Student perspective on fairness of assessment in mathematics classroom

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Abstract. An appropriate assessment that can show specifically the ability of students is something that is expected can be felt by students. Therefore there must be a fair assessment in an authentic assessment conducted on students. We report the results of case studies on student perspectives related to seven themes of fairness assessment that aim to investigate students' perspectives on the assessment of fairness in mathematics classes. We developed 20 questions related to fairness theme indicators and were given to five 11th grade high school students (15-17 years) from one of the referral schools in suburban areas in West Java. The results of this study illustrate that not all indicators of fairness are felt by students and the acquisition of student values influences their sense of fairness. This shows that the fairness of assessments in math classes is still lacking even in schools with referral school categories (implement authentic assessments).

1. Introduction
Assessment fairness is considered a key component of classroom assessment theory and practice [1] and the main component in the teacher assessment literacy model [2]. Fairness is also one of the principles of assessment [3]. And the assessment we are currently using in schools is an authentic assessment. Authentic assessment is a comprehensive assessment to assess the input, process, and output of learning [4]. An assessment is fair when personalized, natural, and flexible, when it can be modified to show specific abilities and functions at the relevant level of difficulty, and when it promotes the relationship between teacher and student [5]. So the students who are actually assessed by the authentic assessment system should also feel the assessment fairness. And this assessment of fairness should have been done by the teacher in making authentic assessments. However, the implementation of this authentic assessment is still experiencing obstacles such as those in Kartowagiran's research [6], Pardimin [7] Retnawati [8] and Wangid [9]. The constraints illustrated such the condition of teachers who carry out authentic assessments still need improvement and the quality of the application of authentic assessments is not entirely good, both in planning, implementation or authentic assessment results. Therefore it is doubtful that students have felt the fairness of classroom assessment in the authentic assessment.

Those studies basically only observe the whole stages of authentic assessment (input, process, and output). And aspects of the fairness of assessment in authentic assessments have not been considered. Whereas in recent years the study of the concept of assessment fairness has been strengthened [10-13]. The fair concept is not only described as the assessment is not useful or detrimental to students because of differences in religious background, ethnicity, culture, customs, socio-economic status, gender, and
other things [3]. But the fair concept is described more broadly, the concept of classroom assessment fairness is summarized by Rasooli et al. in their research findings are divided into several themes [12]: (a) opportunities for learning and access to learning; (b) transparency, consistency and justification; (c) accommodation; (d) does not endanger and constructive class environment; (e) avoid pollution scores; and (f) group work and peer assessment. So that to ensure fairness of assessment has been carried out in the authentic assessment process, students must feel the overall indicator of that theme.

Thus exploring students' perspectives on assessment fairness in authentic assessments are needed. The reason is clear: if we expand our knowledge of the perspectives students have about the fairness of assessment, we will be able to see the accuracy of the assessment made in authentic assessment processes, the assessment that best suit their needs and expectations, and thus help improve their learning. Especially in learning mathematics that has special characteristics in the learning process with a scientific approach. So that fairness in the assessment becomes an observed aspect that "how far students feel the fairness of assessment in math class?" Taking this into account, we conducted a small-scale case study to illustrate the assessment fairness in authentic assessment practice. This case study aims to investigate assessment fairness at mathematics subjects in 11th-grade high school students (15-17 years) perspective.

2. Method
This qualitative research uses a case study method to describe students' perspectives in classroom assessment fairness, especially in mathematics classes. The studies were conducted in a secondary school in the suburbs of a district at West Java. School is chosen because it is included in the referral school category in the list of psma.kemedikbud.go.id. Referral schools are defined as schools developed by the Directorate General of Primary and Secondary Education, the Ministry of Education and Culture and local governments to become referral schools for other schools in the vicinity in implementing quality assurance for independent education, meeting National Education Standards (SNP), owning/achieve more education indicators than SNP, and have achievements or excellence in the academic and non-academic fields. Where one of the criteria is to have implemented the 2013 curriculum (the latest curriculum that is being used). Thus the implementation of authentic assessments must also be carried out in referral schools. After selecting the school sample, the researcher selected representatives of 11th-grade high school students aged 15-17 years with advice from the teacher to participate in the interview (see Table 1). The selection is based on criteria. The criteria are based on age group (youngest and oldest), performance in group work and acquisition of academic values [12].

Table 1. Interview participants.

| Pseudonym | Gender | Years | Last Math Score | Rank | Performance in group work |
|-----------|--------|-------|-----------------|------|--------------------------|
| Fania     | F      | 17    | 35              | 20'th | Average                 |
| Indri     | F      | 15    | 50              | 16'th | Average                 |
| Malik     | M      | 16    | 80              | 1'st  | Average                 |
| Alatif    | M      | 15    | 20              | 30'th | Not active              |
| Naura     | F      | 17    | 60              | 2'nd  | Active                  |

The main instrument in this study was an interview guide for students and teachers with questions related to the indicators of fairness assessment themes found by Rasooli et al. (see Table 2). Individual interview methods were selected for this study [12]. Because it allows researchers to get data about feelings, experiences and memories, emotions, motives, and the like directly from the subject. In the context of this study, this format allows researchers to think in more nuanced ways about different perspectives on each student so that they cannot be influenced by the opinions of others. In order to facilitate the research process, mobile phones were used as audio recording devices. With a time range of 20-30 minutes for each student.

After completing the data collection process, the results are analyzed by looking at the indicators of fairness assessment that have been felt by students and which have not been felt by students. Researchers also pay attention to the criteria for each student so that differences in answers can be analyzed. While
the results of interviews with teachers are used to validate student answers to the assessment process that has been done by the teacher.

Table 2. The concepts of classroom assessment fairness.

| No | Themes indicated the concepts of classroom assessment fairness | Indicators |
|----|---------------------------------------------------------------|------------|
| 1  | Opportunity for learning and access to demonstrate learning | • Access to quality resources  
• Access to test content  
• Varied learning opportunities  
• Students are provided to demonstrate what they know or can do |
| 2  | Transparency, consistency, and justification                  | • Transparency learning expectations (criteria)  
• Consistent application across students or student groups  
• Provide explanations to students for reasons that give rise to learning objectives and assessment criteria |
| 3  | Accommodations                                                | • Accommodating exceptional and English language learners (ELL) to present with a fair opportunity to demonstrate what they know, “to level the playing field, so to speak, without giving them an advantage over students who do not receive the accommodation” |
| 4  | Do no harm and constructive classroom environment             | • Students should be treated with respect and care  
• Students and their families should be protected from the harmful personal impact of the assessment process and its consequences  
• Power dynamics  
• Respectful relationship |
| 5  | Avoid score pollution                                         | • Student’s grades should exclude factors that there are construct-irrelevant  
• Student’s grade should exclude factors that underrepresent the construct related to their achievement |
| 6  | Group work and peer assessment                                 | • Group composition  
• Equity in grading  
• Involvement in criteria development  
• Gender bias  
• Friendship bias  
• Cognitive bias |

3. Result and discussion

3.1. Opportunity for learning and access to demonstrate learning

From the theme of opportunity for learning and access to demonstrate learning, the theme of how students had the opportunity to get equal access to learning resources, the content to be tested, learning that varies and showed their abilities, was identified quite clearly in table 3.

Table 3. The interpretations of the first theme of assessment fairness in the student perspective.

| Theme | Indicators | Fania | Indri | Malik | Alatif | Naura |
|-------|------------|-------|-------|-------|--------|-------|
| 1. Opportunity for learning and access to demonstrate learning | Teacher is competence | X | X | √ | √ | X |
|       | Adequate facilities | X | X | √ | √ | √ |
|       | Can try questions for exam preparation | X | X | √ | √ | √ |
|       | Learning is in accordance with learning styles | X | X | √ | X | X |
|       | Able to show the ability | X | X | √ | X | √ |

√ Yes  
X No
Table 3 shows that students still experience obstacles in getting equality of access to their learning resources, namely teachers. Three of the five students considered the teacher had not helped them to understand mathematical material. Thus assuming, teachers are less competent for most students. Whereas for students who get satisfactory grades and students who are less active in group work consider the teacher has been competent that is already helping them in understanding learning. The researcher validates with the teachers’ answer that basically the teacher has tried to help students understand mathematics learning. They have served as civil servants for more than 15 years and have fulfilled their undergraduate education qualifications. In addition, teachers often receive training for the 2013 curriculum. For access to other learning resources, namely learning facilities, two of the three students considered that they still lacked learning facilities. Students consider the lack of learning facilities due to previous school backgrounds that have more satisfying facilities. The teacher emphasized that the provision of some learning facilities was indeed still limited. As for testing content, two out of five students said that they were not given the opportunity to try questions as preparation for school examinations. While for indicators of student opportunities in obtaining varied learning, students who obtained low math scores agreed that they felt that the learning done was not in accordance with their learning style. And they also agree that they cannot show their abilities. The researcher validated the results of interviews with the teacher that the way of learning was done in general without looking at each student's learning style.

From the proportion of student answers obtained, it seems that the teacher has not made a consistent assessment in each class of the selected sample. And the use of learning styles has not been adjusted to the diversity of students. Whereas in the concept of fairness, the teacher must understand the diversity of students [2]. While Tierney argued the need for various learning opportunities in response to various learning abilities, styles, and peculiarities of students [1]. In this interpretation, an instruction that is fair and different from students based on needs is considered fair because each student must have the resources or opportunities to help him succeed in learning. Access to show learning - giving students “multiple opportunities, diverse, fair, and meaningful to show their learning” [11]. Has been characterized in terms of the opportunities for assessment given to students to show what they know or can do.

3.2. Transparency, consistency and justification
The second theme is to identify assessment fairness, namely transparency, consistency, and justification. Where the results as listed in table 4 below.

| Theme | Indicators | Fania | Indri | Malik | Alatif | Naura |
|-------|-----------|-------|-------|-------|--------|-------|
| 2. Transparency, consistency, and justification | Explanation about assessment criteria | X | X | | | |
| | Consistent application of criteria | X | X | X | X | |
| | Explanations to students for criteria reasons | X | X | | | |

√ Yes
X No

Table 4 shows that when students were directed to questions with theme indicators; transparency of criteria in assessment, consistency of criteria for assessment and justification or reasons for determining assessment criteria, they all answered the same that the teacher did not explain the criteria in class assessment. Although this is contrary to the results of interviews with the teacher that the criteria have been communicated to students, only not included the reason in determining the assessment criteria.

Whereas it is known that transparency in assessment criteria helps students understand the learning objectives and teacher performance expectations [12]. As Tierney suggested, transparency can increase students’ access to opportunities for learning and opportunities to demonstrate learning by giving them clear learning and assessment expectations [11]. As for the consistency of the assessment criteria,
because students do not know the criteria set for assessment so they are hesitant to answer whether these criteria are used consistently or not. So that it is important that the indicators of this theme must be felt by students. In addition to being a theme indicator of fairness assessment, a transparent assessment is also an indicator of the implementation of authentic assessments [4].

3.3. Accommodations
Providing accommodation for students is the third theme of assessment fairness. In this accommodation indicator, students are intended by the results of Rasooli et al. are English Language Learner (ELL) and students with special needs. But because the language of instruction in Indonesian schools is generally Indonesian, ELL is modified with students from a foreign language background. Why do we have to accommodate students with special needs and students with foreign language backgrounds? Because accommodating both of them emphasized as a principle of fairness in the standard of assessment in the class [2]. Although the school discourse that combines special and regular education services in one school system (inclusive school) is also a discussion in schools that use the 2013 curriculum, the school used in this study do not have students with special needs and students with foreign language backgrounds as in table 5.

Table 5. The interpretations of the third theme of assessment fairness in the student perspective.

| Theme                                    | Indicator                                                                 | Fania | Indri | Malik | Alatif | Naura |
|------------------------------------------|---------------------------------------------------------------------------|-------|-------|-------|--------|-------|
| 3. Accommodations                        | Accommodating extraordinary students and students with foreign language backgrounds | X     | X     | X     | X      | X     |

√ Yes
X No

Table 5 shows that the theme of accommodation for students who are categorized as exceptional category students and students with foreign language backgrounds cannot be examined at this school. In further research, these indicators theme might be developed by adjusting the state of school culture in Indonesia. So that students who are given accommodation may be replaced with other categories with constant consideration to provide easy accommodations for students in learning without privileging them from students who are not given accommodation.

3.4. Do no harm and constructive classroom environment
The fifth theme for fairness assessment is that assessment not harmful and the constructive class environment, the results of was in table 6.

Table 6. The interpretations of the fourth theme of assessment fairness in the student perspective.

| Theme                                    | Indicators                                                                 | Fania | Indri | Malik | Alatif | Naura |
|------------------------------------------|---------------------------------------------------------------------------|-------|-------|-------|--------|-------|
| 4. Do no harm and constructive classroom environment | The teacher respects and gives attention to students | √     | √     | √     | √      | √     |
|                                           | The teacher protects the results of the values obtained and provides support | √     | √     | √     | √      | √     |
|                                           | Students' voices are considered in making assessment decisions | X     | X     | X     | X      | X     |
|                                           | There is mutual respect between students and teachers | √     | √     | √     | √      | √     |

√ Yes
X No

Table 6 shows that all students agree that the teacher respects and cares for them and provides protection from the impact of the assessment obtained. The teacher protects the privacy of their score results, even though students get zero scores for math scores. Both teachers and students say that mutual respect is built between them. But students agree to say that the assessment decision is in the hands of the teacher, students are not given a voice in determining the assessment decision. The teacher acknowledges that
student decisions are not considered in the assessment process. Control of a decision is sufficiently held by the teacher.

Actually as a sign of mutual respect that also helps overcome power dynamics, evaluating students’ voices to be actively involved in class decisions (including assessment decisions) is recommended, because the contemporary concept of class assessment argues that assessment is done with and for students rather than for them [12].

3.5. Avoid score pollution

In the 2013 curriculum assessment system, the assessment of affective, cognitive and psychomotor are mutually integrated even though it has its own instruments to assess each aspect. But if we look at the students’ answers in table 7.

Table 7. The interpretations of the fifth theme of assessment fairness in the student perspective.

| Theme                          | Indicators                                                                 | Fania | Indri | Malik | Alatif | Naura |
|-------------------------------|---------------------------------------------------------------------------|-------|-------|-------|--------|-------|
| 5. Avoid score pollution      | • There are factors that affect value/ rank other than the results obtained | √     | √     | √     | √      | √     |
|                               | • Value/ rank is influenced by attitude, being active and task.            | √     | √     | √     | √      | √     |

√ Yes
X No

In table 7 they argue that the values they get are influenced by activities in the classroom, assignments given and attitudes they do during the learning process. This was reinforced by the teacher that these things did affect the results of the values they obtained. Such as the score they get from the assessment process can change because of their good or bad attitude. Or the timeliness of collecting assignments can affect their scores. Previous studies have found that students feel injustice when teachers base their value decisions on insufficient, inappropriate, and insignificant data that can cause misinterpretations of their achievements. For example, by investigating how students with different learning styles (i.e., individuals vs. projects) evaluate the fairness of teacher assessment of class participation, finding that students with individual learning styles regard teacher ratings of class participation as unfair because they are more likely to work alone and assessing class participation is less than students with group learning styles and projects. In addition, they show that students with individual learning styles experience setbacks in terms of class participation values while students with group learning styles and projects progress [12].

So that we have to make an assessment result that reflects the competency indicators assessed. Without being influenced by other things that affect value. That way students can find out their level of ability in the competencies assessed. The value obtained is an authentic value. So students get feedback about the results of the assessments they have obtained.

3.6. Group work and peer assessment

Table 8 shows the results of the last theme regarding the reasonableness of assessment. Consisting of six indicators developed into seven indicators.

Table 8. The interpretations of the sixth theme of assessment fairness in the student perspective.

| Theme                          | Indicators                                                                 | Fania | Indri | Malik | Alatif | Naura |
|-------------------------------|---------------------------------------------------------------------------|-------|-------|-------|--------|-------|
| 6. Group work and peer assessment | • The composition of study group members beneficial in achieving scores     | X     | √     | √     | √      | X     |
|                               | • Satisfied with the score get among friends in a group                   | X     | X     | √     | X      | X     |
|                               | • Students are involved in making assessment criteria conducted by the teacher | X     | X     | X     | X      | X     |
Three of the five students agreed that group composition is beneficial for scores. It seems that older students consider group composition often not profitable in obtaining scores. And what Barfield said is true that older students consider group values to be more unfair than younger students [14]. As for the indicators of their satisfaction with the scores obtained, four of the five students agreed that they were not satisfied with the group scores obtained. Unlike students who have high mathematical values, he is satisfied with the results of his grades. This must be considered and studied the things that make most students feel dissatisfied. Because student satisfaction with the values obtained has indicated the benefits of assessment fairness [12]. As for the involvement of students in making assessment criteria, it was emphasized once again that this was only the authority of the teacher. Students are not involved or given the opportunity to give advice. Indicators of bias in assessment, from all students, simultaneously say that peer assessment is done objectively for all students of different sexes or who have closeness in friendship. The last indicator is related to the assessment in the group, all students agree that the teacher uses more than aspects in the group assessment. And students who have high scores agree that the score given by the teacher to a group of friends tends to be different because it is adjusted to their performance in the group, while those who score low have the opposite opinion. It seems that they get value dissatisfaction because they feel the value they get still tends to be the same as other friends.

4. Conclusion
From the results described in the previous section, even though we cannot observe all the themes of classroom assessment fairness, most of them can already be described. So we draw two conclusions as follows. First, in general, the student has not felt the assessment fairness, especially on several themes such as; transparency of assessment criteria, consistency of assessment criteria and reasons behind assessment criteria, and avoid score pollution. While on some other assessment fairness themes most of the indicators have been fulfilled but precisely the most important indicators cannot be felt by students. In other words, the classroom assessment fairness at mathematics subject has not been fully felt by students. Second, the acquisition of scores influences the sense of justice gained by students. Because students who get high grades tend to respond positively to questions. Different from other student categories. This finding shows that the fairness of classroom assessment in mathematics lessons is still less felt even in schools with referral school categories. For further investigation, we wondered how the practice of assessment fairness in authentic assessments was carried out in the classroom, especially in mathematics classes.

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Table 8. Cont.

| Indicators                                                                 | 1 | 2 | 3 | 4 | 5 |
|---------------------------------------------------------------------------|---|---|---|---|---|
| Provide an objective assessment to friends even though they are different in gender | ✓ | ✓ | ✓ | ✓ | ✓ |
| Provide an objective assessment to best friends                           | ✓ | ✓ | ✓ | ✓ | ✓ |
| Teacher gives a different score to some aspects of assessment in the group | ✓ | ✓ | ✓ | ✓ | ✓ |
| Teacher gives a different score as other friends in the group             | X | X | ✓ | X | ✓ |

✓ Yes
X No
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