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Evaluation of Online Classrooms for Students with Disabilities

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Abstract:

The Shepherd special needs school in Nottingham, UK use virtual learning environments (VLEs) that have been specifically designed to cater to the educational needs of children with severe learning impairments. This study provides a complete account of the methodology employed in the development of a testing plan for the Virtual Learning Environments (VLEs) under investigation. The assessment of the design of three Virtual Learning Environments (VLEs) and the students' utilization of these platforms in accordance with constructivist learning theory was conducted using an evaluation approach. Field research was conducted to observe student-teacher pairs using virtual learning environments (VLEs). The study identified eighteen behavior categories that aligned with five of Jonassen's (1994) seven constructivist principles. The actions of teachers and students were examined in order to substantiate or refute the principles of constructivism. The three virtual learning environments (VLEs) exhibit varying degrees of commitment to constructivist concepts, and suggestions for enhancing their adherence are provided.

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ı300E (ISSN- 3006-1563) P(ISSN-30061555)0063006

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Introduction

The inclusion of three-dimensional elements, the unrestricted movement within the medium, the capacity to interact with objects, and the ability to engage with the external environment collectively contributed to the heightened excitement. The majority of other widely utilized computer applications employed in educational institutions were found to be deficient in including these functionalities. The primary objective of virtual environments (VEs) was to enhance the variety of instructional resources accessible to users. Following initial testing, it became evident that virtual reality (VR) had the potential to provide children with educational possibilities that are typically not accessible inside a conventional classroom environment. While these interactions may not serve as complete replacements for real-world experiences, they can assist children in preparing for such experiences by addressing the "experience gaps" in their education that arise due to parental overprotection, physical constraints, and mental impairments.

The preliminary investigation involving virtual environments (VEs) and students with special educational needs (SEN) shown a deficiency in organization and was carried out in an unstructured manner. In the absence of established guidelines for the development and utilization of Virtual Environments (VEs) within educational settings, our approach involved a process of experiential learning and iterative refinement. This iterative process was informed by the valuable insights provided by user-teacher researchers, enabling us to make necessary adjustments to the

Virtual Learning Environments (VLEs) employed in the classroom. During the subsequent six-year period, VIRART developed more than twenty distinct virtual classrooms. The LIVE program classifies these activities into three overarching domains: experiential learning, which provides opportunities for students to develop practical life skills; communication, which fosters improvement in speech, signing, and symbol skills; and personal and social education, which represents a particularly ambitious aspect of the program, aiming to educate students on appropriate behavior in public contexts.

Furthermore, VIRART has implemented a continuous testing program for the virtual learning environments (VLEs) designed for special education throughout the developmental phase. Several investigations were undertaken within the framework of this initiative, all of which indicated the potential significance of virtual reality technology in this domain.

The preceding two pupils encountered difficulties in navigating through the various warehouses and accurately identifying the goods within the reward warehouse. In contrast, three pupils demonstrated the ability to identify certain products within the warehouse.

Certain students encountered difficulties while attempting to operate the mouse or spaceball, expressing a preference for tactile interaction with the screen and employing gestures to select desired items. The majority of pupils promptly comprehended and replicated the manual gesture associated with each signal.

This study provided anecdotal evidence suggesting that Virtual Learning Environments (VLEs) have the potential to complement traditional teaching methods in supporting children with special needs. However, it was evident that several pupils encountered difficulties in operating the virtual reality (VR) input devices. The potential for increased accessibility of these gadgets could be realized through enhanced flexibility.

2. Designing and evaluating appropriate input devices for virtual learning environments (VLEs): Virtual Learning Environments (VLEs) are designed to provide a user-friendly interface. However, in the event that children are unable to comprehend the functionality of the input devices accompanying these devices, their functionality will be compromised. According to Vanderheiden (1992), students with special educational needs (SEN) encounter three challenges while utilizing virtual learning environments (VLEs): the inherent architecture of the VLE, the outdated forms of presentation it employs, and the design of the input devices.

The initial emphasis of VIRART was centered on making generalizations pertaining to collective entities (Hall, 1993). The proficiency of Shepherd School students with special needs in navigating and engaging with virtual items was assessed by an evaluation of their previous virtual learning environment (VLE) competencies. The findings of the study indicated that the optimal joystick for locomotion was characterized by the simultaneous provision of two degrees of freedom. The findings from additional evaluations of readily accessible input devices have substantiated the

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assertion that a 5-joystick serves as the optimal navigation tool for the targeted user cohort. In contrast, the aforementioned input devices like as mouse and touch displays did not undergo a similar occurrence. Further research and investigation should be conducted on these devices, as proposed by Brown et al. (1997a).

VIRART has also endeavored to develop unique technological devices tailored for children with special needs, specifically designed to be utilized within virtual environments. According to Lannen (1997), Mojo is a movement platform specifically designed to cater to children who exhibit less proficiency in their fine motor skills.

This gizmo is controlled by the rocking motion of a learner. The oscillatory movements characterized by lateral and longitudinal displacements bear resemblance to the motions observed in the virtual learning environment (VLE). The efficacy of employing a naturalistic form of input has been observed to be particularly advantageous in contexts that prioritize physical motion, such as the virtual skiing environment. In addition to supplementary features such as a wind and fog machine, scratch and sniff cards, creative modeling, and other forms of output, a virtual room inspired by Krueger's work has been developed for educational institutions with limited financial resources (Brown & Mallet, 1997).

I am. Approximately 50% of the class consisted of male individuals. While it was not universally feasible to ensure that every kid had the same teacher for the whole academic year, a total of 11 children were able to achieve this continuity.

The participants' mean scores for receptive and expressive behaviors on the Vineland Adaptive Behavior communication subdomain were 14.4 and 21.2, correspondingly. This observation indicated a spectrum of conversational skills that varied from inadequate to proficient when compared to individuals of the same age group. At both the commencement and the conclusion of the investigation, students underwent assessments to measure their acquisition of knowledge pertaining to the Makaton symbols.

Every pair engaged in a series of four to ten weekly sessions of the Makaton curriculum.

The duration of each session, which may last up to 20 minutes, as well as the number of regions reviewed and the frequency of exploring each component, were determined solely by the instructor or student.

The proceedings were captured on video.

The actions of the teachers were classified into eight distinct categories, including pointing, asking questions, providing manual guidance, utilizing three-dimensional movements, and initiating their own movements. On the other hand, the actions of the students were categorized into three groups, which encompassed initiating a move that the teacher subsequently completes, as well as independently making spontaneous moves in either two or three-dimensional space. The durations of the sessions exhibited variability, as did the conversion rates of various types of behavior into frequency groups.

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I300E (ISSN- 3006-1563) P(ISSN-30061555)0063006
Finance & Audit Research Archive letters

With the exception of the category of teacher's questions, which was not included in the analysis, all intra-rater reliability tests demonstrated a high level of statistical significance. The data collected from partners who engaged in more than seven sessions was found to be inadequate. The behavior rates of all teachers exhibited a substantial drop across numerous sessions, as seen by the results of a regression analysis (all cases, $p<0.0001$). Didactic types of direction, such as instructions and physical gestures, lost popularity earlier than more delicate kinds, such as hints and pointing.

The regression analysis of student results was precluded due to a slight bias present in the data. Hence, a comparative analysis was conducted on the rates of the three groups during their most recent sessions, employing a paired t-test. The results revealed a statistically significant rise in rates for all three groups ($p<0.05$).

A Wilcoxon test was conducted to examine the change in pupils' familiarity with Makaton symbols. The results indicated a statistically significant improvement in familiarity ($p=0.03$). It is evident that the deterioration in instructor behavior preceded the escalation in student behavior, which exhibited a logarithmic acceleration when analyzing statistics across all teacher categories over the course of the session.

Based on the findings of this study, it was observed that students developed the ability to effectively navigate their interactions with the Virtual Learning Environment (VLE) through accumulated experience. The

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I300E (ISSN- 3006-1563) P(ISSN-30061555)0063006
Finance & Audit Research Archive letters

utilization of the virtual learning environment led to an observed increase in the Makaton vocabulary of students, as stated by the participants.

The experimental cohort of students engaged in biweekly online food shopping over a span of eleven weeks. Although the four virtual supermarkets and five shopping lists contained identical products, they exhibited distinct visual appearances. The sessions led to modifications in both the arrangement of the grocery store and the corresponding shopping list.

Various metrics were recorded for each student while they completed a shopping list, including the total time taken, the number of products picked up, the number of accurately retrieved items, and the duration of active participation in the task. The control group received instructions to utilize alternative virtual learning environments (VLEs), whereas the experimental group was granted access to and actively engaged with the virtual supermarket. In order to ensure the participants' familiarity and ease with the diverse shopping lists, sessions were conducted wherein a comprehensive review and question-and-answer session were performed. This was done prior to their return to the physical store. Subsequently, students returned to the authentic supermarket and proceeded to replicate the initial task.

A total of nineteen students participated in the study, with nine students assigned to the experimental group and ten students assigned to the control group. The data collection process was completed by all

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ı300E (ISSN- 3006-1563) P(ISSN-30061555)0063006

participants, except for four students who were unable to participate in the final food shopping excursion.

The duration required to complete activities in the experimental group during the follow-up session was recorded as 11.59 minutes, but in the control group, it was observed to be 16.92 minutes. Upon using baseline time as a covariate in the analysis, it was seen that there was a statistically significant difference ($p=0.02$) in the follow-up times between the two groups.

b. Students who joined their parents during shopping but refrained from providing assistance reported a positive final shopping experience. The experimental and control groups yielded similar outcomes, despite the fact that students who accompanied their parents during shopping were able to complete the task more efficiently.

The experimental group exhibited a significantly higher number of right items acquired during the most recent shopping excursion compared to the control group ($p < 0.05$). This discrepancy cannot be attributed to a generally elevated rate of object acquisition.

The findings of this study provide evidence that engaging in training inside a virtual learning environment (VLE) can effectively improve individuals' familiarity with tasks and boost their practical abilities. In the given context, it was observed that students who received instruction through a virtual learning environment (VLE) modeled after a supermarket exhibited enhanced proficiency in promptly and accurately recognizing

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1300E (ISSN- 3006-1563) P(ISSN-30061555)0063006
Finance & Audit Research Archive letters

the goods listed on their shopping lists, as compared to their counterparts who did not get similar instructional intervention.

Several investigations have yielded encouraging results regarding the utilization of Virtual Learning Environments (VLEs) for the instruction of students with special educational needs. At this particular point in time, the study team recognized the importance of adopting a more methodical approach to design and evaluation. The researchers accomplished this by examining the manner in which students with special educational needs (SEN) utilize virtual learning environments (VLEs), and by employing pertinent modern educational theories to analyze and elucidate their observations.

The user has the ability to navigate towards the right side of the screen without any restrictions. This may be achieved by utilizing the joystick for movement and the touch screen or mouse for engaging with the three-dimensional objects that symbolize the intended significance of the Makaton sign. The instructor will delegate the task of answering the phone and silencing it by lowering the receiver to the pupil. Furthermore, students have the opportunity to see the utilization of mobile phones in diverse contexts, encompassing both domestic and public environments. Consequently, they acquire the ability to categorize phones into overarching groups based on their shared functionalities, despite variations in their physical attributes such as size, shape, or color.

The signing sequence can be initiated by students through either touching the upper left corner of the screen or clicking the mouse. The model is

I300E (ISSN- 3006-1563) P(ISSN-30061555)0063006

capable of producing a sign for the word "telephone" and audibly articulating it using the computer's speaker system.

The students are encouraged to engage with the model through the process of vocalizing and gesturing the word. The Makaton sign will remain fixed in the lower left corner of the screen for the duration of the procedure. The PC 13 keyboard offers students the opportunity to explore 16 distinct Makaton habitats. By utilizing the function keys, students can familiarize themselves with four unique Makaton symbols inside each habitat. Subsequently, individuals have the opportunity to assess their acquired knowledge by selecting tangible manifestations of the Makaton signs that have been presented in a randomized sequence (Figure 4).

Please take note of the image labeled as Figure 4 below.

3 Theoretical Pedagogy

Several scholars (Lanier, 1991; Pantelidis, 1993; Stuart and Thomas, 1991) have underscored the importance of Virtual Environments (VE) in an educational context, despite the absence of a comprehensive assessment of its efficacy. Hence, it is unsurprising that a comprehensive assessment of the knowledge and competencies attained by students with special needs through the utilization of virtual environments in educational settings has not yet been conducted.

A restricted number of controlled studies have employed virtual environments to facilitate individuals in acclimating to real-world settings

(Foreman, 1993) and honing abilities acquired in a virtual supermarket prior to engaging in an actual supermarket (Standen et al., 1998).

This research is a comprehensive analysis that examines the underlying principles and frameworks that form the basis of educational virtual environments and their application as instructional tools. The assessment of virtual learning environments (VLEs) is grounded in constructivist theory, as it has been deemed a more appropriate educational framework compared to alternative perspectives, such as objectivism. Virtual environments based on constructivist principles have been created for various forms of education and training (Winn, 1993; Grove, 1996).

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According to Winn (1993), the assertion is made that constructivism serves as the most suitable basis for formulating a theoretical framework about the process of learning within virtual environments. The basis of this perspective is in the consensus among educators that constructivism plays a pivotal role in the development of impactful instructional strategies (Bonner, 1988; Champagne et al., 1982; Tennyson and Rasch, 1988).

The educational theory of constructivism has been identified as a valuable framework for assessing virtual learning environments (VLEs) due to its consideration of the characteristics inherent in these digital platforms that can facilitate and improve the learning process. In the LIVE program, a study conducted by Brown et al. (1996) revealed the identification of seven elements that have demonstrated effectiveness in virtual learning environments. The primary objective of the authors was to provide a rationale for the suitability of constructivist learning theories in the context of virtual learning environments (VLEs), specifically emphasizing the specific needs of students with special education requirements.

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