

## Chapter 31

# Measurement in K–12 Online Learning Environments: Measurement of Student Engagement and Other Latent Constructs

Elizabeth A. Anderson

 <https://orcid.org/0000-0001-5594-8403>

*Independent Researcher, USA*

### ABSTRACT

*The measurement of online latent constructs, such as student engagement, have mimicked the measurement of these constructs in traditional, brick-and-mortar learning environments. For brick-and-mortar K-12 schools and online K-12 schools there are challenges that need to be addressed to establish a measure with support for validity. Measurement in an online learning environment has different accessibility and data collection requirements. The online learning environment lends itself well to the use of student behaviors to measure latent constructs, including student engagement. The behaviors of students in an online learning environment are regularly documented. This chapter will delve into the ways latent constructs, using student engagement as an example/case study, are currently being measured in the K-12 online learning environment and alternatives to these measures mimicking traditional brick-and-mortar measures.*

### INTRODUCTION

The measurement of online latent constructs, such as student engagement, have mimicked the measurement of these same latent constructs in traditional, brick-and-mortar learning environments. For brick-and-mortar K–12 schools and online K–12 schools there are challenges that need to be addressed to establish a measure with support for validity. One of the most elusive latent constructs in K–12 education, including online K–12, is student engagement. Several studies have assessed student engagement, both in an online learning environment and in other learning environments (Chen, Lambert, & Guidry,

DOI: 10.4018/978-1-7998-8047-9.ch031

2010; Hamane, 2014; Lerma, 2010; McNeal, Spry, Mitra, & Tipton, 2014). Yet there are still challenges in the measurement of student engagement. Fredricks and McColskey (2012) stated “one of the challenges with research on student engagement is the large variation in the measurement of this construct, which has made it challenging to compare findings across studies” (p. 763). If latent constructs, such as student engagement, are not consistently measured, then the impact of these constructs on academic achievement is not clear.

In the last 30 years there has been an influx of K–12 students into the online learning environment (Allen & Seaman, 2010; Hamane, 2014; Parker, 2015). These online students range from students using technology-mediated learning in traditional brick-and-mortar schools, attending blended programs where content and courses are online to 100% online students who attend an online/virtual school. More research needs to be done to fully understand the differences between traditional K–12 brick-and-mortar learning environment students and K–12 online learning environment students. These differences can require differences in assessments of academic achievement as well as differences in the measurement of latent constructs. As explained by Pazzaglia, Clements, Lavigne, and Stafford (2016), “although research and recommendations exist for promoting student engagement in face-to-face school settings, it is unclear whether those recommendations translate to the online learning environment, because online settings involve unique considerations and challenges” (p. 3).

Latent constructs are the bread and butter of the educational research community (Samuelsen, 2015). A latent construct is a factor that cannot be directly measured or observed but must be indirectly measured using one or more observable indicators of the latent construct. Student engagement is an example of a latent construct. While student engagement has been found to be important to academic achievement (Betts, 2012; Cremascoli, 2011), college preparedness (Allen & Seaman, 2010) and other academic factors (Appleton, 2017), student engagement is not able to be directly observed or measured without the use of observable indicators of student engagement.

In order to find and/or select observable indicators that can be used to measure latent constructs, such as student engagement, the latent construct must first be able to be defined and operationalized. Currently, there is not a clear definition for student engagement (Appleton, 2017; Fredricks & McColskey, 2012) nor for many other vital latent constructs. This makes the measurement of these latent constructs in a K–12 online learning environment even more difficult. It is essential when measuring latent constructs, such as student engagement, to take into account individual and contextual differences (Sinatra, Heddy, & Lombardi, 2015). This includes the differences in learning environment and how those differences change the manifestations and measurement of latent constructs (Dixson, 2015; Roblyer & Wiencke, 2004).

It is also important to be aware that most latent constructs are not student characteristics and should not be used to describe a student but are malleable states in which a student can be in at any time during the learning process (Appleton, 2017; Gobert, Baker, & Wixon, 2015). For this reason, latent constructs should be measured in a way that allows them to be malleable and change in different contexts, with different student populations and over time (Anderson, 2017). Having malleable latent constructs that are measured as malleable becomes even more important in the online environment where students are learning at their own pace and interacting with the content in different ways at a variety of points in time (Anderson, 2017; Appleton, 2017).

Before diving into the details of how latent constructs are measured or could be measured in the K–12 online learning environment, first the foundation of latent construct measurement must be laid. For this chapter on the measurement of latent constructs in the K–12 online learning environment, student engagement will be the exemplar used throughout the chapter.

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/measurement-in-k12-online-learning-environments/271173](http://www.igi-global.com/chapter/measurement-in-k12-online-learning-environments/271173)

## Related Content

---

### Design of an Instant Data Analysis System for Sports Training Based on Data Mining Technology

QunBi Lei (2023). *International Journal of Web-Based Learning and Teaching Technologies* (pp. 1-15).  
[www.irma-international.org/article/design-of-an-instant-data-analysis-system-for-sports-training-based-on-data-mining-technology/330991](http://www.irma-international.org/article/design-of-an-instant-data-analysis-system-for-sports-training-based-on-data-mining-technology/330991)

### Challenges of Motivating Students in Online Learning Platforms: An Analysis Through the Eyes of Teachers

Sevim Bezen (2023). *Handbook of Research on Creating Motivational Online Environments for Students* (pp. 59-81).  
[www.irma-international.org/chapter/challenges-of-motivating-students-in-online-learning-platforms/328829](http://www.irma-international.org/chapter/challenges-of-motivating-students-in-online-learning-platforms/328829)

### The Usefulness of Massive Multiplayer Online Role Playing Games (MMORPGs) as Tools for Promoting Second Language Acquisition

Daniel H. Dixon and MaryAnn Christison (2018). *Applications of CALL Theory in ESL and EFL Environments* (pp. 244-268).  
[www.irma-international.org/chapter/the-usefulness-of-massive-multiplayer-online-role-playing-games-mmorpgs-as-tools-for-promoting-second-language-acquisition/188187](http://www.irma-international.org/chapter/the-usefulness-of-massive-multiplayer-online-role-playing-games-mmorpgs-as-tools-for-promoting-second-language-acquisition/188187)

### A Case of Using Wikis to Foster Collaborative Learning: Pedagogical Potential and Recommendations

Hong Lin and Kathleen D. Kelsey (2010). *Web-Based Education: Concepts, Methodologies, Tools and Applications* (pp. 775-790).  
[www.irma-international.org/chapter/case-using-wikis-foster-collaborative/41379](http://www.irma-international.org/chapter/case-using-wikis-foster-collaborative/41379)

### Learning in Cross-Media Environment

Stefano Bonometti (2017). *International Journal of Web-Based Learning and Teaching Technologies* (pp. 48-57).  
[www.irma-international.org/article/learning-in-cross-media-environment/187150](http://www.irma-international.org/article/learning-in-cross-media-environment/187150)