

## ONLINE FORUM DISCUSSIONS: THEY WILL RESPOND THE WAY YOU ASK<sup>1</sup>

**Zsuzsanna Szabo \***

*Marist College, Poughkeepsie, USA*

**Jonathan Schwartz**

*University of Hawaii West O'ahu,  
USA*

### *Abstract*

*This paper presents a longitudinal study, across three semesters following 19 elementary education preservice teachers registered in three blended courses (foundations of education, and integrated reading and language arts methods), at a university in Hawaii. In two courses the instructor, aside of regular course content, taught also about Bloom's Taxonomy, and used it as a rubric for grading students' discussions about language arts instructional methods in elementary education. A total of 912 forum postings (reflections and comments) were analyzed and scored. Results show that teaching Bloom's taxonomy as an instructional tool in a blended course, and using it as a rubric to score online postings, improved students' performance in online discussions. The level of assigned discussion task was also shown to be a factor in the level of students' responses in the online discussions. Results are presented by semester and type of posting (reflections vs. comments). Lessons learned and educational implications are presented.*

Keywords: online forum discussions; preservice teacher education; Bloom's taxonomy

### **Preservice Teacher Education and Use of Technology**

Multiple studies show that online discussions have the potential to cultivate and develop student higher order thinking skills (Black, 2005; Hara,

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Correspondence concerning this paper should be addressed to:

\* Ph.D., Education Department, Marist College, Poughkeepsie, NY, U.S.A. E-mail: [zsuzsanna.szabo@marist.edu](mailto:zsuzsanna.szabo@marist.edu)

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Bonk, & Angeli, 2000; Meyer, 2003; Thomas, 2002; Schwartz & Szabo, 2011; Szabo & Schwartz, 2011; Wu & Hiltz, 2004).

McFarlane (1997) recognizes the complexity of using technology in the classroom, and states that there are advantages as well as limitation to the use of technology. For this reason, the most important issue is related to how technology is used in education. As McFarlane states, “computer use alone, without clear objectives and well-designed tasks, is of little intrinsic value” (McFarlane, 1997, p. 35).

Similarly, Sivin-Kachala and Bialo (2000) in a synthesis based on 311 research studies concerning the student-to-student and student-to-teacher interaction show an increase of interaction level when technology is used in education. Based on their findings, Sivin-Kachala and Bialo (2000) conclude that “it is not the technology that makes the difference but rather how teachers adapt and apply technology that makes the difference” (p. 389).

Technology needs to be purposeful and related to the content of teaching in order to be effective. Previous studies conducted by Schumm, Webb, Turek, Jones, and Ballard (2006), compared face-to-face and online courses when evaluating students’ critical thinking skills. It was found that the use of online discussion boards increased critical thinking, and that students demonstrated more complex questions, and increased contact in online format. Similar findings by Derry, Hmelo-Silver, Nagarajan, Chernobilsky, and Beitzel (2006) show the effective use of online discussion boards in college-level courses. Their research demonstrates that technology helped students develop deep learning and enhanced critical thinking skills. There is also evidence that the use technology in effective ways will enhance students’ critical thinking skills (Szabo & Schwartz, 2011). Dennen and Wieland (2007) argue that given certain discussion requirements, students may fail to engage in deep conversations and provide thoughtful and reflective contributions. Technological means integrated in the teaching and learning process help students improve their learning and develop higher order thinking skills. Technology is not only a useful teaching tool, but also a method that enhances the process of teaching and learning. Technology offers an environment available outside of classroom time where students continue to reflect and discuss topics learned during class time. Higher order thinking skills are essential and need to be fostered as part of teacher education programs. The importance of higher levels of thinking highlights the need for targeted teaching

methods. Preservice teachers should be able to use the skills later in their teaching practice.

### **Teaching with Bloom's Taxonomy**

Bloom's original (Bloom, Krathwohl, & Masia, 1956) and the revised taxonomy (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths, & Wittrock, 2001) was developed based on the concept that cognitive and thinking processes are hierarchically organized from lower level cognitive processes to higher order ones. Teaching to preservice teachers what is Bloom's taxonomy and how to use it might be essential in the education process, and using the taxonomy to plan for classroom instruction and assessments are also key skills to becoming a successful classroom teacher. Bloom's taxonomy (*see* Appendix A) uses six levels for cognitive processes (remembering, understanding, applying, analyzing, evaluating, and creating), and four levels for the knowledge processes (factual, conceptual, procedural, and metacognitive). Looking at the two dimensions of Bloom's taxonomy, one can observe that thinking processes go from lower levels (upper left corner of the taxonomy), to higher levels of thinking (lower right corner of the taxonomy). Bloom's taxonomy traditionally is used to plan for classroom assessments; however, more recently was used as a rubric to assess online discussions (Szabo & Schwartz, 2011). Szabo and Schwartz (2011) used Bloom's taxonomy as a rubric to evaluate the level of online postings by education students. Results from their study demonstrated that the use of online discussion forums as instructional method increased critical thinking in preservice teachers. Usually Bloom's taxonomy is taught to education students in assessment related courses. When education students learn how to design classroom assessments they learn also how to use Bloom's taxonomy to plan the assessment items. Planning with the Bloom's taxonomy helps students think about and design assessment items appropriate to the different levels of Bloom taxonomy. We believe that by teaching Bloom's taxonomy to students in instructional methods courses, not necessarily related to assessment topics, but discussing about and using Bloom's Taxonomy in online forums might help students plan their lessons more effectively. If students are taught Bloom's taxonomy and they are presented with the taxonomy as being used as a rubric to assess their written tasks, then students might use self-assessment and

improve the levels of thinking and in consequence the levels of their performance on the written tasks.

In this study (based on a previous study; Szabo, Schwartz, & Lopez, 2013) we present instructional methods used in teaching preservice teachers that imply the use of Blackboard discussions and intentional teaching on how to use Bloom's taxonomy; with the purpose to improve online discussions. Three research questions that are addressed in this study consider if teaching Bloom's taxonomy and using it as a rubric to evaluate online discussions in the instructional process (1) will help students demonstrate higher order thinking as measured by changes in the level of the Blackboard reflections posted by participants across the semester, (2) if that will transfer across the comments posted in online discussions among students, and (3) if the level of task for online discussion will determine the level of students' postings.

## Methods

### *Participants and Course Descriptions*

This longitudinal study was conducted in three undergraduate teacher education courses, following 19 students registered in Spring 2009, Fall 2009, and Fall 2010 semesters. The first course was related to foundations of education, the second integrated reading and language arts methods for K-3<sup>rd</sup> grades, and the last course integrated reading and language arts methods for 4-6<sup>th</sup> grades. All three courses were blended and followed the same format. In addition to meeting face-to-face, courses included a substantial online component. Each week students completed a module that covered a different topic. Instructional activities included reading a chapter or assigned articles, taking part in online asynchronous discussion, completing an assignment, and then taking a quiz. As part of the online discussions requirements students were to post one *initial reflection* on a given task on the readings, and also to *comment* on two colleagues' reflection. This study focused for each course only on the online discussions board postings.

In the first course, foundations of education (Spring 2009), students completed weekly Blackboard discussions on course topics as part of their coursework and were given general instructions on the expectations concerning the posted reflections and comments. In the second course, integrated reading and language arts methods for K-3<sup>rd</sup> (Fall 2009), students were taught Bloom's

taxonomy in the first week of the semester, as additional topic of the regular course content, and were required to use the taxonomy as a rubric to measure the level of posting in their weekly online discussions. In the third course, integrated reading and language arts methods for 4-6<sup>th</sup> grades (Fall 2010), students were instructed on Bloom's taxonomy and were told that the same Bloom's taxonomy will be used as a rubric to evaluate their online discussion postings. Each semester, the discussions tasks assigned by the instructor were designed to cover particular levels located on Bloom's taxonomy (*see* Appendix B for semesters and modules with discussions at particular levels). Out of all the discussion forums across the semester, only six forums per semester were selected; two of each, from the beginning, middle, and end of semester. This selection at three points in the semester would allow seeing any changes across the semester.

#### *Discussion Tasks and Performance Scoring*

In the first semester in study (Spring 2009) most of the tasks for the modules were at the conceptual analysis level of the taxonomy (*see* Appendix B). It was expected that students' performance would show at least analysis of concepts in discussion. By comparison, all tasks in the Fall 2009 semester were at procedural level (*see* Appendix B). This was planned to observe if only by assigning higher level tasks to be completed in the online discussions will increase also the level of performance in students' online discussions postings. The levels for discussion tasks assigned in the third course (Fall 2010) were a combination of the previous two semesters (conceptual and procedural levels, *see* Appendix B). Since the students were also taught about Bloom's taxonomy and they were aware that the taxonomy will be used as a rubric to evaluate the level of their online discussions, it was expected that students might use the taxonomy as self-assessment rubric and the performance in the online discussions will be at higher levels of thinking, or will map on the level the task was designed.

Each semester the discussion postings were categorized as reflections and comments.

Students were given a number to protect identity, and postings were rated by semester and course to make distinction in analysis. The two authors were raters and used Bloom's taxonomy (*see* Appendix A) as a rubric to evaluate all postings across the semesters. Initially for Spring 2009 semester

online discussions evaluation, there was a training period when the raters individually rated the same twenty reflections and ten comments. Since the inter-rate correlation was rather small ( $r=.68$ ), the raters discussed each posting and agreed on rating procedures. A new set of twenty reflections and ten comments were individually rated. This resulted in higher inter-rater reliability ( $r=.87$ ). The raters then proceeded to score all the reflections and comments using the taxonomy as a rubric. Inter-rater reliability for Fall 2009 and Fall 2010 scoring was at similar level as in spring semester (Fall 2009:  $r=.89$ ; Fall 2010:  $r=.93$ ).

There were a total of 300 reflections across the three semesters, and a total of 612 comments (*see* Table 3 below).

## Results

From each of the three courses were selected 6 modules to be studied (two modules from each: beginning, middle, and end of semester). There were a total of 912 online postings (Spring 2009 = 235, Fall 2009= 341, Fall 2010= 336), which were categorized as initial reflection (300) or comments (612) posted to the reflection. Using Bloom’s taxonomy as a rubric (*see* Appendix A), each posting was scored by giving a score of 1 if the posting covered the respective level, or a score of 0 if it did not. A total score was calculated for each individual posting. ANOVA analysis was conducted separate for “reflections” and for “comments,” by Bloom’s taxonomy levels, and course (semester). Results show statistically significant differences in the levels of posting across semesters for both, the reflections (*see* Table 1), and comments (*see* Table 2).

Table 1. ANOVA table for reflections across semesters

	SS	df	MS	F	Sig.
Between groups	1048.98	2	524.49	48.42	.0001
Within groups	3216.65	297	10.83		
Total	4265.63	299			

Table 2. ANOVA table for comments across semesters

	SS	df	MS	F	Sig.
Between groups	2001.20	2	1000.60	73.64	.0001
Within groups	8274.48	609	13.58		
Total	10275.69	611			

Compared to comments posted across all three semesters, reflections were written at higher cognitive level than comments (*see* Table 3).

Table 3. Reflections and comments number and mean score across semesters

Semester	Number of comments	Comments mean score	Number of reflections	Reflections mean score
Spring 2009	160	6.66	75	10.96
Fall 2009	230	10.08	111	15.23
Fall 2010	222	11.20	114	11.70
Total	612		300	

However when reflections and comments were analyzed across semesters it can be seen that the lowest levels for reflections and comments are found in Spring 2009 (*see* Figure 1). In that particular semester students were only given instructions concerning how a reflection or a comment would look like, and general expectations in a rubric.



Figure 1. Mean scores by semester and type of posting

In that first semester scores for comments were much lower than scores for reflections. In the second semester (Fall 2009) scores for both, reflections and comments, are higher than in previous semester. In the last semester (Fall 2010) interestingly the level of reflections and comments in the discussions

were not statistically significant different. The level of scores for comments across semesters is statistically significant between all three semesters. The difference in level of scores for reflections is statistically significant different between semesters; except between first and last semesters (Spring 2009 and Fall 2010). When analyzing the levels of scores for comments, results are statistically significant across all three semesters.

#### *Discussions and Educational Implications*

Results show that the highest levels for online discussions postings were in Fall 2009. This was the semester when Bloom's taxonomy was taught as part of instructional process and students were instructed and were required to use the taxonomy as a rubric to guide the level of their online forum postings. The combination of teaching Bloom's taxonomy and assigning higher thinking level tasks for discussions (most of the tasks assigned for discussions were at procedural level, see Appendix B), seems to have as result higher levels of reflective thinking and an increase in the level of comments. However, it seems that the higher level of reflective thinking did not transfer over into the level of comments posted. Despite that the level of comments posted in Fall 2009 is higher than in Spring 2009, it is still lower compared to reflections posted in Fall 2009. From comparing results from the first two semesters in the study (Spring 2009 and Fall 2009), it can be concluded that teaching and using Bloom's taxonomy as a rubric along with higher thinking level tasks will have as result an increase in the level of online discussions. These results also support the results from previous research which shows that the level of assigned online discussions can increase higher order thinking in students (Szabo & Schwartz, 2011; Dennen & Wieland, 2007). Our results are in line with previous research (Black, 2005; Schwartz & Szabo, 2011; Wu & Hiltz, 2004), that shows how teaching students recognize higher order thinking helps them also perform at higher levels.

Results from the last semester (Fall 2010) show similar levels for reflections and comments within semester, with no statistically significant difference between levels in the posted comments and reflections, but lower levels of reflections compared to levels from Fall 2009. Discussion tasks assigned in Fall 2010 were a combination of the previous two semesters (conceptual and procedural levels). Since there is a statistically significant difference between levels of reflection posting in Fall 2009 and Fall 2010, this



difference might be connected to the lower levels of tasks assigned for discussions in Fall 2010. As the task level decreased the performance level form students followed suit (*see* Appendix B). These results reinforce the finding that the level of assigned task for discussion is very important. Despite the fact that students learned about Bloom's taxonomy and they were aware that the taxonomy will be used as a rubric to evaluate their online postings, they chose to respond to the tasks at the level the tasks were set. This finding is very important for the online education field since it makes instructors aware that what they ask that is what they will receive as performance from students.

Looking across the three semesters, and taking into account the task level assigned for discussion, it can be seen the importance of assigning higher level thinking tasks if the instructor expects students to demonstrate higher order thinking level in online discussions. This is a direct educational implication when instructors plan their online discussions tasks. Future research should focus on studying how teaching Bloom's taxonomy to students and using it as a rubric, while manipulating the level of tasks is consistent with students' performance.

#### *Limitations*

Despite the statistically significant results there are several limitations that need to be mentioned. First, the small number of students participating in the study (19 students since we followed only those who took in order all three courses). Second, the three courses were taught by the same instructor across the three semesters. For these reasons results may have a low external validity. Third, it is possible that the results from the last semester are due to the fact that students were familiar with the taxonomy and the instructor's teaching style, and they posted higher level discussions even when the task was designed at lower (conceptual) level.

### **Conclusions**

Results from this study suggest that the level of online discussions tasks guides the level of discussions on the forums. If instructors expect students to demonstrate higher order thinking skills in their online discussions, then the instructors should assign appropriate level tasks. Only by asking students "higher" questions we will receive "higher" responses. They will respond the

way you ask! Also, our study suggests that teaching students Bloom's taxonomy and using it as a rubric is helpful for students to self-evaluate and improve the levels of their postings. Future research is needed to study the effect of task level on student performance in online discussions.

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### Appendix A

#### Bloom's Revised Taxonomy

Anderson, L. A., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., & Mayer, R. E. (2001). *A Taxonomy for Learning, Teaching, and Assessing*. Upper Saddle River, NJ: Pearson.

Knowledge dimensions	Cognitive processes (different levels of thinking)					
	<u>Remembering</u>	<u>Understanding</u>	<u>Applying</u>	<u>Analyzing</u>	<u>Evaluating</u>	<u>Creating</u>
Factual						
Conceptual						
Procedural						
Metacognitive						

### Appendix B

Discussions task at the particular level on Bloom's taxonomy by semester and module

Semester	Module #	Task level on Bloom's Taxonomy
Spring 2009	1	Conceptual, analysis
	2	Conceptual, application
	7	Conceptual, analysis
	8	Procedural, application
	14	Conceptual, evaluation
	15	Conceptual, evaluation
Fall 2009	2	Procedural, application
	3	Procedural, application
	7	Procedural, application
	8	Procedural, application
	13	Procedural, application
	14	Procedural, application
Fall 2010	2	Procedural, application
	3	Procedural, application
	7	Conceptual, evaluation
	8	Conceptual, analysis
	10	Conceptual, analysis
	11	Conceptual, analysis