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Creating and Understanding Individualized Real-Time Analytic Data Using AI for Student Academic Success While Reducing Bias in a Virtual Classroom Environment

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Abstract. Today's technology finally allows real-time digitized data from a classroom environment, but what does it mean and how can we get structured contextual aspects from that to make a difference in how students learn? While an instructor's observational skills and assessment related activities rule the environment today, classrooms of over 20 kids with distractions to students can mitigate all those efforts [1]. We propose using an interactive and immersive (3D) Experience for dual purposes, the first is to obtain additional observational data points and assessment type activities to improve attentiveness augmented with questionnaires to assess a student's well-being. The second is to use anonymity capabilities to further allow for openness and lowering of bias from other students for students to express themselves. Virtual reality is a tool to do just that. Join us to explore the possibilities of a classroom environment that can help the next generation of students transcend the norms of today and provide a smoother road to academic success!

Keywords: Analytics, Bias, Academic Success, AI Modeling, Virtual Reality, DEI, Anonymity, RTI, PII, Immersive Learning.

1 Introduction

The objective of this workshop is to build on the 2021 publication by The Commons XR (TCXR) to engage students in an immersive educational experience [2]. The background for the 2021 special session involved replication of an activity for the purpose of investigating bias in the classroom. Since then, The TCXR platform has grown to include new features and provide further insights for the students, instructors, and institutions, and even parents!

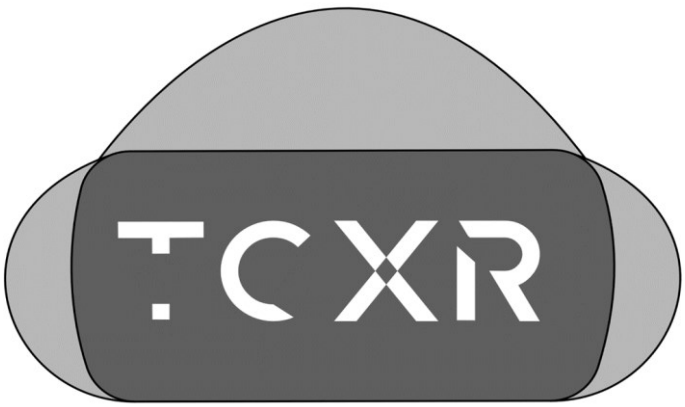

Fig. 1. TCXR logo.

The workshop will be structured within our 3D immersive classroom experience (herein called "Experience"), which can be used for those attending physically or remotely using VR headsets or laptops, and has three components: a pre-screening questionnaire, participation inside the Experience, and a view of the data freshly drawn from that same Experience. The pre-screening questionnaire will help understand one's demeanor before entering the Experience which may affect one's ability to learn, participate, or engage in a pedagogical environment. The Experience is not only a virtual environment to function as an educational tool for the instructor, but also a means to collect data from both students in how they behave in the classroom along with instructors with how they assess a student's performance. The view of the data is to show not only what happened inside the Experience from an analytical view, but also insights into a student's best responsiveness to certain actions and phenomena occurring inside the Experience, giving educators a way to map a student's learning style to match a pedagogic style that best suits them.

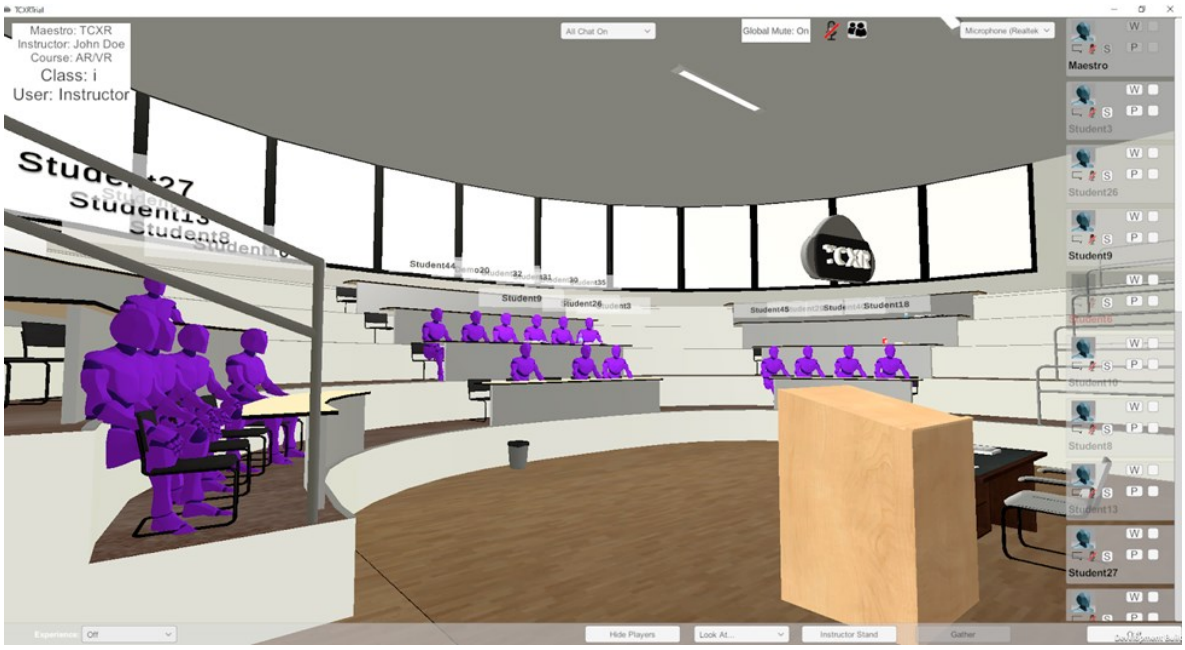

Fig. 2. An instructor's view of students sitting in a virtual amphitheater.

1.1 Aims and Target Audience

TCXR's platform is referred to as SAIL or "Student Analytic-based Interactive Learning." In our proposed workshop, all participants will enter as avatars that are genderless and purple to reduce bias and allow for more open comments, questions, and answers to questions. Therefore, all participants in our SAIL Experience will have all personally identifiable information (PII) abstracted, allowing them to act in a manner free of judgment and implicit bias while we obtain data prior to (entry questionnaire) and during the Experience to provide visualization of data to indicate attentiveness and AI generated behavioral models.

1.2 Novelty, Timeliness, and Relevance

TCXR recognizes increasing issues of students struggling to maintain focus and attentiveness in the classroom but have been exacerbated by the Pandemic [3]. The Commons XR "SAIL" platform helps students achieve academic success using real-time digital sensory assessments obtained through our platform, producing individualized learning habits and additional observational behavior to those of the instructors. By asking students to fill out a pre-Experience screening questionnaire, TCXR can help educators assess a student's needs in the classroom that may have been affected by factors external to the classroom in a fashion anonymous to other students. This way, students can be identified in need of assistance without the fear of judgment from their peers or a feeling of shame for requiring it. These forms can help give context to the data that appears during the SAIL Experience, such as reduced responsiveness to a tired student. More information on these SAIL characteristics will be available at the workshop.

The data will be obtained using immersive (VR, AR, XR) technology and then individualized through AI modeling. This is both an innovative and disruptive new way of thinking about how to assess students for early response to intervention (RTI) support. It is also a mechanism to foster a supportive classroom environment, increase attentiveness in the classroom, and quantify learning for each individual student. SAIL is an easy-to-use platform for teachers to incorporate into their interactive classroom pedagogical style for a short burst (15-20 minutes) of class time, thereby not having to build an entirely new lesson plan. We obtain data through our platform, whether students are attending in person, remote and/or hybrid modalities.

It is also known that there are biases in the classroom, especially student to student [4]. By creating anonymity among the students, we remove those biases so social interaction will be enhanced, and diverse views would be amplified [5]. SAIL seeks to remedy these issues while increasing attentiveness, alleviating bias and providing behavioral data visualization for students in the classroom.

TCXR has been invited and published with iLRN 2021 and 2022 for focusing on equity in education. For over half a year, TCXR has used the help of more than 20 interns to replicate a classroom environment to model student participation and behavior. TCXR has run trials with interns to build the database of structured sessions for over a year to analyze and improve their product while also conducting research. Their feedback has been helpful in producing a platform that will not only assist educators in producing more structured and interactive classes but cater to the students' needs as well to maintain focus, attentiveness as well as openness to their questions and thoughts.

Fig. 3. A student's view of the Experience in an amphitheater seat.

1.3 Participant Engagement and Interaction

Participants will be in an interactive and pedagogic activity which will run for 15-20 minutes, providing digitized real-time data from the class, resulting in approximately 1 million rows of data each session. Participants will be asked a screening questionnaire before entering our SAIL Experience. The activity will educate participants in a subject in a highly interactive environment. There will be pedagogical concepts such as gamification, flip the classroom, interactable objects, and assessments interspersed throughout the activity. Participants will also be timed for questions, specific activities, and other interactions inside SAIL where TCXR analytics will map how they react. We will provide display names for all participants to identify them for the instructor (e.g., Student1, Student2, etc.).

Data is collected in SAIL from the initial screening questions, an avatar's action (directed or not) within SAIL and the instructor's observational notes. Upon the activity's conclusion, viewers will see SAIL analytics based on the participant's activity.

The data is displayed on a dashboard that was collected from the direct and indirect actions participants took while inside SAIL. They will see their level of attentiveness, comprehension, and other factors both on an individual level and as an aggregate, using our AI modeling process. The data is dynamic, meaning that participants can ask for certain insights for what had occurred on the dashboard. TCXR staff will assist in answering any questions on insights or usability of the platform.

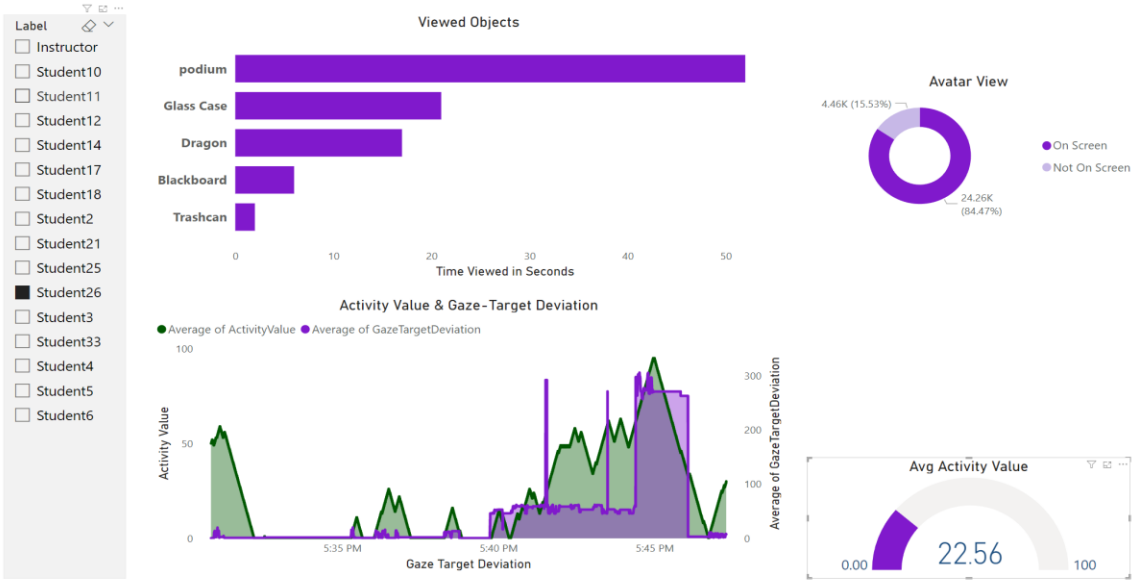

Fig. 4. A sample of SAIL's post-session analytics.

1.4 Workshop Description and Plan

A. Introduction: TCXR will briefly detail the features available to the participants.
B. Screening questionnaire: Participants will fill out a short questionnaire before entering our Experience.
C. Activity: Participants will take part in our interactive structured class.
D. Data Analytics: Everyone will view the data from that Experience visualized as individual analytics.
E. Post Experience Conversation: Post Experience Debrief

1.5 Intended Outcomes

At the end of the workshop, participants will be able to:

1. Assess the connection between our observational assessments and student attentiveness during the class
2. Engage in an immersive Experience designed to show the reduction of bias
3. Rate their own personal experiences and observe their analytic data activity in the Experience, correlating those to attentiveness measurements
4. Examine their current teaching practices and design new class activities to support student academic success [6].

References

1. McCoy, B. R.: Gen Z and digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. DigitalCommons@University of Nebraska – Lincoln. https://digitalcommons.unl.edu/journalismfacpub/116/. Last acess 2023/03/10.
2. Brandon, E., Freiwirth, R., Hjersman, J.: Special session — student engagement with reduced bias in a virtual classroom environment. In 2021 7th International Conference of the Immersive Learning Research Network (iLRN) (2021).
3. Wyse, A. E., Stickney, E. M., Butz, D., Beckler, A., Close, C. N.: The potential impact of COVID-19 on student learning and how schools can respond. Educational Measurement: Issues and Practice, vol. 39, no. 3, pp. 60–64 (2020).
4. Morales-Martinez, G., Latreille, P., Denny, P.: Nationality and gender biases in multicultural online learning environments. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (2020).
5. Boysen, G. A., Vogel, D. L.: Bias in the classroom: Types, frequencies, and responses. Teaching of Psychology, vol. 36, no. 1, pp. 12–17, (2009).
6. Hébert, T. P., Corcoran, J. A., Coté, J. M., Ene, M. C., Leighton, E. A., Holmes, A. M., Padula, D. D. It's Safe to Be Smart: Strategies for Creating a Supportive Classroom Environment. Gifted Child Today, 37(2), 95–101 (2014).