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Assessing the Impact of Accepting Virtual Reality Technology and its Impact on Motivation in Vocational Schools in Palestine

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ABSTRACT

Objective: In this particular research, the primary aim is to analyze the impact and the role of employing virtual reality (VR) technology in enhancing the performance of 11th-grade students in vocational institutions in Palestine. More specifically, this study seeks to address some factors which include; ease of use, perceived usefulness, and VR characteristics based on the Technology Acceptance Model approach. **Methods:** Using fifty students, this research has taken place in Hebron Industrial High School and Hebron Evening High School. These participants have been engaged in practical VR lessons on their mobile phones. Taking their performance into account, the PLS-SEM methodology was used to examine the relationships between the examined characteristics and students' motivation. A conceptual model has been constructed to show this relationship. **Results:** Students' VR motivation levels had a fairly strong positive relationship with the use of VR techniques. The relationship between perceived usefulness and the VR features used in the instructional approach greatly influenced the student's motivation. It was however noted that ease of use did not have a direct influence on motivation. It would therefore appear that it is the interaction and engrossing elements of VR that are more effective in student

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motivation. **Recommendations:** As the study highlights the potential of using VR as a powerful tool in vocational education, it recommends integrating VR technology into vocational education curricula to enhance students' motivation and better connect classroom learning with real-world applications, thereby preparing students more effectively for the contemporary job market.

Keywords: Virtual Reality, Vocational Education, Technology, Motivation, VET Education

تقييم تأثير قبول تقنيات الواقع الافتراضي وتأثيرها على الدافعية في المدارس المهنية في فلسطين

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ملخص

الهدف: الهدف الأساسي في هذا البحث هو تحليل تأثير ودور استخدام تقنية الواقع الافتراضي في تحسين أداء طلاب الصف الحادي عشر في المؤسسات المهنية في فلسطين. وبشكل أكثر تحديدًا، تسعى هذه الدراسة إلى معالجة بعض العوامل التي تشمل؛ سهولة الاستخدام، والفائدة المتصورة، وخصائص الواقع الافتراضي بناءً على نهج نموذج قبول التكنولوجيا (TAM). **المنهجية:** تم إجراء هذا البحث وذلك بمشاركة خمسين طالبًا في مدرسة الخليل الصناعية الثانوية ومدرسة الخليل المسائية الثانوية. وقد شارك هؤلاء المشاركون في دروس الواقع الافتراضي العملية على هواتفهم المحمولة. مع الأخذ في الاعتبار أدائهم وقد تم استخدام منهجية PLS-SEM لفحص العلاقات بين الخصائص المدروسة ودوافع الطلاب، حيث تم إنشاء نموذج مفاهيمي لإظهار هذه العلاقة. **النتائج:** كانت مستويات دافعية الواقع الافتراضي لدى الطلاب ذات علاقة إيجابية قوية إلى حد ما باستخدام تقنيات الواقع الافتراضي. أثرت العلاقة بين الفائدة المتصورة وخصائص الواقع الافتراضي المستخدمة في النهج التعليمي بشكل كبير على دافعية الطلبة. ومع ذلك، فقد لوحظ أن سهولة الاستخدام لم يكن لها تأثير مباشر على الدافعية. وبالتالي، يبدو أن عناصر الانغماس والتفاعل في الواقع الافتراضي هي الأكثر فعالية في تحفيز الطلاب. **التوصيات:** نظرًا لأن الدراسة تسلط الضوء على إمكانات استخدام الواقع الافتراضي كأداة قوية في التعليم المهني، فإنها توصي بدمج تكنولوجيا الواقع الافتراضي في مناهج التعليم المهني لتعزيز دافعية الطلاب وربط التعلم في الفصول الدراسية بشكل أفضل بتطبيقات العالم الحقيقي، وبالتالي إعداد الطلاب بشكل أكثر فعالية لسوق العمل المعاصر.

الكلمات المفتاحية: الواقع الافتراضي، التعليم المهني، التكنولوجيا، الدافعية، التدريب المهني.

Introduction

With the rapid advancement of technology, particularly the fourth industrial revolution, there is an urgent need to keep up in all fields, the most important of which are virtual reality and augmented reality (Guo et al., 2020) The impact of this will be investigated in the field of education.

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Recently, virtual reality has been applied to teaching at various educational stages around the world (Radianti et al., 2020). This study was used in Palestine for eleventh-grade vocational students.

Virtual reality is a virtual environment where the user can interact with three-dimensional objects (Hanson et al., 2020). In contrast, augmented reality allows the user to interact with objects and see both real and virtual reality simultaneously (Chiang et al., 2022). Hence, the so-called "mixed reality" (MA) appeared, which is the integration of virtual reality with augmented reality (Doerner et al., 2022).

Vocational and technical education aims to reduce unemployment and provide the local market with specialized professionals by providing the student with the skills necessary for him/her, so vocational and technical education is defined as: "to provide students with the foundational skills, knowledge, attitudes, and competencies necessary to pursue a career and to participate productively in society." (UNESCO Institute for Statistics., 2012)

Secondary vocational education in Palestine has received attention from governments, society, and individuals because of its importance in developing professions in Palestine, as well as providing the Palestinian market with qualified professionals (Kuhail, 2015). However, secondary vocational education faces some difficulties and obstacles, the most important of which is the rapid development of the labor market. This affects students directly and leads to inadequately acquired skills for the profession and weaknesses in their technological skills (Ministry of Education, 2022)

The weakness in technical skills, especially in technological skills, is a problem that most vocational and technical specializations suffer from, as it affects the expected output of the student and the performance in the market after graduation, where the teacher deals with this deficiency only through videos or illustrations; that is, without the presence of the objects or the equipment, this is not enough for students of vocational education, and they lose part of their self-confidence (Ministry of Education, 2021)

Virtual reality provides an opportunity to connect teachers and learners in a new way. Through experience and the acquisition of new cognitive skills (Matsika & Zhou, 2021), it is overcoming a large portion of the lack of equipment and tools and narrowing the gap with the labor market due to virtual reality's benefits to compensate for a part of this deficiency. Virtual reality's benefits are that it uses visual, interactive forms like 3D and 360-degree images and videos. Moreover, using VR makes the learner more engaged and interested in the learning process. It's more like game-based learning and helps them remember more (Claudia et al., 2019). This will provide the market with the required skills and improve the student's productivity and tech skills (Matsika & Zhou, 2021).

As a result, this research aims to examine the effects of using technology in vocational education. To do so, the researchers have used the Technology Acceptance Model (TAM), which contains the following variables: 1- usefulness, 2- behavioral intention, and 3- ease of use. However, only two variables were considered from this model (usefulness and ease of use) in line with the objectives of this study for the student to focus on motivation and not be distracted by a third, and some studies have criticized the link between behavioral intention with usefulness and ease of use (Matsika & Zhou, 2021). In addition, a motivation variable has been included based on observing the students; this aligns with the goals of related organizations like UNESCO that aim to advance vocational education and promote gender parity (UNEVOC, 2021). Another variable that has been introduced to the proposed model is the virtual reality characteristics, which have been discussed in prior studies (Makransky & Petersen, 2019).

Education today faces a critical demand while having certain challenges. VR has emerged as a powerful tool to reduce these challenges, particularly for vocational education. The VR technology enables the students to interact with more informative objects like 3D objects, empowering the way of their understanding and their practical skills. Vocational training, where hands-on experience is vital, utilizes such enhancement in a valuable manner. Moreover, this VR approach bridges

the gap between real-world industry requirements and academic theory, thus preparing students for the real job market (Loay, 2023).

This research focuses on the integration of VR technology into vocational education. It emphasizes the potential impact of using VR on 11th-grade students in Palestine, aiming to enhance motivation and technical skills leading to preparing them for the challenges of the real-world industry. Hence, this research aims to contribute to the global conversation on technology's role in shaping the future of education.

Literature Review

VR technology has been used in the past, dating back to 1957 when Morton Heilig developed the Sensorama, which was a bicycle simulator incorporating sensory elements such as wind, sound, and smell (Clemens, 2022). Over the decades, VR has been upgraded into a dynamic technology that offers immersive, three-dimensional environments for users.

VR technology is rapidly evolving with applications across many fields, including education at various levels. It can revolutionize the learning and teaching process while enabling researchers to explore more capabilities in vocational education, where vocational education has an important role in developing skilled professionals to meet the requirements of the job market (Singh et al., 2020).

Vocational education faces many challenges due to the fast evolution of the labor market (Ministry of Education, 2021). Such challenges would impact the students, leading to an insufficient acquisition of the required technical skills and enhancing the gap between classroom learning and job market interests.

This current study seeks to provide certain valuable perceptions on the main factors that influence the adoption of VR in vocational education, particularly in Palestine.

The Technology Acceptance Model (TAM) is considered a suitable theoretical work frame for understanding user acceptance of new technology (Davis in 1986). Hence, it points out that ease of use and

usefulness will significantly influence users' willingness to adopt a specific new technology.

Previous research has explored VR acceptance in education, particularly within vocational education settings. These investigations have discussed factors influencing students' attitudes toward these immersive learning tools (Makransky & Petersen, 2019). The main aim of such studies is to give an insight into the role of usability, utility, and features of VR in shaping students' motivation and technical skills. Based on such studies, one can contextualize the findings of the current research within the broader landscape of VR acceptance in education, specifically in the vocational education domain.

At present, the impact of education with technology is significant, both directly and indirectly. Through the use of smart devices and also through the exploitation of social networking sites, the teacher's communication with the student became greater, and this gradually reinforced the need to use virtual reality in education in all fields like medicine, chemistry, tourism, engineering, etc. (Smith et al., 2023).

Proposed Conceptual Model

Using a conceptual model in this study is important to clarify certain issues like understanding complex relationships between different variables in the hypothesis, how different factors can interact with each other, and how they affect the outcomes or dependent variables. Moreover, such models enhance the credibility of the findings as they show that the study is based on a solid theoretical foundation and that the relationships between variables have been carefully considered and specified. In general, the proposed conceptual model is important for the understanding, testing, and prediction of relationships between variables. The model consists of two parts: the outer model and the inner model.

Model variables and hypothesis development:

Based on the study's objectives and the literature, four variables were identified to conduct the study: 1- Motivation (MOT), 2- Ease of Use (EOU), 3- Usefulness (USE), and 4- Virtual Reality Features (VRF).

Based on these variables, a conceptual model is proposed, as shown in Figure 1, with both inner and outer indicators.

Each of these variables has its own set of indicators. These indicators are (reflective indicators), and each indicator is measured by the Likert scale from 1 to 5, where 1 represents the lower limit, and 5 represents the upper limit. These variables are illustrated as follows.

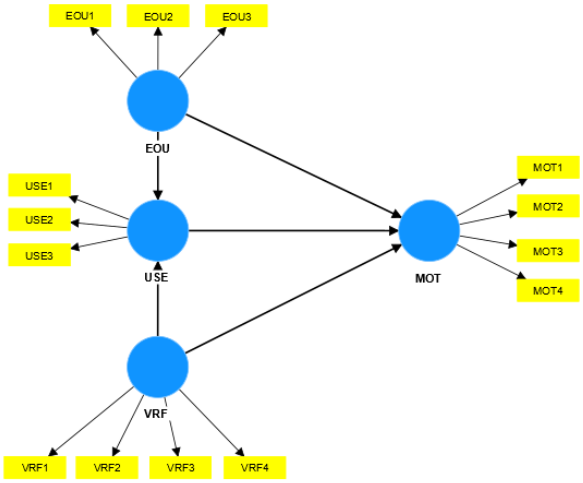

Figure (1): The proposed conceptual model.

Motivation: this variable links students' enjoyment and playfulness to the effectiveness and efficiency of their technological experience; enjoyment refers to how much fun someone has when using technology (Shen et al., 2022).

Ease of use: using technology and dealing with it, such as running the program and accessing all its features without much effort, the user evaluates the program to determine whether or not it requires effort to benefit from it (Hamidi & Chavoshi, 2018).

Usefulness: is the degree to which someone believes using a specific technology leads to improved performance. The anticipated advantage of

VR in this research is its ability to help learners become more technologically savvy (Matsika & Zhou, 2021).

Virtual reality features are an essential part of the VR platform that may impact the user. Some of the most critical features are display and control. Since this parameter reflects the three-dimensional models and objects shown during the VR experience, the presentation is a crucial and vital component of virtual reality (Hanson et al., 2020). As for the display, it is the way formats and names are shown on objects, depending on their density or placement, which influences the user's feelings (Shi et al., 2020). As for control, it measures how participants believe they can control different aspects of the VR experience, for instance, being able to handle virtual environment items by rotating, disassembling, zooming in and out, and other actions needed by the virtual environment (Makransky & Petersen, 2019).

The hypothesis formulation of this study is grounded in a thorough review of existing literature that investigates the acceptance and impact of VR technologies in educational settings, particularly in vocational education. This formulation has been built between variables, as shown in Figure 1. Previous studies have consistently contributed valuable insights into the factors influencing user attitudes and behaviors toward the adoption of VR. Based on these perceptions, the hypotheses for this study are formulated to explore the correlation between key variables derived from the TAM and VR features. The formulation and the required justification of the hypotheses are stated as follows:

1. Hypothesis 1 (H1): Ease of use is positively related to motivation.

The effect of ease of use on motivation has been examined by (Ai-Lim Lee et al., 2010) study, which has found that an easy-to-use interface positively affects motivation, and so the users will be more motivated by such technologies as they experience its ease of use.

2. Hypothesis 2 (H2): Usefulness is positively related to motivation.

This relationship has been researched by (Hamidi & Chavoshi, 2018) and (Makransky & Petersen, 2019). These studies have shown that there

is a positive correlation between perceived usefulness and motivation. Then, as the users experience the benefits of such a technology, they are more motivated to use it.

3. Hypothesis 3 (H3): VR features are positively related to motivation.

This concept is supported by (Ai-Lim Lee et al., 2010) study which has shown that the features and capabilities of VR will positively enhance motivation.

4. Hypothesis 4 (H4): VR features are positively related to their usefulness.

This correlation has been investigated by (Makransky & Petersen, 2019) who have shown that the features of VR contribute to its perceived usefulness.

5. Hypothesis 5 (H5): Ease of use is positively related to usefulness.

This correlation, between ease of use and usefulness, has been investigated by (Ai-Lim Lee et al., 2010), which has shown that a technology that is easy to use is often perceived as more useful.

The proposed model, which is presented in Figure 1, illustrates the correlation between the key variables: (MOT), (EOU), (USE), and (VRF). The indicated arrows in Figure 1 represent the hypothesized positive relationships between these variables based on the explanation provided while formulating the hypothesis.

Accordingly, this study aims to put these hypotheses to the test through a practical model, investigating how VR impacts vocational education. This will provide valuable insights into the factors that motivate students and influence their acceptance of VR technology in the learning process.

Methodology

A quantitative approach was employed in this study to comprehensively examine the impact of VR integration on vocational education. This research was conducted at Hebron Industrial High School and Hebron Evening High School in Palestine, focusing on 11th-grade

vocational students. The sample size of 50 students was determined based on Steven Thompson's equation, ensuring statistical significance and a minimum coefficient of determination (R^2) (Hair et al., 2017).

To get the students engaged, they used their mobile phones to apply VR lessons; this was done in cooperation with An-Najah National University, which uses its platform on the EON-XR platform. This platform provides many 3D models and 360-degree images. Several 3D images that were compatible with the textbook were chosen, and these models were redesigned in line with the objectives of each lesson. All designs and models were done by teachers and specialists in this field.

The data collection tool utilized in this study was a structured questionnaire carefully designed to align with the proposed model and hypotheses. The questionnaire consisted of 13 direct questions exploring key variables: Motivation (MOT), Ease of Use (EOU), Usefulness (USE), and Virtual Reality Features (VRF). Additionally, five demographic questions were included to gather essential information about the participants.

The questionnaire was built based on the model, as shown in Figure 1. This aims to study the relationship among the variables and the validity of the hypotheses. Moreover, as mentioned by Joseph Hair, when there are four variables at a significance level of 5% and a minimum coefficient of determination (R^2) of 0.25, then not less than 38 samples are needed (Hair et al., 2017). Hence, this study includes 50 samples from two schools' three divisions, all of whom completed the questionnaire which is illustrated in the Appendix.

Findings

This study has focused on the efficacy of using VR to enhance motivation and skills among 11th-grade vocational students in Palestine. A diverse cohort of 50 students from Hebron Industrial High School and Hebron Evening High School was carefully selected, ensuring the validity and generalizability of the findings. The 11th-grade level was chosen to target the demographic crucial for the impact of effective vocational education. Including both industrial and evening high schools ensured

diversity, offering insights into VR's impact across different educational settings. Due to the nature of the targeted program (Mechanical Engineering), all of the participants were males aged 15-17 years, and all of them were from Hebron Governorate.

The Smart-PLS 4 software was used to analyze the questionnaire responses, evaluating the proposed conceptual model for reliability and validity. Coefficients of determination (R-square) shed light on the impact of VR on motivation and usefulness in vocational education. This software is robust, especially when dealing with small sample sizes. It can provide reliable results even when traditional limited data is used.

As for the results of the outer model through the outer loading of indicators, the outer loading value of the indicators must be greater than 0.7 for the indicators to be approved (Hair et al., 2017). The researchers adopted 13 indicators in this study, distributed across variables, as shown in Figure 1. The study shows that the value of outer loading for all indicators is greater than 0.7 except for the indicators VRF1 and MOT2. The value of external loading for each of them is equal to 0.643 and 0.649, respectively; hence, these indicators were excluded from the model. The final structure of the model, where all indicators are greater than 0.7, is shown in Figure 2.

As for the reliability and validity of the variables and indicators, the value of the average variance (AVE) must be greater than 0.5; all variables achieved this acceptable value, as shown in Table 1. Moreover, the composite reliability is achieved by all elements as all values are greater than 0.7, which achieves the required level, as shown in Table 1.

Table (1): Reliability and Validity Analysis.

Construct	Cronbach's alpha	Composite reliability	The average variance extracted (AVE)
EOU	0.409	0.772	0.628
MOT	0.72	0.842	0.64
USE	0.703	0.834	0.627
VRF	0.745	0.856	0.665

The Cronbach's alpha coefficient values are also shown in Table 1. All these values are greater than 0.7 except the value for the EOU, which reads 0.409. This value is less than 0.7, and this indicator did not meet the required value.

The inner model is examined to prove the validity of the hypotheses that have been built and to determine the relationship between the variables in the study. This was done through the path molding coefficient (B), which determines the validity of the hypotheses between the variables. This value (B) must be greater than 0.1, as shown in Figure 2. The value of B between EOU and USE is 0.434; the value of B between USE and VRF is 0.461; the value of B between USE and MOT is 0.457; the value of B between VRF and MOT is 0.266; and finally, the value of B between EOU and MOT is -0.119. The values of B among all preceding variables indicate the validity of all initiated hypotheses except for the hypothesis between motivation and ease of use and motivation, for which the B value indicates that there is a negative relationship between them (-0.119), as shown in Figure 2.

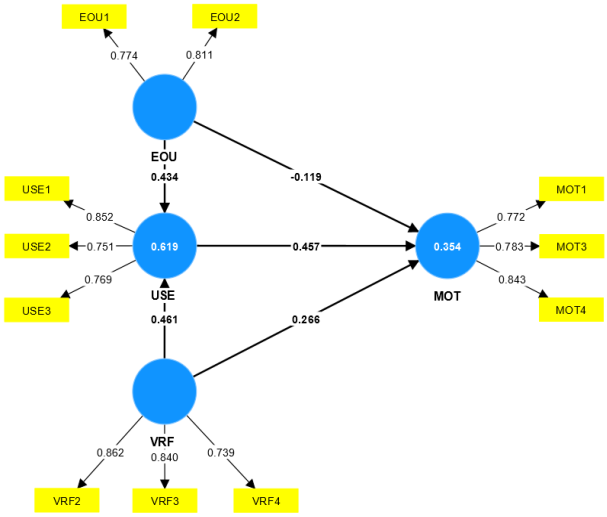

Figure (2): The final adjusted conceptual model.

Concerning the B values in Figure 2, the validity of the hypotheses is discussed as follows:

H1: Ease of use is positively related to motivation.

Hypothesis 1 was not supported, meaning that there is no direct relationship between ease of use and motivation, and this is inconsistent with Ai-Lim Lee's study, which said that there is a relationship between ease of use and motivation (Ai-Lim Lee et al., 2010). The researchers point out the reason for not supporting the hypothesis in the sample of students that originated in the age of technology.

H2: Usefulness is positively related to motivation.

Hypothesis 2 was supported, and this indicates a positive relationship between usefulness and motivation, which is expected as Hamidi & Makransky's study indicated a relationship linking usefulness and motivation (Hamidi & Chavoshi, 2018), (Makransky & Petersen, 2019).

H3: VR features are positively related to motivation.

Hypothesis 3 indicated a positive relationship between VR features and motivation, which is consistent with Ai-Lim Lee's study that there is a positive relationship between VR features and motivation (Ai-Lim Lee et al., 2010).

H4: VR features are positively related to their usefulness.

Makransky's study agreed with the study results, with a positive effect between VR features and usefulness, as expected, and a direct positive relationship between them (Makransky & Petersen, 2019).

H5: Ease of use is positively related to usefulness.

Hypothesis 5 indicated a positive effect between ease of use and usefulness; the hypothesis is correct. This is consistent with (Ai-Lim Lee et al., 2010) study on the relationship between usability and usefulness.

The relationship values could be examined by the value of R-square, which shows the variance of the dependent variables as shown in Table 2, where the coefficient of determination for motivation (MOT) was 0.354,

where 35.4% of the variance is explained by the set of variables (EOU), (USE), and (VRF), and the coefficient of determination for usefulness (USE) was 0.619, where 61.9% of the variance is explained by the relationship between (EOU) and (VRF).

Table (2): Coefficients of determination R square values.

Construct	R-square	R-square adjusted
MOT	0.354	0.312
USE	0.619	0.602

Discussion

This section discusses the results and compares them to some previous related ones, as has been seen in the literature. The discussion is based on the key variables explored in this study: (MOT), (EOU), (USE), and (VRF).

1. Motivation (MOT) in Vocational Education: The findings here indicate a positive relationship between the use of VR and students' motivation levels in vocational education. These results coincide with the work of Ai-Lim Lee (2010), who initiated the immersive and interactive nature of VR to significantly enhance student engagement and motivation.
2. Ease of Use (EOU) and Usefulness (USE) in VR Adoption: The correlation between ease of use and usefulness in the findings aligns with previous studies (Hamidi & Chavoshi, 2018) and (Makransky & Petersen, 2019). Those studies have shown that the user-friendly interface and seamless interaction with VR technology contribute to perceived usefulness. Students are more likely to find VR useful when the technology is accessible and navigable without significant effort.
3. VRF Impact on Motivation: The positive association between satisfaction with VR features and students' motivation corresponds with (Ai-Lim Lee et al., 2010) findings. The unique features and capabilities of VR, such as 3D and 360-degree images and videos, contribute to heightened student engagement. The immersive and

interactive aspects of VR appear to positively influence motivation levels, providing students with a more captivating and memorable learning experience.

4. Comparison with Previous Studies: When comparing these findings with previous studies, it is evident that the positive impact of VR on motivation and learning outcomes is a consistent theme. Studies by (Hamidi & Chavoshi, 2018), (Ai-Lim Lee et al., 2010), and (Makransky & Petersen, 2019) have collectively highlighted the potential of VR to enhance motivation, usability, and usefulness in various educational contexts. The current study contributes to this body of knowledge by specifically exploring these relationships within the realm of vocational education.

Moreover, the theoretical and practical implications could be discussed as follows:

Theoretical Implication

The findings of this study contribute significantly to the theoretical understanding of the impact of VR integration in vocational education, particularly within the context of Palestine. The following theoretical implications underscore the advancement of existing knowledge:

1. Expansion of TAM Model: The study builds upon TAM by emphasizing the specific elements of Ease of Use (EOU) and Usefulness (USE) in the context of VR adoption in vocational education. By focusing on these factors, the study refines our understanding of how students perceive and interact with VR technology.

2. Incorporation of VR Features: Utilizing the VRF as a variable in the proposed model expands the theoretical framework. This acknowledges the significance of the unique features offered by VR, such as 3D and 360-degree images, in influencing students' engagement and motivation.

Practical Implications

This implication may extend to other partners like educators, policymakers, and practitioners in the field of vocational education. Accordingly, integrating VR technologies with vocational education should consider points like:

1. Enhanced Engagement and Motivation: The positive correlation between using VR and student motivation confirms that incorporating VR into vocational education can make the students more engaged in the learning environment. Moreover, educators can utilize VR to bridge the gap between practical applications and theoretical knowledge.
2. Optimized Usability: Educators and developers should focus on optimizing the usability of VR applications. Intuitive interfaces and user-friendly experiences can enhance students' comfort and confidence in using VR technology, promoting an attractive integration into the learning process.
3. Investment in VR Features: Due to the clear positive relationship between satisfaction with VR features and student motivation, educational institutions and policymakers should consider a proper investment in VR technologies that would offer immersive features.
4. Professional Development for Educators: As VR becomes an integral part of vocational education, educators may benefit from targeted professional development programs. Training sessions can empower instructors to effectively utilize VR tools, design immersive learning experiences, and align virtual content with vocational competencies.

Hence, the ideas in this study help shape how vocational education works in Palestine. By looking into how VR affects things, we not only improve our theories but also give practical advice to teachers and decision-makers. This should make vocational education better, more valuable, and up-to-date.

Conclusion

The main findings of this study contribute to a refined understanding of the impact of VR technologies on students' motivation, technical skills, and overall learning experience as follows:

Enhanced Motivation and Technical Skills: The results confirm that the use of VR positively influences students' motivation to learn in vocational education. The immersive and interactive nature of VR applications cultivates a heightened level of engagement, aligning with the evolving needs of 11th-grade vocational students. Moreover, this study has shown the improvement in students' technical skills, treating VR technology as a transformative tool to bridge the gap between the required practical skills and the theoretical knowledge.

Key Parameters: The factors that have been discussed here (like ease of use, usefulness, and virtual reality features) could be seen as critical dimensions of the success of VR integration in vocational education. While ease of use did not exhibit a direct impact on motivation, the user-friendly interface and accessibility are acknowledged as foundational elements for a positive learning experience. Usefulness, closely tied to the practical application of VR, demonstrates a positive correlation with motivation. Furthermore, satisfaction with virtual reality features, including 3D and 360-degree images, emerges as a key contributor to heightened motivation levels.

Student Interaction and Adoption: Observations show remarkable interaction and adoption of VR applications by students. The technology proves to be not only a teaching tool but a catalyst for student enthusiasm and active participation in the learning process. Contrary to initial expectations, the ease of use does not diminish the students' motivation, highlighting their familiarity and comfort with technology from an early age.

Implications for Vocational Education in Palestine: The practical implications underscore the transformative potential of VR in vocational education. The findings advocate for strategic investments in VR technologies, optimized usability, and professional development for

educators. By leveraging VR's capabilities, vocational education in Palestine can position itself as a dynamic and responsive force, equipping students with both the motivation and technical skills required in the contemporary job market.

Limitations

Some limitations appeared during this study, as it did not include female students due to the nature of the program where all of the enrolled students are male ones. On the other side, any possible negative impact of using VR in such applications was not examined. Moreover, the relatively weak infrastructure at the school was an obstacle that caused some delay in conducting the study. Hence, it is recommended to consider these limitations in any related future study.

***Disclosure Statement:** The authors declare that this research has been conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

***Ethical Approval and Consent to Participate:** This study was conducted following ethical standards and was approved by the relevant bodies. Informed consent was obtained from all participants, ensuring that they were fully aware of the study's purpose.

***Availability of Data and Materials:** The datasets generated and analyzed during this study is available from the authors upon reasonable request.

*** Author Contribution:** Both authors have contributed significantly to this study. Allam Mousa led the conceptualization and design of the study and Loay Abushamseieh handled the data collection and analysis. All authors reviewed and approved the final manuscript.

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