Confidence to tackle challenges and succeed in academic pursuits is bolstered	3.93	0.71	78.6%	9
10	The option to seek additional help when necessary is comforting and enhances the learning experience	3.93	0.71	78.6%	8
All items		4.07	0.72	81.4%	

Note. M = mean score, RII = relative importance index ([mean / 5] * 100%), SD = standard deviation, R = rank

4.1.2 Student characteristics

Table 2 presents the descriptive statistics for the nine items associated with student characteristics. The item with the highest RII (i.e., 91.2%) was "Hands-on experience is the best way for me to learn", with a mean score of 4.56 and standard deviation of 0.5. This emphasizes the significance of realistic, hands-on learning experiences, which can be enhanced using AI-driven tools in STEM schooling, especially for college students who gain knowledge from translated materials.

The item with the lowest RII (i.e., 72.2%) was "Setting clear learning goals keeps me focused and motivated", which recorded a mean score of 3.61 and standard deviation of 0.86. This result shows a desire by students for better assistance in goal-setting and achievement, potentially through AI-facilitated personalized knowledge considering linguistic challenges. Overall, the student characteristics category demonstrated a high rating, with a mean score of 3.99, RII of 79.8%, and standard deviation of 0.60.

Table 2: Descriptive statistics for items related to student characteristics

No.	Item	M	SD	RII	R
1	Hands-on experience is the best way for me to learn, allowing the effective grasping and retention of concepts	4.56	0.50	91.2%	1
2	Listening to lectures and audio resources helps me to absorb information and understand key concepts	4.27	0.45	85.4%	3
3	The visual presentation of concepts aids in the grasping of complex ideas and makes material more memorable	4.28	0.45	85.6%	2
4	Writing notes and summarizing information solidifies understanding	3.94	0.73	78.8%	4
5	Efficient time management is crucial for success in online courses	3.88	0.85	77.6%	5
6	Setting clear learning goals keeps me focused and motivated, offering a sense of accomplishment upon achieving them	3.61	0.86	72.2%	9
7	Regular assessment of understanding helps identify areas for improvement	3.68	0.91	73.6%	8
8	Engaging course content and format facilitate active participation and success	3.88	0.86	77.6%	5
9	Studying resonant topics enhances motivation and enjoyment of the learning process	3.83	0.87	76.6%	7
All items		**3.99**	**0.60**	**79.8%**	

Note. M = mean score, RII = relative importance index ([mean / 5] * 100%), SD = standard deviation, R = rank

4.1.3 Student engagement

Table 3 displays the descriptive statistics for the six items associated with student engagement. The item that ranked highest based on the RII (i.e., 78.6%) was "Encountering problems in the online course prompts students to seek solutions and apply creative problem-solving strategies", with a mean score of

3.93 and standard deviation of 0.92. This highlights the importance of problem-solving activities for engaging students, which can be supported by AI tools designed to foster critical thinking and problem-solving skills, particularly for students navigating translation challenges.

Conversely, the item with the lowest RII (i.e., 68.8%) was "Engaging in online discussions allows for the exchange of ideas and perspectives, fosters collaborative learning, and enhances understanding", with a mean score of 3.44 and standard deviation of 0.73. This suggests a need for enhanced strategies to encourage participation in online discussions, which could be facilitated by AI-driven engagement tools tailored to the linguistic needs of Arabic-speaking students. Overall, the student engagement category achieved a high rating, with a mean score of 3.80, RII of 76%, and standard deviation of 0.64.

Table 3: Descriptive statistics for items related to student engagement

No.	Item	M	SD	RII	R
1	Engaging in online discussions allows for the exchange of ideas and perspectives, fosters collaborative learning, and enhances understanding	3.44	0.73	68.8%	6
2	Completing assignments on time demonstrates commitment to the course and ensures studies stay on track	3.83	0.68	76.6%	4
3	The online course environment fosters a sense of community and belonging, making students feel connected and supported	3.91	0.84	78.2%	3
4	Enthusiasm for learning and eagerness to contribute to discussions and activities are evident	3.92	0.83	78.4%	2
5	Problem-solving skills are enhanced, preparing students for real-world applications	3.53	0.96	70.6%	5
6	Encountering problems in the online course prompts students to seek solutions and apply creative problem-solving strategies	3.93	0.92	78.6%	1
All items		**3.80**	**0.64**	**76.0%**	

Note. M = mean score, RII = relative importance index ([mean / 5] * 100%), SD = standard deviation, R = rank

4.1.4 Learning outcomes
Table 4 presents the descriptive statistics for the four items related to learning outcomes. The item with the highest RII (i.e., 84%) was "The engaging content, interactive format, and supportive learning environment make it a valuable educational experience worth sharing with others", with a mean score of 4.2 and standard deviation of 1.00. This reflects the positive impact of well-designed online courses on student satisfaction, which is crucial for Arabic-speaking students who may face additional translation challenges.

Conversely, the item with the lowest RII (i.e., 82.2%) was "This online course has broadened my knowledge and provided valuable insights into the subject matter", with a mean score of 4.11 and a standard deviation of 0.98. This

suggests that while students are generally satisfied, there is room for improvement in ensuring that new knowledge is effectively acquired, especially when language barriers are considered. Overall, the learning outcomes category exhibited a high rating, with a mean score of 4.15, RII of 83%, and standard deviation of 0.98.

Table 4: Descriptive statistics for items related to learning outcomes

No.	Item	M	SD	RII	R
1	This online course has broadened my knowledge and provided valuable insights into the subject matter. I have acquired new perspectives and information that I can apply in my academic and professional endeavors.	4.11	0.98	82.2%	4
2	I can integrate what I have learned into my personal and professional life, enhancing my overall development	4.17	1.02	83.4%	2
3	Based on my positive experience with this online course, I am keen to explore further learning opportunities in the online format. I appreciate the flexibility and accessibility it offers, and I look forward to continuing my educational journey online.	4.12	0.98	82.4%	3
4	The engaging content, interactive format, and supportive learning environment make it a valuable educational experience worth sharing with others	4.20	1.00	84.0%	1
All items		4.15	0.98	83.0%	

Note. M = mean score, RII = relative importance index ([mean / 5] * 100%), SD = standard deviation, R = rank

4.2 Interview Analysis

The interviews were conducted smoothly. The findings offer many insights into the best engagement, interaction and communication patterns; the design of the online learning platform; success and failure experiences; and the influence of technologies such as VR and AI. The aim of the analysis is to present a more complex picture of the experiences of higher education lecturers in online learning by discussing the themes and presenting interview excerpts from the participants.

Theme 1: Engagement in online courses compared to in-person courses
The interviews elicited several opinions regarding the extent of participation that is perceived in fully online classes compared to face-to-face classes. Several of the participants expressed their preference for online courses, which they said were more engaging due to the flexibility and convenience of this mode. For instance, Student Participant 1 said: "*I noticed I became more involved in the online courses to the extent of controlling my learning process.*" Furthermore, Teacher Participant 1 also said: "*the engagement for online learners was more appropriate for the student*" and "*students tend to be more jovial when learning through the online platform.*" However, some of the student participants believed that a lack of traditional classes will influence students to become passive. For example,

Student Participant 5 said: "*Using ability, I think that I am less participating in the online courses since I do not get to interact with my colleagues and lecturers face to face.*" Additionally, translation challenges were highlighted, with Student Participant 3 noting: "*Translating English content to Arabic sometimes takes extra time, which affects my overall engagement.*"

Theme 2: Interaction and communication with instructors and peers
Communication with instructors and fellow students is another issue that frequently arose during the interviews on the characteristics of online courses. Several participants noted that due to the anonymous setting of an online space, communication was easier and less restrained. Student Participant 3 said: "*The online format allows me to ask questions and even to discuss with my classmates more easily.*" In contrast, Teacher Participant 4 also said: "*many students are shy and get nervous when they speak in front of people and class.*" However, other student participants mentioned that they get worried that online courses will not allow them to interact with their peers easily. For example, while describing the organization and communication within the courses, Student Participant 4 said: "*It [online learning] was more explicit sometimes because there are no casual conversations or whatnots as such.*"

Theme 3: Design and layout of online learning platforms
The design and layout of online learning platforms play a crucial role in shaping the user experience and affecting engagement and learning outcomes. Participants offered various opinions on this aspect of online learning. Some, such as Teacher Participant 4, appreciated the user-friendly interfaces of online platforms: "*The online platform we use is very easy to navigate, and everything is organized in a clear and intuitive way.*" In contrast, Teacher Participant 13 suggested that improvements could be made to the design, particularly in terms of visual appeal: "*The design layout of Blackboard is straightforward, but it could be better if they add more colors and enhance it.*"

Theme 4: Successful and unsuccessful online learning experiences
The interviews allowed for numerous descriptions of what could constitute a positive and a negative online learning experience. Several participants highlighted that the use of certain features – in this case, the discussion board, the chat function, and the possibility of working with online quizzes – was very useful. For instance, Student Participant 5 said: "*The discussion board was rather stimulating, and it provided an opportunity to discuss and share our opinions with others, classmates.*" However, some participants expressed some difficulties regarding the online learning platform, including technical problems or the need to change learning approaches. During the interviews, Student Participant 6 said: "*I took an online course. One of the major activities was watching the lecture videos, and I barely managed to keep on watching the videos without dozing off.*"

Theme 5: Impact of technology: Virtual reality and artificial intelligence
Another issue that emerged during the interviews was the potential of employing advanced technologies, such as VR and AI systems, in online courses for higher education. Many participants discussed their expectations for these technologies in the context of online learning. For example, Teacher Participant 9

said: "*I think that virtual reality and artificial intelligence will make learning even more interactive, which will positively impact the learning process and make it easier for students to grasp such concepts.*" Furthermore, Teacher Participant 15 stated: "*I found virtual reality and artificial intelligence to be quite useful, and the knowledge I have gathered in higher education helped me a lot.*"

Nevertheless, some of the participants expressed some degree of concern regarding some of the negative aspects of technology usage. Teacher Participant 10 mentioned that, "*while technology can be an incredible tool for learning, there is a risk of overreliance, which could lead to a lack of critical thinking and problem-solving skills.*" Additionally, there were concerns about the accessibility and affordability of advanced technologies for all students, as Teacher Participant 8 pointed out: "*Not all students have access to the latest technology, which could create a digital divide and exacerbate existing inequalities in education.*" This could lead to a further enhancement of inequalities in education technology gaps.

Theme 6: Design and layout of online learning platforms
A common observation to make about the responses received was the focus on the easy-to-navigate interface, coupled with the improved aesthetics of the platforms. Teacher Participant 11 mentioned that, "*a well-structured and easy-to-navigate layout helps in retaining students' attention and makes learning enjoyable.*" Teacher Participant 13 echoed this sentiment, stating: "*The layout of Blackboard could be designed better, for example, icons, colors, hoover hint for each page, drop menu, etc.*" Design therefore plays a major role in learning.

Theme 7: Support and resources for online learning
The effect of advanced technology, which includes VR and AI, on online learning in higher education emerged as a critical theme within the interviews. Several participants voiced optimism regarding the feasible benefits of integrating this technology into the online learning platforms and getting to know how it works. Teacher Participant 9 declared: "*Virtual reality and artificial intelligence might be used to create more immersive and interactive studying stories, which could significantly enhance student engagement and know-how of complex standards.*" Teacher Participant 15 also discussed the benefits of VR and AI, stating that many college students believe that these technologies have assisted them with their studies.

Furthermore, there have been issues regarding the accessibility and affordability of advanced technologies for all college students. This was pointed out by Teacher Participant 6: "*Not all students have access to the latest technology, which could create a digital divide and exacerbate existing inequalities in education.*"

Theme 8: Improvement of online learning environments
Many participants emphasized the significance of user-friendly and visually attractive structures in facilitating engagement and learning. Teacher Participant 4 mentioned that, "*a well-structured and easy-to-navigate layout helps in retaining students' attention and makes learning enjoyable.*" Student Participant 6 echoed this sentiment, stating that: "*The layout of Blackboard could be designed*

better, for example, icons, colors, hoover hint for each page, drop menu, etc." The importance of design and layout therefore extends beyond aesthetics; it has a direct impact on the learning experience.

Theme 9: Disadvantages of online learning
Despite the numerous advantages discussed, some participants pointed out the disadvantages of online learning. Student Participant 5 expressed concerns about the lack of social interaction, stating: "*I miss the face-to-face interaction with my peers and professors.*" Furthermore, Teacher Participant 14 mentioned that the disadvantages of online learning would apply to those who refuse to engage with materials online. These concerns highlight that online learning might not be suitable for everyone and that there are aspects of traditional in-person learning that cannot be entirely replicated in the online environment.

Theme 10: Security and privacy concerns
Finally, security and privacy concerns emerged as a theme from the interviews. In this regard, Student Participant 7 pointed out: "*the only disadvantage I could think of is the security, where people can hack and your identity can be stolen.*" Ensuring the security of online learning platforms and protecting the privacy of students and instructors are vital for building trust and fostering a successful online learning environment. Student Participant 8 also noted that, "*online learning in Saudi Arabia is concerned about the cyber security, as online learning platform tools may be used for cyber hacks.*" Therefore, educational institutions in Saudi Arabia should ensure that their online systems and platforms are secure and regularly updated to prevent such attacks.

5. Discussion
This research utilized an exploratory mixed-methods approach to assess the impact of web-based learning and translation challenges on the interest and achievement of Arab students in Saudi universities. This discussion presents not only the quantitative findings but also the qualitative understanding of online learning and its probable developments.

Participants highlighted the importance of user-friendly and visually appealing interfaces for online learning platforms. They suggested that well-structured layouts can enhance the learning experience and that platforms should seamlessly integrate translation features for Arabic-speaking students.

The quantitative and qualitative results were consistent with the views of students and instructors and other findings, supporting the finding on web-based learning and its positive impact on students' interactions with their work. Previous work has revealed that online education enhances engagement and achievement in class (Lu, 2020). For instance, some of the findings emphasized by Sun and Hsu (2013) substantiate the observation that a web-based learning environment facilitates increased interaction and participation over traditional classroom conditions. In addition, the brick-and-mortar approach and incorporation of multimedia and other succeeding types of educational aids have been revealed to be aids to active learning.

This follows the findings of the categorization theory of multimedia learning by Mayer (2009), positing that through the utilization of multimedia resources in learning, the understanding and retention of knowledge is facilitated. Cavanagh and Kiersch (2023) showed that incorporating more learning resources, including simulators and videos, makes learning enjoyable for learners and enhances their performance. All the above findings provide support to multimedia in relation to achievement in online learning courses, as has been noted in the results of other studies indicating the use of multimedia in enhancing learning engagement and innovation (Chen et al., 2018).

One of the most important emerging themes of student experiences identified in the qualitative component of the study is the issue of interaction and communication demands in online classes. Both the accessibility and flexibility were appreciated for their positive effects in providing students and instructors with opportunities to continue interaction in a manner that contributed to the richness of the learning process. This research supports prior studies asserting that increased interaction improves academic achievement and student satisfaction. Liando and Tatipang (2022) and Salam and Arifin (2020) noted that with the availability of content in students' first language, they will be better prepared for reintegration, their performance in exams and other forms of assessment will improve, and their general comfort using digital platforms to self-direct their learning will increase.

Interview participants acknowledged the value of innovative tools in learning. They approved the use of VR and AI for the formation of an online learning environment, which supports the assumption of other educational investigations and confirms the enthusiasm of individuals who integrate technologies to optimize learning. Nevertheless, the necessity of aligning technological adoption with educational goals to preserve learning quality was also noted. This is consistent with findings from recent studies (cf. Jeon & Lee, 2023) that stress the importance of integrating technology in ways that complement and enhance pedagogical strategies.

Among the success factors of online learning, the availability of institutional support and resources was accorded prominence. This dimension concerns the support and resources offered, with previous studies highlighting the need of organizational support to address the challenges associated with online learning. Research has shown that to enable students, particularly online students, to succeed in their educational endeavors, adequate support structures are necessary (Rajabalee & Santally, 2021).

Some research has highlighted the following issues – the need for a better online learning environment interface design, as well as the shortcomings of learning online, such as security and privacy challenges (Ali & Zafar, 2017). The need for designing with access in mind and for designing materials that are user-friendly to all learners was also mentioned as critical for learning, as well as the need for safe online environments so that students can trust their environment enough to

be able to learn effectively. This viewpoint corresponds to the findings of several works that state that there is a need to integrate more intuitive and secure learning platforms (cf. Miya & Govender, 2022).

By making engagement and interaction in online learning a higher priority, the higher education institutions mentioned in this study should take note of the current situation. Collaborative decision-making concepts could lead to substantial interactions if collaborative tasks and feedback are provided on time. Furthermore, the institutions are advised to start investing in aligning future technologies with purposeful and meaningful technology-enhanced learning and to guarantee the quality of and access to the support services and resources offered to online learners. Other recommendations involve focusing on a user-centered design for platforms and privacy and security issues that have not been adequately addressed.

Consequently, the present research underscores the general applicability of engagement, interaction, technology assessment, support, and resource accessibility in web-based learning environments. It can guide the amelioration of the online learning processes for Arabic-speaking students struggling with translation-related issues. These findings should be considered to enhance and create online programs so as to ensure successful, meaningful, and satisfactory experiences for online learners. The findings of this study can therefore, together with further discussion within the framework of digital learning and translation challenges that define students' performance and self-estimation in the context of Saudi Arabia, be used to enrich the available knowledge in this area by revealing a more extensive and diversified picture.

6. Conclusion
Having conducted this study on the accessibility of web-based learning and translation challenges among Arabic-speaking students in Saudi Arabia, it can be determined that web-based platforms act as game-changers in the sphere of higher education. In light of the quantitative and qualitative analyses presented, this research used the context of digital transformations in the learning environment and contributes toward understanding specific factors that motivate students to develop learning processes that facilitate better academic results. Based on the discussed evidence, it is possible to conclude that learning technologies have a crucial impact on learning, but only if learning engagement is targeted and if learning interaction is aimed at the important aspects.

Furthermore, the necessity of integrating extensive forms of support and the appropriate application of innovative technologies such as VR and AI in the educational process have been indicated as crucial for increasing the effectiveness of learning experiences in an online environment. Therefore, the following practical implications are proposed: To enhance the understanding and management of a vast array of factors that determine the effectiveness of web-based learning, it is suggested that higher education institutions should undertake a comprehensive review of the presented findings.

This will enhance the types of engagement activities to develop a more robust institutional support system and incorporate best-use technologies to help learners better leverage the significant potential of digital tools to facilitate increased levels of student engagement with subject areas and improved course outcomes. Every day, institutions are faced with the question of how student needs and expectations can be met and challenges surmounted as the design and delivery of education become more complex through web-based learning. The ability and willingness of institutions to shift and embrace the revolutionary and innovative aspects of web-based education are, as presented in this study, key in the future provision of quality higher education that is contextual, relevant, effective, and efficient, while meeting the diverse needs of students.

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