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Applying Evidence-Centered Design to Assess Learner Competency Levels in VR Learning Experiences

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Abstract. When designing virtual reality (VR) training, it's important that VR learning experiences output the proper data to measure learning and drive evidence-based insights about learner competency levels. This presentation proposes using the Evidence-Centered Design for Assessment (ECD) framework for designing VR experiences to ensure learning activities are aligned to competency indicators that produce learner data that can be evaluated to assess mastery levels. The ECD framework can bring value to VR learning solutions by providing a method of embedding assessments directly within the learning experience without breaking immersion or disrupting flow. In the ECD framework, evidence of learning is directly tied to and measured by a learner's actions within the VR environment, providing empirical data that practitioners and organizations can use to make inferences about a learner's competency levels. This presentation will detail how to implement ECD into VR learning experiences and ensure that the solution's instructional design is strategic and measurable, by leveraging three main models: Competency Model, Evidence Model, and Task Model.

Keywords: Virtual Reality, Evidence-Centered Design, Immersive Learning.

1 Introduction

Virtual reality (VR) is an increasingly popular medium for delivering learning experiences, yet there has been little defined in terms of solid frameworks and best practices for immersive learning experience design. An additional obstacle is that the perception of unlimited possibilities when designing VR learning experiences can often pose challenges for immersive learning designers: they may not know where to start or they may have so many ideas that they struggle to sift out all but the most viable ones. This can make designing VR learning solutions feel like a shot in the dark, with learning efficacy a moving target. Similarly, there is little consensus around the best practices for measuring learning in VR environments. Behavioral data such as usage, engagement, and attention are popular metrics collected by VR training software, but these metrics provide

only a glimpse of how engaged a user may have been during the immersive experience and cannot truly paint a whole picture of a learner's knowledge and proficiency levels. This problem is two-fold. Immersive learning designers need a strategic method of achieving sound instructional design that manifests as learners interact in VR, and a valid and reliable method of measuring learning that occurs in the VR environment. Such a framework can provide an introductory approach for new or aspiring immersive instructional designers to enter the field and confidently begin designing and developing evidence-based VR training, as well as provide a valuable approach for experienced designers to add to their repertoire.

1.1 Evidence-Centered Design

This presentation proposes adapting Evidence-Centered Design for Assessment Framework (ECD), initially developed for adaptive testing, and extended to game-based learning, to the design and evaluation of VR learning experiences [1],[2]. By applying ECD to the design of VR experiences, designers can ensure that the learning activities they produce elicit key behaviors that fulfill the intended learning goals defined for the learning solution [3]. This same framework also enables the capture of data to measure learning which in turn enables evidence-based insights about learners' competency levels [1].

For VR, inducing the perception that a learner is physically present in the virtual space, and maintaining this immersion throughout an entire learning experience is critical for efficacy and engagement. The beauty of applying ECD to VR is that it provides a method of assessing learning by harnessing interactivity, one of the three pillars of VR, to trigger measurement and it does this without disrupting the other pillars, immersion, and presence, and ultimately flow [4].

This presentation aims to demonstrate how developing a Competency Model (CM) enables designers to make claims about a learner using evidence collected within a VR solution. This presentation will discuss CM examples and demonstrate how to operationalize unobservable facets to observable indicators and provide a tangible way to identify the key behavioral evidence to solicit from a learner in order to infer their proficiency with the competency [1],[2]. Mechanisms for developing an Evidence Model (EM) will be discussed using immersive use cases, and how to use the EM to inform the design of immersive VR experiences such as scenarios, tasks, or activities within the Task Model (TM) to elicit evidence of learning [3].

2 Conclusion

Participants will learn how they can adapt the ECD framework to fit their VR training needs and come away knowing how to design evidence-based VR experiences that have a

lasting positive impact on the success of both the learners and your company.

References

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