Formative Assessment Using Repertory Grid Technique via Facebook: A Social Media Tool to Support E-Learning

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Abstract: Designing technologies that enhance formative assessment in e-learning is crucial for improving teaching and learning in these environments. Whereas many studies have examined the effectiveness of formative assessment in traditional classroom contexts, researchers have only recently begun to explore technology-enhanced assessment. To understand how we can take advantage of existing social media tools to support e-learning, we describe a Facebook app called FARGO that offers potential to support teachers and students with assessment for learning.

Introduction

Designing technology tools that can enhance assessment in e-learning environments is crucial for improving teaching and learning in these contexts. Innovative assessment tools may be embedded in the technology-enhanced learning environment. When closely aligned with instructional goals and course activities, they provide teachers and students with supports for cognitive and motivational processes. Whereas many studies have examined the effectiveness of formative assessment and feedback in traditional classroom settings (Andrade & Cizek, 2010; Black & Wiliam, 1998; Noyce & Hickey, 2011), less is known about transferring assessment practices from face-to-face to online environments (Beebe, Vonderwell, & Boboc, 2010). In higher education contexts, there is a paucity of studies on online formative assessment (Gikandi, Morrow & Davis, 2011). Therefore, our objective is to investigate how tools for formative assessment embedded in Facebook and course activity structures can support online and blended teaching and learning. Online formative assessment tools may: 1) provide just-in-time feedback on learning progress to students; 2) help teachers reflect on their teaching practices and enact change to optimize learning; and 3) support students' self-regulated learning (Zimmerman & Schunk, 2001).

Conceptual Framework and Methodology

Guided by a socio-cognitive knowledge building (Scardamalia & Bereiter, 2003) framework, this design-based research study explores opportunities for concurrent, embedded and transformative assessment (Scardamalia, Bransford, Kozma, & Quellmalz, 2009) using a Facebook app called FARGO (Formative Assessment using Repertory Grid Online). The first iteration analyzed data from 26 participants from a blended undergraduate marketing class. The second iteration analyzed data from 13 participants in a blended B.Ed. instructional technology course. The third iteration analyzed data from 5 participants in an online M.Ed. e-learning course.

FARGO: Software and Preliminary Findings

FARGO is software designed by Chris Teplovs to elicit repertory grids for the purpose of formative assessment. It takes advantage of the existing Facebook infrastructure and employs the well-established repertory grid technique (RGT; Fransella, Bell, & Bannister, 2003; Kelly, 1955). RGT has been used successfully not only in psychology but also in education and more recently, in computer-supported collaborative learning research (Aditomo, Calvo, & Reimann, 2009; Vatrapu, Reimann, & Hussain, 2011). FARGO collects data efficiently and overcomes the time-consuming nature of conducting interviews using the RGT.

In this study, FARGO is deployed as an exercise embedded within the broader course learning activities in a learning management system. FARGO prompts participants to think about the relationships between elements of a particular topic. For example, B.Ed. students were asked to think about the relationship between six instructional technologies in two steps: 1) the widely-adopted triadic sorting of elements for personal constructs and 2) subsequent five-point Likert-scale rating of the elements (Fransella, Bell, & Bannister, 2003). Constructs are defined as "a way in which some things are construed as being alike and yet different from others" (Kelly, 1991, p 74). Thus, participants go through a series of prompts that presents three technologies (e.g., Smartboard, smartphone, tablet) at a time. For each triad, they are asked to identify the element that is different (e.g. Smartboard) from the other two elements (smartphone, tablet) and to state how it is different (e.g., presentation technology). Then, the participant is asked to state how the two remaining elements in the triad are similar to each other (e.g., mobile technologies). These differences and similarities are used to label the extreme values of the Likert scale (e.g. 1 and 5). The remaining elements (other technologies) are rated on this construct. The triadic sorting process is repeated a total of eight times, resulting in a total of eight constructs elicited from each participant.

After the construct elicitation, each participant is shown a visual representation (i.e. table) of the relationships they identified between different technologies. Showing students their own repertory grid makes their learning "open" or visible to them and provides formative feedback to encourage students to exercise cognitive responsibility over their learning. The course instructor also completes the exercise. This enables students to see how an expert conceptualizes the same topic.

In the first iteration, 25 of the 80 undergraduate marketing students (31%) completed the FARGO exercise. The instructor's constructs on the relationships revealed dichotomous, unique constructs with virtually no overlap with each other, and a spread of values (1 to 5) in rating the elements. This suggests that the instructor, an expert, constructed complex understanding of the relationship between the elements. Student grids showed a range in quality, with more advanced student grids showing overlap with the expert's grid in features, and other student grids featuring repeated constructs or constructs with one similar pole. Another characteristic of less advanced student grids is that the elements were rated only by polar values (i.e., only 1 and 5, not 2, 3, or 4). These qualitative and quantitative features of repertory grids were explored in the following iterations.

In the second iteration, 13 of the 46 (28%) B.Ed. students who gave informed consent completed the FARGO exercise. In the third iteration, all five M.Ed. students who gave informed consent completed the FARGO exercise. To analyze quantitative data from second and third iterations, we counted 1) the number of non-polar values (i.e., 2, 3, 4) for each of six elements rated on eight constructs and 2) the number of unique constructs, or "themes." For example, a student might identify three unique constructs ("software-hardware", "entertainment-educational", and "big-small") and repeatedly use the same construct when rating different triads. The non-polar values were summed for a total non-polar value. The mean number of non-polar values for B.Ed. students was 13.3 and the mean number of themes was 5.9. The mean number of non-polar values for M.Ed. students was 14.5 and the number of themes was 6.7. No significant differences were found between B.Ed. and M.Ed. participants using independent samples t-tests for non-polar values ($t(17)=.30$, $p=0.77$) and mean number of themes ($t(17)=.92$, $p=.37$). Confirming our findings from the first iteration, repertory grids elicited from experts tended to have comparatively fewer polar values and little overlap between constructs.

References

Aditomo, A., Calvo, R. A., & Reimann, P. (2011). Collaborative writing: Too much of a good thing? Exploring engineering students' perceptions using the repertory grid. In *Proceedings of the Computer Supported Collaborative Learning Conference 2011* (pp. 128-135). Hong Kong: ISLS.

Andrade, H. L., & Cizek, G. J. (2010). *Handbook of formative assessment*. New York, NY: Routledge.

Beebe, R., Vonderwell, S., & Boboc, M. (2010). Emerging patterns in transferring assessment practices from F2f to online environments. *Electronic Journal of e-Learning, 8*(1), 1-12.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7-74.

Cook, K., Seely, C. & Chaput, L. (2011). Customizing and capture: Online assessment tools for secondary mathematics. In P. E. Noyce & D. T. Hickey (Eds.), *New Frontiers in Formative Assessment* (pp.49-68). Cambridge, MA: Harvard Education Press.

Fransella, F., Bell, R., & Bannister, D. (2003). *A manual for repertory grid technique*. Chichester, UK: John Wiley & Sons Ltd.

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education, 57(2011),* 2333-2351.

Kelly, G. (1955). *Principles of personal construct psychology*. New York: Norton.

Kelly, G. (1991). *The psychology of personal constructs (Original work published 1955)*. London: Routledge.

Noyce, P. E., & Hickey, D. T. (Eds.). (2011). *New Frontiers in Formative Assessment.* Cambridge, MA: Harvard Education Press.

Scardamalia, M., & Bereiter, C. (2003). Knowledge Building. *Encyclopedia of Education* (2nd ed.). New York: Macmillan Reference, USA.

Scardamalia, M., Bransford, J., Kozma, B., & Quellmalz, E. (2012). New assessments and environments for knowledge building. (Eds.) P. Griffin, B. McGaw, & E. Care. *Assessment & Teaching of 21st Century Skills* (pp. 231-300). New York: Springer.

Vatrapu, R., Reimann, P., & Hussain, A. (2012. Towards teaching analytics: Repertory Grids for Formative Assessment. In J. v. Aalst, K. Thompso, M. J. Jacobson, & P. Reimann (Eds.) *Proceedings of the International Conference of the Learning Sciences 2012* (pp. 341-345). Sydney: ISLS.

Zimmerman, B. J., & Schunk, D. H. (2001). *Self-regulated learning and academic achievement: Theoretical perspectives (2nd ed.)*. Mahwah, NJ: Erlbaum.

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