

EVIDENTIAL VS NON-EVIDENTIAL BELIEFS IN CASE OF ORAL ASSESSMENTS: A SEQUEL

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Abstract. In a previous paper, seven mathematics professors shared their views on types of knowledge and understanding in mathematics that can be assessed on written and oral exams. These professors are coming from Bosnia, Poland, Romania, Ukraine, Canada, the United States, and Germany. In this paper, some professors share their views on positive and negative aspects of oral and written assessments in mathematics. The results in this study show that non-evidential beliefs can affect views on oral assessments in mathematics.

Keywords: mathematics, oral assessment, oral examination, beliefs

ZDM Subject Classification: **B40, C70, D60**

1. Introduction

This paper is in the sequel to my previous paper published in this journal [11]. In the previous paper, seven mathematics professors were asked to share their personal experiences and perspectives on using written and oral assessments in mathematics classroom, and the results showed that written exams alone are not sufficient to assess students' conceptual knowledge and relational understanding in mathematics. As I used the same study in this paper, the names of participants are the same: Melissa, Elisabeth, Van, Nora, Dave, James, and Jane. Also, it is assumed that literature review on oral assessment, structure of oral examination in mathematics, participants' education and teaching backgrounds, and methodology of the study described in the previous paper [11] are known to the reader.

Although a number of researchers indicate that oral assessments have a positive impact on students' learning of mathematics [1, 3, 5, 6, 7, 8, 9], the oral examination in mathematics courses at the university level is not present, neither in Canada or the United States. Teachers' views "can provide significant insight into what teachers value and the relative importance they assign to different aspects of mathematics or the teaching of mathematics" [12, p. 131]. In this paper, these seven participants share their beliefs on positive and negative aspects of oral and written assessments in mathematics.

2. Theoretical Framework

Green [4] introduced two types of beliefs: *evidential* and *non-evidential*. According to Green [4], beliefs are held *non-evidentially* when they are held without regard to evidence, or opposite to evidence, or

apart from good reasons. These *non-evidential* beliefs cannot be modified by introducing reasons or evidence neither they can be changed by rational criticism. On the other hand, beliefs that are based on evidence or reasons are beliefs held *evidentially*. These *evidential* beliefs can be rationally criticized and modified in the light of further evidence or better reasons.

3. Results

Based on the participants' responses, there are three major issues pertaining to oral assessment: fairness, time, and anxiety. Therefore, these three aspects of the results will be discussed in this section.

Fairness:

When it came to the question of fairness, the views were divided between the following: oral exams can be perceived as less fair than written ones, and that there is no ideal assessment. The following comments exemplify this point:

"It may look like... in written exam everybody writes the same questions, right? But in the oral, there are different topics, different sections, so ... at least when I was a student, somebody could draw a card with a topic from chapter 2 and somebody with chapter 13 and maybe that person didn't go that far as to study chapter 13" (*Elisabeth*).

"There is still debatable fairness because even if I have four TAs marking the same question, believe me, if I remark later, disparity, 4% or 5%. So, nothing is bulletproof... you cannot make guarantee that all will be extremely fairly assessed" (*Nora*).

The participants who had been previously exposed to oral assessments in mathematics, Melissa, Elisabeth, Van, Nora, and James, believe that there is a written record/proof of students' work during the oral exams as each student would have a scrap paper with their work on it that would be collected at the end of the exam by the examiner. This type of belief can be considered as *evidential belief*. The following comment exemplifies this:

"The room was quite big so they would be sitting at some distance. There was completely no chance to cheat. You're sitting 4 or 5 meters away from another person. You were not allowed to come with any bags or anything. So, it was out of question. You come, the instructor would give you sheet of paper. You cannot bring anything with you. Pen, pencil. That's it" (*Nora*).

On the other hand, the participants who had never been exposed to oral assessments in mathematics, Dave and Jane, do not believe that there is a written record/proof of students' work during the oral exams. Their belief is probably based on their lack of experience with oral exams. Therefore, this type of belief can be considered as *non-evidential belief*. The following comment supports this:

"When you have a written exam and there's this record of like completely detailed record about what happened on the exam, then the student has some sort of form of recourse if they feel they weren't, you know, graded correctly. And it's there, it's written and whereas, with the oral exam you're kind of just taking notes, you know, maybe there's a second person in the room who's taking notes, but it's kind of a sketch of what's going on" (*Jane*).

Time:

When it came to the second issue pertaining to oral assessment, issue of lacking time to administer oral exams, it was interesting to see that the majority of participants believe that because of large class sizes in their mathematics courses, it is difficult for them to find the time to administer oral exams. This can be also considered as *non-evidential belief* for two reasons. The first reason has to do with the fact that those participants who are currently teaching in Canada spend a quite amount of time assessing students in their mathematics courses, using different forms of assessments. Therefore, if there is a belief that the lack of time can be an issue for conducting oral exams, then how is it possible to find the time to assess students very frequently? The following comment exemplifies this:

"So sometimes in Foundations of Analytical and Quantitative Reasoning course for example

somebody looking from the outside may say ‘oh you're assessing them so much’ because we have 10 written quizzes, 10 homework assignments, many LONG CAPA quizzes. Every week there is a LONG CAPA quiz and two midterms and the final exam. So in the end the final grade is out of 30, 34 grades or something like that, so someone from the outside will say ‘what are you doing? Why are you assessing them so much?’” (*Elisabeth*).

The second reason is due to the large class sizes in mathematics courses. The question that I raised here was: Does class size really matter for conducting oral exams? The reason why I brought this question was because when I was comparing participants’ average mathematics class sizes that they are currently teaching with average mathematics class sizes during their undergraduate studies and/or their prior teaching, I realized that the numbers were quite similar. These numbers are shown in Table 1. Participants’ mathematics classes that they are currently teaching are represented in Table 1 as Lecture A, Lecture B, and Lecture C. Each of these three classes illustrates the number of students enrolled in them.

<i>Participant</i>	Average class size (Past)		Average class size (Present)	
	Lecture	Lecture A	Lecture B	Lecture C
<i>Dave</i>	-	80-150		
<i>Elisabeth</i>	120	30-35		
<i>Jane</i>	-	3		
<i>Melissa</i>	240	200-300	80-150	30-40
<i>Nora</i>	100-125	100-500		
<i>Van</i>	120	100-500	25	60

Table 1. Past and present average class size

Anxiety:

In terms of anxiety, the views were divided between the following: the level of anxiety would be higher in oral than written exam, and that it would be hard to determine which type of exam could cause more or less anxiety among students. The following comments exemplify this:

“So, there is a quite bit of pressure to perform in a short period of time and that’s not easy... I believe with oral exam there is a higher level of anxiety” (*Van*).

“When I was younger, I used to like the oral examination because I was very spontaneous and I liked to show off as a kid ... but then in the university, I got to be a little bit shy to get together with people who are really mathematicians... I wasn’t very good at oral examination. I was very shy and if I’m put now to grade people by oral examination that will be really hard for me especially if I have all the other people watching...” (*Elisabeth*).

“There was anxiety during the exams definitely, but – and whether it was more before written or oral, well ... on average it was probably more anxiety but not significantly because there were students who preferred oral examinations, they felt that they could demonstrate their knowledge better... but overall my experiences from oral exams were positive” (*Melissa*).

“... it depends on the type of personality, I would say. I cannot generalize here. But from what I have seen around me, oral exam has its own anxiety, written exam has its own anxiety... in the written exam, the anxiety is that you can get something which you completely don’t know. You studied everything and you didn’t study this much, right? And you get exactly the questions, which are related to that two chapters, which you missed. What can you do? Nothing. Right? When it’s an oral exam, there is anxiety because you talk eye to eye... in my country, it was normal” (*Nora*).

Even though there might be a general assumption that the level of anxiety in oral exams is higher than in written exams, not all participants agreed on that. When Nora was asked about her experience with students taking written exams, she responded:

“I have seen young men, not girls, young men who were sitting and shaking like that in the written exam... we had 700 students in the gym writing. I thought one girl would need to go to the emergency. One very good student was literally losing her mind, because there were so many people sitting around her, in completely unfamiliar settings in the gym where she has never been before... she couldn't perform. She got her much lower grade than she was actually able to get if there was a chance to talk.”

4. Discussion and Conclusion

The question that could be asked here is: What does it mean for any form of assessment to be considered as fair? Is fairness of assessment related to its objectivity? Does objectivity in mathematics assessment exist? Romagnano [10] believes that all assessments of students' mathematical understanding are subjective, and that objectivity does not exist. Also, Romagnano [10] thinks that a conclusion about a student's knowledge would require the teacher's judgment, and, therefore, “No “objective” assessment occurs; subjective—that is, human—knowledge, beliefs, judgments, and decisions are unavoidable parts of any assessment scheme” (p. 36). Human judgment about mental constructs is introduced when test designers decide “what items to include on the test, the wording and content of the items, the determination of the ‘correct’ answer, . . . how the test is administered, and the uses of the results” [2]. On the other hand, there was no strong evidence here that showed whether the number of students could be an important factor for conducting oral exams in mathematics. It seemed that despite of the large classes, oral exams still played an important part in assessing students in mathematics for those who strongly favored them. For instance, despite having only three students in class, Jane was someone who strongly disfavored oral exams, even though she had such a small class, which would be perfectly doable for conducting oral exams, she was strictly relying on written exams solely. Thus, this showed that the way Jane viewed mathematics assessments strongly affected how her mathematics classes were assessed regardless of their sizes. Moreover, Jane's non-evidential beliefs about oral assessments could not be modified even if she was provided with the evidence or reasons. Lastly, when it came to the question of anxiety, what needed to be asked here is: Is there a way to measure the level of anxiety in oral and written exams? How can we know which type of exam can cause more anxiety than the others? Is the level of anxiety determined by the personality of the exam-taker rather than the type of exam? These questions require further research.

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