

# Assessment in Transportation Engineering Education

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## Introduction

The article (Rose, 2011) under the focus of this critique is published in 2011 in the Journal of Transportation Research Board (TRB). This publication was supported by the TRB Transportation Education and Training committee ("Transportation Education and Training Committee,"). This committee is involved with academic training in transportation engineering, and supports development of improved education and training programs for precollege, college, and professional levels. The language and the tone of the article is suited for the audience, that is mainly limited to educators in the field of transportation engineering. This is one of the rare articles, published by TRB, which is concerned with the actual process of assessment in transportation engineering education. The focus of most of the articles is on the development of improved teaching practice or curriculum for academic education or training of transportation engineers. The general terminology of engineering education is not widely noticeable in these articles, since professors of transportation engineering primarily write them. The author of this article is also a professor of transportation engineering in Monash University, Melbourne, Australia. The subject department offers graduate-level classes as a part of transport and traffic program, and recently they had a shift towards distance education program.

## Potential advantages and disadvantages of online discussions

As part of one of the transportation planning courses, the instructor decided to introduce the environment for online discussions. The division that the author mentions is between synchronous (e.g., chat rooms) and asynchronous (e.g., discussions) online communication. The assessment technique used in this class are asynchronous online discussions, that considered as important information-technology-enabled communication (Bourne, Mayadas, & Campbell, 2000). The author introduces several potential benefits of online discussions. First, the author claims that online discussion tools have the potential to increase interaction between students and the students and instructors, with the ability to create the environment for cooperative integration of knowledge from experience. Furthermore, the author focused on the asynchronous discussion, considering them as advantageous when participants are dispersed spatially, temporally, or have different constraints for their schedules. Finally, virtual discussions have the potential to reduce barriers for participation, such as physical ability, race, gender or social economic status, while encouraging students to work on the course materials throughout the semester. On

the other hand, there was a general consideration about the design and moderation of online discussions. In addition, there were concerns related to students' time outside of class to reflect and prepare for the discussion, and dependence on discussions' outcomes based on the students' knowledge of written English.

### **The assessment design**

The subject class was a graduate-level course in transportation planning, and data was collected for years 2004, 2005, and 2009. During the subject class, students were conducting discussions based on the research on the specific topic. The 13-week semester had eight discussion topics planned based on the topic from the curriculum – with only half of them assessable. In addition to gaining technical knowledge, the objective of these online discussions was to enhance cognitive and exploratory skills, along with critical thinking. The classroom had gender diversity, and there was evident spatial and time distribution of students. Furthermore, students were of different age groups and related scheduling constraints. These factors were appropriate reasons to have asynchronous online communication. The online discussions were introduced from the beginning of the semester along with the background memo containing rules, etiquette, and with the recommendation to focus on the quality rather than the quantity of the discussion. However, the first three discussions were considered as introductory, giving time to students to gain familiarity with the online discussion tools and rules. In addition, the fifth topic was also considered as non-assessable. Consequently, all these non-assessable discussions resulted in the lost assessment time.

In addition to the analysis of the online discussions themselves, the instructors introduced two additional assessment tools for determining a range of indicators for engagement and effectiveness. First, the authors provided students with a 5-point scale rubric for their self-assessment. This rubric was intended to grade the level of activity along with the capacity to extend the depth of the discussion. In addition, there was an end-of-semester evaluation questionnaire. The questionnaire asked students to rate the usefulness of each topic on a 5-point likert scale and provide follow-up comments in the open-ended question at the end. In general, these two tools were appropriate for supporting analysis of assessment design. However, the author left out some important information related to the implementation of these tools and has not conducted any analysis of validity or reliability (Moskal, Leydens, & Pavelich, 2002) as the important concepts in engineering education assessment.

### **Discussion tool aspects**

The analysis presented in the paper was based on the data collected across three years (2004, 2005, 2009). The author defined several parameters for determining the engagement and effectiveness of the online discussions. Considering that this paper is primarily directed towards engineering education practice and was published in a primarily practical journal of

transportation engineering, the lack of detailed engineering education or psychological analysis is evident. All the parameters and the presented graphics are clearly practice-driven. The first parameter used was the annual distribution of total postings in percentages of students. This parameter was introduced to show the percentages of inactive or active students across years. The graphical representation of this parameters shows that every year had inactive and largely active students, with the majority of students having ten to thirty posts per semester. This parameter is focusing primarily on the quantitative aspect of the posts, without any qualitative analysis of related posts, which conflicts with the recommendation given to the students.

The second parameter was annual cumulative percentage of students involved in each discussion topic. This parameter was introduced to show the percentage of students involved in the discussions that were assessable. The conclusion from this parameter was that up to 40% of students are not participating in the non-assessable discussions. In addition, the small increase in participation between the second and third non-assessable topics leads to the conclusion that the number of non-assessable discussions could be potentially reduced. Two or even only one non-assessable discussion topic could be enough for accustoming the students to this environment. This is especially evident for students from year 2009 and relating it to the recent increase in the number of social network users (Sara Radicati, 2011) it can be expected that most of the students would be primarily familiar with the use of online discussions.

The third parameter presented was a number of discussion postings per participating student for each discussion topic. This parameter was introduced to track the start of the participation in the online discussions. From the related linear graph it is evident that the incremental increase number of postings happens towards the end of the semester. This effect could probably relate to the increased familiarity with the discussion tools, perception of their benefits for the learning process, or expected improvements to the course grade.

The author used the information from the five point Likert scale for several conclusions. The two important conclusions that were pointed out by students are the importance of easiness of use for the online discussion tool, and the applicability of online discussions for better understanding of the course material. This was related to their comments to the open-ended question that pointed out online discussions as a successful approach for ensuring completeness of readings and conveying the in-class working environment. Students comments were neutral to the overall grade weight given to the online discussions (10%). The authors consequently concluded that reduction in the weight would result in reduced student involvement. Although all these conclusions might be appropriate, it is evident that the author did not provide any supporting line of reasoning or methodology used for creating the Likert scale questionnaire.

The presented research has several other limitations. First limitation was a modest class size and related small statistical samples (21, 18, and 25 for years 2004, 2005, and 2009,

respectively). As the author himself stated the experiment was not rigorously designed, with a focus on treatment-only group. The author left out some important information, such as information on the criteria in the rubric for self-assessment or the detailed information on the data collected from the self-assessment rubric. The author also claims that self-assessment grades were aligned with instructor grades but does not provide the evidence of grading technique or evidence of the alignment. In addition, there is no explanation and formulation of the open-ended question in the questionnaire. Finally, there is missing information on the other factors for grading and relation to the class learning objectives.

## **Conclusion**

This paper focused on the asynchronous online discussion, originating from the need for novel assessment techniques in the online learning. It is noticeable that there was a shift towards online learning in the previous decade, supported by the development in the informational technology (Harasim, 2000). This shift is changing the roles of faculty and students, educational timing and methods, development of students' skills, along with the economics of engineering education (Spurlin, Rajala, & Lavelle, 2008). In addition to all these changes, the conventional methods of teaching and assessment require change and adaptation to the new situation. This paper presented the effort to resolve the issue of the design of the online discussion environment as one of the new assessment techniques in the online learning. In addition, the efforts were directed towards different approaches to support interaction between participants in such virtual "classroom."

As suggested partially by the author himself, further research is essential in the area of online discussions. Although they are increasingly becoming state-of-the-practice the understanding of their design and moderation is not corresponding to this implementation rate. As one of the point for further research, there is a need to investigate the relation between the performance in discussions and performance on the other assessment tools in the class. The second issue can relate to the length of time windows for responding to questions. In the subject class, this time that was limited to about a week period thus preventing students to expand and relate to other learned concepts in a constructivist learning. Furthermore, further research needs to address the issue of peers as potential moderators of online discussions. However, the biggest potential research issue should relate to the question of motivation source for involvement in the online discussion. Currently, the involvement in the online discussion is primarily dependent upon external motivation related to the grading of discussions. An example is the assignment of a higher grade for the first responders to the topic that conflicts with the temporarily asynchronous participants' availability. The potential research should look for an approach that would move beyond the extrinsic motivation and thus improve the quantity and quality of online discussions as one of inevitable future applications in engineering education.

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