

Tool for Evaluating Learning in an Open and Distance Learning Environment

Dr. (Ms.) Sameena Falleiro

Associate Professor (Department of Computer Science)
Parvatibai Chowgule College of Arts and Science (Autonomous), Margao, Goa

Abstract

There has been continuous progress in exploring various platforms to implement online learning. Notwithstanding the same, one pressing requirement is understanding the kind of learning taking place in these environments. Student's engagement is an important factor that helps the learning process. This paper evaluates an engagement scale that has been designed by the researcher, as a tool to examine the effectiveness of learning in Learning Management System-(LMS) through a two sample "post-test only" experimental research design. The paper discusses the development, validity, reliability and the scoring method of the engagement scale. The researcher developed the engagement scale using a four-point rating scale with 21 items, with an objective to study the cognitive, affective and behavioral aspects of engagement. Further subdivision of each of the features was done to find out to what degree these learners are engaged with their educational activities, so as to study the nature and quality of interaction that the participants have in the various activities of LMS. The scores obtained from the engagement scale helped to determine the extent of engagement and motivation. The findings are useful to conclude that if these tools can be used to measure effectiveness of learning in LMS, they can be used to examine learning for any other open and distance learning environment.

Keywords

LMS, MOODLE, Engagement, Motivation and Academic Performance

Introduction

The last decade witnessed students heavily immersed in Web 2.0 technologies with the internet is playing an increasingly important role in students' social and academic life (Munoz & Towner, 2012). Learning Management Systems (LMS) is changing the way students are getting educated nowadays. This new paradigm has become a critical component in the mission of academic institutions extending the learning process beyond the classroom (Coates, 2005). Different systems have different emphasis but common LMS features include content authoring tools, calendars, syllabi, discussion boards and assessment mechanisms (Hall, 2003; Chapman, 2003). Student's engagement results provide educators across a variety of campus programs and departments, information to consider in their efforts to understand the student experience and to collaborate in the design of educationally productive activities and programs (NSSE, 2011). Measuring engagement and its link to learning is challenging and this is especially true when the term engagement is often used in broad terms to describe a range of behaviours that learners exhibit (Bulger, Mayer, Almeroth, & Blau, 2008).

The present research study discusses the development, validity, reliability and the scoring methods of tools prepared by the researcher to evaluate the engagement levels in students studying via an LMS. It also discusses the development and implementation of the Evaluation Rubric (ER) to capture all the learning that is taking

place via the various features that the LMS offers.

Review of Literature

Educators must actively collaborate about the experience of their students, talk about what students know and can do, and design new approaches to engaging students at high levels (NSSE, 2011). Independent studies done by Chen, Lambert, and Guidry, (2010) and Kuh, et al. (2001, 2003) to investigate student engagement in face-to-face and web-based learning environments show a general positive relationship between the use the learning technology and student engagement and learning outcomes.

Engagement

Engagement is mental effort focused on learning and it is a precondition to learning progress (Kuh, 2005; Helme & Clarke, 2001). Measures of student engagement inform many aspects of university education. In higher education, engagement has become a catch-all term most commonly used to describe a compendium of behaviors characterizing students (Krause & Coates, 2008). It has even been suggested that student engagement could be used as an indicator of institutional teaching quality (Kuh, 2001). Measuring engagement and its link to learning is challenging and this is especially true when the term engagement is often used in broad terms to describe a range of behaviours that learners exhibit (Bulger, Mayer, Almeroth, & Blau, 2008). Additionally, engagement is the degree to which learners are engaged with their educational activities and that engagement is positively linked to a host of desired outcomes, including high grades, student satisfaction, and perseverance. This definition implies the use of three interrelated criteria to assess student engagement levels namely:

- a) Cognitive:
The extent to which students are

attending to and expending mental effort in the learning tasks encountered.

- b) Affective:
The extent to which students are making active responses to the learning tasks presented and their emotional reactions.
- c) Behavioral:
The level of students' investment in and their collaborative actions to the learning tasks and also implies their group work (Chapman, 2003).

Objectives of the Study

1. To develop a Tool for evaluating Engagement to study the effectiveness of LMS for student Engagement.

Research Design and Methodology

The Research Design used for this study was the “Experimental method” with “post-test only” design. The number of students in the experimental and control group were 13 each respectively. The students in the two groups were enrolled in a compulsory course titled Software Engineering (SE) during the last (sixth) semester (B.Sc. Computer Science degree programme offered by Goa University, India) for the academic year 2014–2015. Both groups were taught the course in the conventional environment, with the only difference being that only students from the experimental group had access to MOODLE-LMS. Engagement implies the use of three interrelated criteria namely, Cognitive, Affective and Behavioral to assess student engagement levels (Chapman, 2003). Keeping the above studies in mind, the researcher developed an Engagement Scale using a four-point rating scale with 21 items, with an objective to study the cognitive, affective and behavioral aspects of engagement.

Besides these tools an Evaluation Rubric (ER) was also constructed to help determine the extent to which MOODLE-LMS features namely Chat, Discussion Forum, Glossary, Assignment and Quiz actively promote

student engagement and participation. The scores obtained from the rubric helped determine whether such activities appeal to the learners, thereby increasing their engagement, motivation and interaction. The criteria in the ER were designed keeping in mind the objectives of the study with an additional focus being to understand the quality of interactions that was taking place through the various activities and resources that the MOODLE-LMS offers. An attempt was made to know a student's willingness, need, desire and compulsion to participate in, and be successful in the learning process by offering the student various LMS features which in turn are expected to affect their engagement.

Development of the Evaluation Tools

Process of engagement tool development

The Engagement Scale was developed as a tool to determine and collect engagement data of the students in the Experimental and Control group in order to realize the objectives of the study. Three categories of engagement were identified by the researcher i.e. Cognitive, Affective and Behavioral as discussed in the Review of literature.

The basic construct involved in framing questions around cognitive component were with regards to time spent in understanding the materials, whether they developed useful techniques to learn new content and whether they were actively involved in most class learning experiences. The affective component of student engagement involves discovering different ways to respond to learning tasks and covers feedback received from teachers as well as confidence to do well in class. The behavioral component concerns student's behavioral or psychomotor actions to the task. Each of these statements were to be rated on a scale of 0 to 3. The engagement scale that was

prepared had a four point Likert-type scale and the objects labeled as: Always: 3; Frequently: 2; Sometimes: 1 and Never: 0

Establishing content validity and reliability of the engagement tool

In view of the above three components that comprised the engagement scale, a pool of potential items was developed. This engagement scale was then subjected to content validity by experts who were holding PhD degree and were professionals in the fields for more than a decade. The experts suggested modifications to the tools. Their feedback and suggestions were then incorporated and there were finally 21 questions in the engagement scale. Each category was presented in the form of statements evenly distributed and indicated in Table 1.1. The Table 1.1 shows the category type, the statement numbers and the number of statements in each category.

Table 1.1 Category of statements in the Engagement Scale

Category	Statement Numbers	Number of Statements
Cognitive	1,3,4,6,7,8 and 18	7
Affective	2,5,9,12,13,15 and 21	7
Behavioural	10,11,14,16,17,19 and 20	7
Total number of statements 21		

To test the reliability of the engagement scale, the Cronbach Alpha was computed from the study to measure the reliability of the tools developed by the researcher. According to George and Mallery (2003) when using Likert-type scales it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales one may be using. Based on this the Cronbach alpha value calculated for the entire Engagement scale w.r.t this study is 0.939, which is Excellent. The category wise

Cronbach alpha values too fall in the Acceptable to Good range. The Table 1.2 gives the Cronbach Alpha values in each category of the Engagement Scale, followed by the total scale value.

Table 1.2: Cronbach Alpha reliability values for each category in the Engagement Scale

ENGAGEMENT	
Category	Cronbach Alpha value
Cognitive	0.843
Affective	0.762
Behavioral	0.878
Total Scale	0.939

Scoring of the engagement tool

The final scale that was administered to the sample contained 21 statements distributed evenly across all the three categories. Each category had seven statements each. The engagement scale that was prepared had a four point Likert-type scale. The students were asked to rate each of these statements on a scale of 0 to 3.

The following are the terms with their intended meanings in the present study:

Always (3):	You experience this all the time
Frequently (2):	You experience this more than 75% of the time
Sometimes (1):	You experience this more than 50% of the time
Never (0):	You do not experience this at all

Table 1.3: Weightages for the Engagement scale

Scale Range	Always	Frequently	Sometimes	Never
Score	3	2	1	0

An increased score indicated higher degree of engagement whereas a decreased score indicates a lower degree of engagement. The researcher calculated the scores for all the items for each respondent to obtain a total

score. This was the total engagement score for that student. The total engagement score obtained by the student after the engagement scale was administered as a post-test and made available in Master Copy.

Implementation and Feedback of the Evaluation Tools

Over the treatment period, various resources and activities were made available to the experimental group through the LMS. The students from this group were expected to access and participate in all these activities from time-to-time. Based on their interaction with the particular LMS feature during the entire treatment period, these interactions were evaluated against each and every criteria mentioned in the ER under the respective LMS feature, and scores were given accordingly. This score was then entered in the ER for each student. The total ER scores and a detailed criteria wise score obtained by the student w.r.t. the LMS features of Chat, Discussion Forum, Glossary, Assignment and Quiz during the treatment period is available in Master Copy.

The post-test on engagement was administered to students of both groups as post-test and data was stored in Master Copy. The researcher calculated the scores obtained in the post-test for all the items in the engagement scale for each and every respondent (in both the experimental group and the control group) to obtain a total score. These total engagement data/scores for each student were stored and analyzed.

Conclusions and Suggestions

The findings are useful to conclude that if these tools can be used to measure effectiveness of learning in LMS, they can be used to examine learning for any other open and distance learning environment. The findings of the study can be applied to a technology enhanced global classroom environment like Massive Open Online

Courses (MOOCS) which are being widely explored as alternatives and supplements to traditional university courses wherein students are expected to use quality time both for their individual and collaborative activities without any face-to-face contact with faculty. Based on increasing requirements for universities to assess their efforts in improving student engagement, this study has suggested a broad definition for engagement and motivation as well as the nature of the activities that a student indulges in an online environment that aligns with an established model of educational effectiveness in undergraduate education. It showed that measuring engagement is difficult and that leaning environments affect the ways that students engage. Taken together, these findings hold practical implications for stakeholders in Higher Education who are seeking to enhance key facets of students' academic motivation and engagement, as well as implications for researchers seeking to assess the impact of technology on academic outcomes.

References

1. Bulger, M. E., Mayer, R. E., Almeroth, K. C., & Blau, S. D. (2008). Measuring learner engagement in computer-equipped college classrooms. *Journal of Educational Multimedia and Hypermedia*, 17(2), 129–143.
2. Chapman, E. (2003). Alternative approaches to assessing student engagement rates. *Practical Assessment, Research and Evaluation*, 13(8). <http://PAREonline.net/getvn.asp?v=8&n=13>. Accessed 25 August 2016.
3. Chen, P. S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education*, 54(4), 1222–1232.
4. Coates, H. (2005). Leveraging LMSs to enhance campus-based student engagement. *Educause Quarterly*, 28(1), 66–68. <http://www.educause.edu/ero/article/leveraging-lmss-enhance-campus-based-student-engagement>. Accessed 20 August 2016.
5. George, D. & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th edn.). Boston: Allyn & Bacon.
6. Hall, J. (2003). *Assessing learning management*. http://www.clomedia.com/content/templates/clo_feature.asp?articleid=91. Accessed 30 August 2016.
7. Helme, S. & Clarke, D. (2001). Identifying cognitive engagement in the mathematics classroom. *Mathematics Education Research Journal*, 13(2), 133–153. <http://link.springer.com/article/10.1007/BF03217103#page-1>. Accessed 15 August 2016.
8. Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. USA: Lawrence Erlbaum Associates.
9. Keller, J. M. & Suzuki, K. (1988). Use of the ARCS motivation model in courseware design. In D. H. Jonassen (Ed.), *Instructional Designs for Microcomputer Courseware*. Hillsdale, NJ: Lawrence Erlbaum.
10. Kuh, G. D. (2001). Assessing what really matters to student learning inside the national survey of student engagement. *Change: The Magazine of Higher Learning*, 33(3), 10–17. <http://www.tandfonline.com/doi/pdf/10.1080/00091380109601795>. Accessed 15 August 2016.
11. Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change*, 35(2), 24–32.

12. Kuh, G. D. (2005). *Student engagement in the first year of college- In Challenging and supporting the first-year student* (pp. 86–107). In L. M. Upcraft, J. N. Gardner, & B. O. Barefoot (Eds.). San Francisco: Jossey-Bass.
13. Kuh, G. D. (2007). *What student engagement data tells us about college readiness*. www.indiana.edu/~ceep/hssse. Accessed 4 August 2016.
14. Kuh, G. D., & Hu, S. (2001). The relationships between computer and information technology use, selected learning and personal development outcomes, and other college experiences. *Journal of College Student Development*, 42(3), 217–232.
15. Munoz, L. C. & Towner, T. L. (2012). *Opening Facebook: How to use Facebook in the college classroom*. http://web.gcc.mass.edu/faculty-support/files/2012/01/Facebook-and-Education_-2.pdf. Accessed 10 August 2016.
16. National Survey of Student Engagement (NSSE). (2011). *Fostering student engagement campus wide—Annual results 2011*. Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.iub.edu/NSSE_2011_Results/pdf/NSSE_2011_AnnualResults.pdf. Accessed 28 August 2016.