Virtual Reality Platform Applied to Ergonomics Teaching

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ABSTRACT

This study examines user perceptions and experiences with a digital platform to provide insights into ergonomic aspects of work environments. A perception survey was conducted among 43 participants, encompassing diverse demographics. The findings indicate that most participants were from Chile (97.7%), with 54% falling within the 18 to 24 age group and 30% between 25 to 34. Educational backgrounds were diverse, with 79% pursuing undergraduate studies and 19% in postgraduate programs. Engineering accounted for 82% of respondents' fields of study. The survey highlighted that 88% had previous exposure to virtual platforms, while 46.5% lacked formal ergonomics training. User-friendliness was reported by 74%, with 93% encountering no technical issues. Notable challenges included camera movement slowness and limited interaction. Perceptions of ergonomic aspects revealed that 75% found visual information clear, and 79% rated audio clarity positively. Moreover, 86% identified risky postures, 72% observed repetitive tasks, and 67% recognized improper manual load handling. Regarding impact, 79% felt the platform enhanced their understanding of ergonomic issues. Positive aspects encompassed ease of use and precise information, while areas for improvement included navigation accuracy, camera sensitivity adjustments, audio quality enhancement, and improved graphical representations. Despite limitations such as potential self-reporting bias and limited sample size, this study provides valuable insights into user experiences and perceptions, contributing to discussions on digital platform usability, ergonomics, and overall impact.

Keywords: Virtual reality, Ergonomics, Teaching

INTRODUCTION

In the era of digitalization, the significance of user experiences and perceptions within various virtual platforms cannot be overstated (Norman, 2013). This study focuses on the user perceptions of a specific platform that provides insights into ergonomic considerations within work environments, shedding light on its effectiveness, usability, and potential areas for enhancement.

Ergonomics, a discipline focused on optimizing the interaction between humans and their environment, is increasingly being incorporated into digital platforms to improve user experiences (Barnes, 2020). As individuals engage

more frequently with virtual environments, particularly in professional settings, the efficacy of such platforms in conveying ergonomic information becomes a critical factor (Dul & Neumann, 2010).

The present research seeks to explore the user experiences and perceptions associated with the platform's interface, content delivery, and overall impact. By examining user interactions and feedback, we intend to discern the platform's strengths and identify avenues for improvement (Dillon & Morris, 1996).

The subsequent sections will delve into the methodology adopted for data collection and analysis, offering insights into the demographic composition of the participants, their prior experiences, and their interactions with the platform. Additionally, we will address the limitations inherent in the research design, recognizing potential biases and constraints.

Amid the evolving landscape of virtual engagement, where digital platforms have become integral to daily routines, this study contributes to the discourse on digital platform usability, especially in terms of ergonomic considerations and user experiences (ISO 9241-11, 2018). By elucidating user perceptions and experiences, this research seeks to provide actionable insights that could inform future iterations of the platform and contribute to the broader conversation on virtual interaction design.

In line with surveys from previous studies, we have incorporated demographic information from participants, including age, gender, country of residence, educational level, and field of study. We also inquired about their experience with digital platforms and their knowledge of ergonomics. Subsequently, we assessed participants' experience with our platform, considering aspects such as ease of use, technical issues, and their evaluation of the visual and auditory information provided. We also considered the number of ergonomic issues identified and, finally, dedicated a section to feedback, where participants share both positive aspects and suggestions for platform improvement.

METHODOLOGHY

Survey Design: A perception survey was designed to gather information about user experiences with the platform. The survey included questions related to demographics, previous experiences, usability, technical issues, perception of ergonomic aspects, and overall impact.

Participants: A total of 43 participants took part in the survey. The sample consisted of individuals from diverse backgrounds, including 11 females, 31 males, and non-binary participants.

Data Collection: The survey was distributed electronically through various channels, ensuring a broad representation of respondents. Participants were asked to complete the survey anonymously, providing honest responses.

Data Analysis: Quantitative data was analysed using descriptive statistics. The gender distribution, age ranges, educational backgrounds, and areas of study were summarized. Percentages were calculated for various aspects, including previous experiences, ease of use, technical issues, ergonomic perceptions, and platform impact.

Platform: The platform comprises six workstations within a facility for receiving, packaging, and storing products. Its purpose is to enable students to identify, evaluate, and propose ergonomic improvements for each of these workstations. The work environment simulates a product-receiving warehouse, where packaging and subsequent storage occur before local distribution. The workstations range from the warehouse manager performing administrative tasks to the cashiers and mechanical maintenance technicians.

The platform allows interaction with each worker, who exhibits various physical and anthropometric characteristics. Additionally, it provides relevant information about the working environment, including noise levels, lighting conditions, and details about the furniture and equipment used.

In an initial step, students can identify ergonomic issues and suggest appropriate evaluation methods. Based on the results obtained, they can design practical solutions to address the identified problems, thus improving working conditions at each workstation. The platform is versatile and accessible from mobile phones, tablets, and computers, and it does not require an internet connection after installation. This enables students and users to conveniently access and work on the platform, even with limited connectivity.

RESULTS

A total of 43 perception surveys were conducted regarding the platform. Among these, 11 respondents identified as female, 31 as male, and some identified as non-binary. Concerning origin, 97.7% of the respondents were from Chile. Regarding age, 54% were between 18 and 24 years old, while 30% fell within the 25 to 34 age range.

In terms of education, 79% of the participants stated they were pursuing an undergraduate degree, with 19% pursuing postgraduate studies. In the field of study, 82% came from engineering backgrounds and 16% from healthcare.

Regarding prior experiences, 88% of the participants had used virtual platforms before, while 46.5% had no ergonomic background. As for user-friendliness, 74% of participants found the platform easy to use, and 93% encountered no technical issues during its use. Some reported technical problems included slow camera movement and the inability to interact with one of the characters.

Regarding the presentation of ergonomic visual aspects, 75% of respondents found the presented information clear. For audio elements, 79% rated clarity as high. Furthermore, 86% of participants identified risky work postures, 72% noticed repetitive tasks, and 67% detected improper manual handling of loads. Among other notable results concerning work design and organization, 44.2% considered it dysfunctional.

Regarding the platform's impact, 79% of respondents stated it helped them understand ergonomic issues within a work environment. Some favorable aspects highlighted included ease of use, clear information, and the versatility of using the platform on different devices. However, participants also identified negative comments and areas for improvement. These areas included accuracy in platform navigation, camera sensitivity adjustments, audio enhancement, increased font size for information, and improvements in the graphical representation of data.

CONCLUSION

A total of 43 perception surveys were conducted regarding the platform. Among these, 11 respondents identified as female, 31 as male, and some identified as non-binary. Concerning origin, 97.7% of the respondents were from Chile. Regarding age, 54% were between 18 and 24 years old, while 30% fell within the 25 to 34 age range.

Regarding education, 79% of the participants stated they were pursuing an undergraduate degree, with 19% pursuing postgraduate studies. In the field of study, 82% came from engineering backgrounds and 16% from healthcare.

In conclusion, the survey has provided valuable insights into user perceptions and experiences with the platform, shedding light on its positive aspects and areas for improvement in terms of usability, technical performance, and ergonomic considerations.

Limitations: The study's limitations include the potential for self-reporting bias and the relatively small sample size. Additionally, the survey's reliance on self-assessment may impact the accuracy of reported perceptions.

The following steps involve continuing educational activities using the platform and gathering participant feedback. Our vision is to expand the platform by introducing new scenarios that address a variety of musculoskeletal injuries, as well as other environmental risks and relevant variables. Furthermore, we are actively working on integrating guided questions and tests related to the identified ergonomic conditions within the platform. This will bring us closer to a real-world scenario where we can assess students' knowledge and practical understanding more effectively.

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