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TEACHING PRACTICAL TASKS WITH VIRTUAL REALITY AND AUGMENTED REALITY AN EXPERIMENTAL STUDY COMPARING LEARNING OUTCOMES

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Relevance:
Currently the effectiveness of Virtual Reality (VR) and Augmented Reality (AR) systems as teaching methods for practical skills is largely unexplored. Studies exploring the question whether these systems can provide the same or better learning outcomes than a text instructed practical task are still missing. This abstract describes result from an experimental study exploring computer assembling tasks combined with pre-/post-online questionnaire.

Methods:
Three conditions (VR, AR and a real setup) were used to teach participant how to assemble a standard desktop computer. Each condition was divided into two parts: (1) participants were confronted with their specific scenario, (2) participants had to go through a real practice after one week. The experimental setup was accompanied by pre- and post-condition-online-questionnaires (using SoSciSurvey). Besides performance data (i.e. learning outcome), wellbeing, prior knowledge of the task and the system used as well as system usability measures were assesses. The survey helped to determine the learning outcome by containing a quiz that queried the designation, function and the correct assembling of the components. Time required to complete the task and error quote were collected using a checklist.

Results:
Results concerning the learning outcome showed that participants in the VR-condition outperformed those who learned from the real setup ((M=10.0, SD=0.0) [virtual reality] vs. (M=8.95, SD=1.27) [control]). Furthermore, results from the assembling duration assessment demonstrated that the VR-group participants completed their tasks 6.62% faster than the control group. Regarding the identification of hardware parts, both groups had a significant improvement during the post-condition compared to the first test run, indicating a learning progress. However, due to the VR group achieving a better outcome in average answers and a more significant difference between the trials, the results indicate a better performance by participants assigned to the VR-condition.

Added Value:
The results show that VR and AR systems could exceed text-based approach in terms of learning outcome performance. The effectiveness of the systems implicates a major benefit for the educational landscape, as learning content that is not realizable in terms of cost, distance or logistics could be designed as an immersive and engaging experience.