

Student Autonomy in Mathematics Assessment: Passive Recipients or Active Participants

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Abstract: Within the realm of mathematics assessment research, there is an abundance of different instances of creative techniques. To my surprise, however, the anticipated role that students play in the evaluation process has received a surprisingly little amount of attention from academics. Students have long been seen to be the goals of mathematics assessment, which stems from the idea that assessment is a kind of measuring. On the other hand, assessment policies have been placing a greater focus on the principles of "Assessment for Learning," which represent students as autonomous actors in the learning process. Within the context of these seemingly contradicting tendencies, this study presents a research strategy with the purpose of understanding student agency in mathematics evaluation. Through the use of a sociocultural and political perspective, I will be discussing the manner in which students continue to be the "objects" of assessment, which is devised and carried out by other individuals for the objectives of other individuals. In order for students to be considered as significant actors in the evaluation of mathematics, I suggest various strategies to further accomplish this.

Keywords: Mathematics assessment, Passive Recipient, Autonomy, Active Participant.

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I. Introduction and Literature

Setting the scene: discursive tensions in how students are positioned in assessment

Extensive research on mathematics evaluation has shown the impact of classroom assessment on students' mathematical learning. Especially when it concerns the use of digital technology in evaluation, the published research literature is rife with fascinating and novel ways to assessment. This is supported by a review of the papers presented in the FAME and CERME TWG21 conferences in prior years. Among the many important topics covered in these proceedings are digital assessment, summative and formative assessment, and standardized assessment.

Despite several advancements in the field of mathematics assessment, the anticipated involvement of students in assessment has received remarkably little academic attention. Is it fair to treat students as objects of evaluation, whose only purpose is to have their mathematical abilities evaluated in ways that teachers decide? Alternatively, might it be more useful to show pupils that they are the ones who ultimately decide how and what they learn?

Despite the fact that many published works on mathematics evaluation do touch on these concepts indirectly, they are often disregarded and under-theorized. Considering the many mathematical evaluation frameworks, how can researchers best understand students' agency and their participation in the learning process?

Based on Nieminen et al. (2013), I address two worldwide megatrends related to mathematics evaluation in order to provide a response to this topic. These tendencies are making their way into math classes across the board, from elementary to university. They influence not only the day-to-day operations of mathematics but also the discourse around evaluation and the responsibilities of students inside.

Firstly, worldwide testing cultures have a significant impact on how math instructors evaluate students in the classroom. In many cultures, exams are "recognized as fundamental pedagogy and influence the public's perception of and engagement with education. There aren't many classes that are tested as thoroughly as math. Music, history, and geography are taught in schools all across the globe, but there isn't a corresponding social need to test, assess, monitor, and forecast kids' abilities in these areas. The "measurement paradigm" has been particularly pervasive in mathematics, which may be attributed in part to the subject's inherent strength in high-stakes testing and its objective, measurable character.

Global media outlets cover national rankings in national spotlights due to international comparison studies like TIMSS and PISA. For instance, the shocking result for Finland in PISA 2012's mathematics category was a prime example of this phenomenon. The washback effect of high-stakes testing is sometimes blamed for the prevalence of testing and summative exams in mathematics classrooms. In contexts where there is no high-stakes testing or testing obligations, such as higher education or low-stakes assessment, examinations

still dominate mathematics assessment. This is evidence of the "era of testing times".

According to Ade et al. (2008), pupils have been seen as "the objects of assessment processes with teachers or external testing bodies controlling the field" throughout the testing period. In other words, students seldom ever have a say in the big questions of assessment—when, why, and how. Given the gravity of mathematics, this is a very pressing concern (Nieminen et al., 2013). This was pointed out by Anne Watson, who painted assessment in a negative light in her outstanding book about mathematics education, portraying it as an adversary that limits students' involvement with mathematics:... assessment and accountability systems force schools to adhere to a fairly narrow set of practices, resulting in many students being taught to pass exams rather than being educated to become proficient and self-assured users of mathematics assessment.

Volante et al. (2014) notes that there has been a significant worldwide push towards "Assessment for Learning" (AfL) policies and practices in recent decades. These policies and practices emphasize multiple assessment ecosystems, including oral assessment, digital innovations, portfolios, self- and peer-assessment, and more.

Materials for professional development, mathematics curricula, and teacher education increasingly center on these "student-centred practices". The majority of mathematics evaluation studies also make extensive use of such methods.

Students seem to be encouraged to take an active part in mathematics assessment since there is a drive to view it as a tool to enhance learning rather than just a technique of measurement. "Student-centred" evaluation seeks to empower students to actively participate in their own learning and have more agency over their mathematical development. According to Gravemeijer et al. (2007), this helps pupils become ready for the societies that will be there in the future. Topics including student agency, activity, engagement, self-regulation, motivation, control, responsibility, ownership of learning, reflection, higher-order skills, assessment literacy, feedback literacy, etc., have been explored in recent research endeavors along these lines.

These megatrends appear to be at odds with one another at first glance. They seem to communicate two meanings from the perspective of the pupil. In this testing age, kids are portrayed as passive subjects who should exhibit their mathematical talents in standardized ways, much like industrial subjects. Contrarily, AfL encourages students to embrace their individuality and take an active role in becoming self-reliant citizens of the modern world. Upon further inspection, however, it becomes clear that these two tendencies complement and reinforce one another (for the whole account, see Nieminen et al., 2013).

Both schools of thought see students as passive participants in expert-defined evaluation systems. Many online formative assessment tools, for instance, teach students to control their own mathematical learning in ways that teachers specify, for objectives that teachers specify.

So, both megatrends are trying to mold kids from a distance, ignoring their own dreams, ambitions, and perspectives in the process. The result is an extremely biased perspective on students as mere objects that may be manipulated by mathematical evaluation. What follows is an alternate proposal I've made, outlining a research plan for a deeper comprehension of student agency in mathematics evaluation.

II. Towards A Research Agenda: Student Agency In Mathematics Assessment

If mathematics evaluation is to help students be ready for the future, then we need to take a close look at how it influences students and their ability to apply mathematics on their own. There is an immediate need for the mathematics education research community to address the concerns of agency in assessment, since assessment and testing play a significant role in the daily practices of mathematics education.

As a whole, student agency is the ability to make one's own decisions and take charge of one's own life. The concept of agency is based on a lengthy line of thought in philosophy, sociology, and religion that seeks to explain the interplay between free will and institutionalized forms of societal control. Regarding the level of focus on individual agency within such institutions, contemporary conceptualizations of agency vary (Matusov et al., 2016). "A focus on student agency in assessment acknowledges students as actors who make choices, and whose actions shape assessment practices in both anticipated and unexpected ways," put the larger debates around student agency in the classroom assessment framework by Adie and colleagues (2008).

Because students do more than just be a part of assessment cultures and practices; they actively shape the way assessment is done and discussed in mathematics, the idea that students can shape assessment structures is fundamental to student agency.

According to Nieminen et al. (2013), the majority of mathematics assessment research has concentrated on individualistic perspectives on student agency, investigating concepts like student motivation, self-efficacy, control, and choice. There is still a need to comprehend the cultural, historical, social, ethical, and political foundations of the mathematical assessment frameworks, even if such perspectives have amassed a significant body of information about students' perspectives on assessment. The agency of individual students within the framework of mathematical assessment—assessment policies, institutional practices, societal discourses, norms, values, etc.—can only be grasped in this manner.

Allow me to provide an example to drive home this notion. Picture this: a kid in your own setting, whether it's elementary school or high school, spends all day the day before an exam on mathematics, cramming for the test. schooling in Greece or Australian university maths. The student takes the test, but thereafter, regardless of the outcome, he or she promptly forgets the majority of the content. Even if this is bad for the student's arithmetic education, the world keeps turning: the instructor switches to a new subject.

In such (very frequent) cases, how might researchers in the field of mathematics evaluation make sense of the data? Let your imagination go wild: a large research grant has been awarded to you, and you are to investigate this phenomena from the perspective of student agency. Since it seems that the student is using her agency for the unhealthy goal of cramming, you can adopt an individualistic stance toward agency. Maybe you might look at the student's (seems inadequate) self-regulation abilities or her (seemingly poor) long-term drive to study mathematics. On the other hand, you may look at the frameworks around student agency by going "beyond the individual." Perhaps such learning behaviors were encouraged by the quick assessment procedures; perhaps there were no chances for formative assessment or feedback loops and cycles throughout the learning process. The ways in which evaluation cultures in mathematics education encourage cramming could be uncovered via investigations into social and socio-mathematical norms. The normalization of cramming in students' minds may be a result of the pervasive reinforcement of the practice in media and popular culture. Maybe you'd want to go a little farther and look at how national and international agendas encourage certain types of classroom learning behaviors, as well as assessment regulations and testing cultures. All of these methods give unique insights into students' agency in evaluation; ideally, they might complement one another if the funding only permits this!

In conclusion, I would want to stress the need of the assessment research community diversifying its focus to include mathematical assessment from a social, cultural, political, historical, and ethical perspective, with a special emphasis on student agency in the assessment process. Research on agency, as pointed out by Matusov and colleagues (2016), should not rely on simplistic but rather multi-dimensional methods in order to account for the wide range of perspectives that exist.

What follows is a discussion of two theoretical frameworks that I have developed for thinking about student agency in mathematics evaluation and research. Of course, this is by no means an all-inclusive list, but it does provide some examples of what may be achievable.

III. Authorial Agency over the Materials of Mathematics Assessment

Designing mathematics assessment tools and techniques is often believed to be the purview of testing companies, publishers, and educators. For instance, a large body of research seeks to develop trustworthy instruments for mathematical summative and formative assessment, such as digital worksheets, scalable exams, or learning analytics and trajectories. Assessment materials should be grounded on expert knowledge according to this method. Although this is often a good thing, it portrays students as uneducated and powerless when it comes to determining the timing, nature, and purpose of mathematical assessments.

One useful framework for understanding how students could be seen as active participants in the creation of mathematics assessments is the idea of authorial agency proposed by Matusov et al. (2016). Students are considered as collaborators in the creation of assessment cultures and cultural artifacts when they are given authority over them. This includes things like test sheets, self-assessment forms, assessment instructions, rubrics, syllabus materials, and more. Therefore, instead than teaching pupils to conform to preexisting evaluation norms, Students may be empowered to own these cultures via actions grounded in democratic ideals, as the concept of authorial agency serves as a reminder. Consequently, math classes are seen as collaborative learning spaces where each student actively participates in the development of lesson plans, classroom activities, and assessment tools.

This might benefit from the growing body of information on student collaboration in assessment design. Students and teachers work together to develop assessment methods in an assessment partnership, with teachers providing necessary assistance and scaffolding. Participatory evaluation, as described by Deeley and Bovill, offers concrete means of achieving the nebulous objectives of democratic education. Students in mathematical communities may develop a sense of ownership with the contents covered by this method, which transforms evaluation from a mechanical process into a cultural artifact. The principles of cultural ownership and democracy are embodied in a co-designed rubric, which serves as both a learning tool and a cultural object. Students may develop what is known as "assessment literacy" when they actively participate in the creation process of mathematical assessment tools and procedures, such as formative assessment techniques.

By viewing evaluation from the perspective of authorial agency, teachers may be more equipped to help their students develop digital agency, or the ability to "control and adapt to a digital world". In math classes, students seldom ever get to use their computers to make decisions. When it comes to digitalizing high-stakes testing, introducing new technology into math classes, or creating digital platforms to monitor students' progress in school via analytics and trajectories, students are hardly heard. Students are often seen as mere end users of

mathematical tools, especially when it comes to evaluation. Online types of self-evaluation and other kinds of collaboratively designed digital classroom assessment, as well as multimodal instruction, more authorial control over digital technology may emerge from portfolios or annotated rubrics. Partnership in assessment is still on the periphery of mathematics assessment research.

But in the context of college mathematics, Tina Rapke (2016) gives a fascinating example of co-designing a test paper. As a result of working in groups, students developed test items and gained a sense of agency over the creation of this crucial educational resource. The most interesting thing about Rapke's story is how he explains how assessment partnerships might work in institutions that prioritize accountability and compliance above "authorial agency":

For my mathematics class, the idea of having students help design the final exam came from a need to meet administrative demands for a more traditional exam format (i.e., each student would have their own paper and pencil) without compromising my belief that both students and teachers should have substantial say in shaping the course of study and evaluation procedures.

IV. Results and Discussion of Epistemic Agency over Mathematical Knowledge

The impact of mathematics on students' lives should not be ignored when discussing student agency in mathematics evaluation. It is true that we run the danger of ignoring the mathematical discipline knowledge systems in favor of more broad and general talks on student agency in assessment. Looking at it through the lens of free will in knowledge, it may be to inquire: what role does evaluation play in developing pupils' mathematical knowledge?

From the perspective of epistemic agency, evaluation procedures are seen as procedures involving knowledge. Both the knowledge structures of the relevant disciplines dictate how assessments are carried out (e.g., musical abilities and mathematical ones are evaluated differently) and the epistemologies that are upheld by assessments are defined by these disciplines. By this logic, the test-driven culture of math evaluation reflects the testable epistemologies taught in classrooms. As a result of their reliance on individualized, timed, and standardized situations—which do not allow for, for instance, embodied modes of performing mathematics—tests and exams might be seen as supporting certain methods of learning mathematics. Put another way, students learn what mathematical knowledge is and isn't and how to demonstrate it via testing.

Assessment, as an epistemic process, molds pupils into epistemic knowledge bearers. For this, I look to Tanswell and Rittberg's philosophical framework on epistemic justice and injustice. They talk on the moral implications of how different math curricula mold students' mathematical thinking and practice. When educational systems "affect humans specifically in their roles as epistemic agents", it is referred to as epistemic injustice. As mentioned in the last story, cramming cultures and other forms of evaluation that falsely represent students as "non-knowers" of mathematics may lead to epistemic injustice. The systematic exclusion and marginalization of specific ways of knowing via mathematics evaluation may also lead to epistemic injustice. Take ethnomathematics as an example; it is seldom that are a part of assessment ecosystems, but which are instead constructed around certain approaches of understanding and applying mathematics.

Nieminen and Lahdenperä provide a good case of epistemic injustice. One college student voiced her disapproval of exams as an evaluation tool in this research, arguing that they serve to legitimize narrow mathematical practices and perspectives:

Because mathematicians spend their days solving issues and writing about them, completing a dissertation is a great method to understand the subject. It is not the role of a mathematician to sit in a dark room and solve problems using memorization of methods and information. It follows that teaching mathematicians how to do this type of thing is a complete waste of time. according to Nieminen and Lahdenperä , a student

Early childhood education in New Zealand provides a strong case study of various epistemologies in assessment (Anthony et al., 2015). Narrative assessment, which uses tales to measure mathematics learning, is introduced in this research. The children's tales highlighted mathematical learning in ways that would have been invisible to adults and positioned the pupils as experts in the subject.

Anthony et al. (2015) found that learning tales not only made individuals' learning visible but also fostered "educative partnerships with family/whanau", which contradicts the individualistic epistemology of mathematics. This example sheds light on the topic.

V. Conclusion

I have contended in this work that the research and practice community need to give students more control over their own mathematics evaluations. Mathematical and evaluation-specific investigations of "agency" are necessary for this, in addition to sociological and ethical studies. While I have touched on authorial and epistemic agency as possible frameworks for student agency in mathematics assessment, there is a wealth of literature on agency that may be used to mathematics assessment in more depth (for a review, see Matusov et al., 2016).

Teachers, in order to include student agency in mathematics evaluation, must confront some difficult personal problems. How may standardized testing of mathematical skills limit student autonomy in the classroom? Several current assessment procedures have the potential to both help children learn mathematics and limit their agency as individuals, citizens, and learners. The assessment research community may have to include social, cultural, political, sociological, and critical perspectives in addition to individualistic and educational ones in order to make sense of such contradictory circumstances. While well-designed digital platforms for formative assessment have the potential to improve students' performance on summative exams, they also run the risk of stifling students' agency by forcing them to conform to the evaluation tasks imposed on them by teachers, test developers, or even for-profit businesses.

According to Barnes et al., assessment is often said to be the driving force for improvements in mathematics education. If mathematics education is serious about preparing students for the societies of the future, it must prioritize the concept of student agency in evaluation, in my opinion. Although students may use their agency in evaluation in unexpected ways, the idea of student agency is dangerous rather than normative. What new possibilities would arise if evaluation was based on the students' own agency? Taking a chance on this concept could be worthwhile.

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