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Primary school teachers' conceptions and practices of assessment and their Relationships

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Abstract: While much is known about assessment, a study examining the conceptions that teachers hold and its relation with their practices in mathematics classrooms is crucial for educators and needs further investigation. This cross-sectional survey study examined teachers' conceptions and practices of classroom assessment and the relationships between them. Data were collected using a questionnaire from 228 mathematics teachers who were randomly selected from 98 primary schools. The result revealed that teachers mostly agreed to accountability and improvement conceptions and slightly agreed to the irrelevance conception of assessment. They also practiced mixed and different assessment types though they were focused practicing more on the assessment of learning. The moderate and positive relationship found between teachers' assessment conceptions and practices (subgroups) revealed that the conceptions that teachers have about classroom assessment influenced their practices and it can account for only 27.3% of the variation in their practices. The study suggests that teachers practiced assessment consistent with their conceptions.

Subjects: Educational Assessment; Educational Research; Mathematics

Keywords: accountability; assessment conceptions; assessment practices; mathematics teachers; primary school

1. Introduction

1.1. Background of the study

Educational assessment is the basis for making inferences about the learning and development of students. It is the systematic process of documenting and using empirical data on the knowledge

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PUBLIC INTEREST STATEMENT

Understanding what assessment means to teachers who have to practice it is an important goal. This survey study focuses on primary school mathematics teachers' conceptions and practices of classroom assessment in Ethiopia. Teachers mostly agreed to accountability and improvement conceptions and slightly agreed to the irrelevance conception of assessment. This influenced their assessment practices, because they practiced mixed types of assessment mainly focusing on assessment of learning. This context allows better awareness of the challenges policymakers might have in involving teachers in an effort to reduce negative consequences associated with classroom assessment systems.

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and skills to refine programs and improve student learning. Hence, assessment has an influential power in education at any level. Focusing on assessment is vital for the progress of teaching and learning processes because it delivers real-time information to help current teaching and learning in individual classrooms. It is used to determine how well the students learning process is happening and at the same time provide the information needed for the teaching-learning process that can lead to the progress of the classroom instruction and settings. In schools, assessment is concerned with observing students' work and collecting information about those observations (Ministry of Education of Ethiopia [MoE], 2018). Thus, assessment can be defined as a way of observing and collecting information to evaluate learning outcomes and identify students' misconceptions and difficulties in learning (Monteiro et al., 2021). Furthermore, Black and Wiliam (1998) also defined the general term assessment as all those activities undertaken by teachers and their students to provide information as feedback to modify teaching and learning activities.

For teachers to gather knowledge of their students' learning assessment plays a crucial role (Cizek, 2010). When this assessment is accurately in the hands of teachers, it is called classroom assessment (Black & Wiliam, 1998). Thus, classroom assessment is part of the teaching-learning process, which includes all assessment that happens within the classroom regardless of its purpose and it helps teachers to make sound decisions on the students' progress. Additionally, Brookhart and McMillan (2020) expressed the concept of classroom assessment as a process that both students and their teachers use in collecting, evaluating, and using evidence of student learning for different purposes, including diagnosing student strengths and weaknesses, monitoring student progress toward meeting desired levels of proficiency, providing feedback to students and parents, and enhancing student learning and motivation.

Hence, teachers' approach to using their classroom assessments as learning tools is both to provide students with feedback on their learning progress and to guide the correction of errors. Therefore, classroom assessment is used by teachers to determine how much and how well their students are learning. It also serves many purposes for teachers including measuring the level of achievement on learning targets taught and diagnosing student strengths and areas needing re-teaching (Brookhart & McMillan, 2020). The central purpose of classroom assessment is also to empower both teachers and their students to improve the quality of teaching and learning (World Bank, 2009) in the classroom through different approaches like "learner-centered, teacher-directed, mutually beneficial, formative, context-specific, and firmly rooted in good practice" (Angelo & Cross, 1993). This indicates that classroom assessment has also been given many different names such as "informal assessment", "instructionally embedded assessment", "assessment for learning", or "formative assessment", which is intended to support the teaching and learning process (Van Den Heuvel-Panhuizen & Becker, 2003). What all these descriptive phrases have in common is that they refer to an assessment that allows the teacher to make well-informed decisions about further instruction and so leads to instruction that sufficiently fits the desires of the students (Veldhuis & Van den Heuvel-Panhuizen, 2015).

1.2. Teachers' conception of classroom assessment

Teachers' conception of classroom assessments is vital because it directs how their assessments are realized in their classrooms (Monteiro et al., 2021) which can influence their assessment practices (Barnes et al., 2017). Conceptions represent what individuals understand, know, believe, think, or feel about a thing at any one time (Mirian & Zulnaidi, 2020) and thus every teacher needs it to have to guide her/his practice of teaching (Azis, 2012). In fact, teachers see the world through the lenses of their conceptions, though they interpret and act according to their understanding of the world. Based on the analysis of typical studies in this field (Brown, 2004, 2006; Opre, 2015; Remesal, 2011), four categories of teachers' conception in relation to assessment can be identified. These are (1) assessment as improvement of teaching and learning (improvement), (2) assessment as making schools and teachers accountable for their effectiveness (school accountability), (3) assessment as making students accountable for their learning (student accountability) and (4) assessment as irrelevant to the life and work of teachers and students (irrelevant), and thus it negatively affects teachers, students, curricula

and teaching. Students' accountability conception of teachers indicates that they think individual students are responsible for their learning (Azis, 2012). Whereas school accountability conception means these teachers perceive assessment holds schools and systems accountable for achieving societal goals and expectations (Brown, 2004) that prescribe consequences for reaching or not reaching required standards. Assessment as irrelevant represents teachers who view assessment as unrelated to their work and students (Brown, 2004). Brown noted teachers who adopt this assessment conception reject assessment due to its perceived harmful impact on their autonomy and student learning and exclude the importance of teachers' intuitive evaluations, student–teacher relationship, and in-depth knowledge of curriculum and pedagogy.

Different works of literature also confirmed these four conceptions of teachers about assessment (Davis & Neitzel, 2011; Mirian & Zulnaidi, 2020; Monteiro et al., 2021; Rural, 2021; Van den Heuvel-Panhuizen et al., 2021; Veldhuis et al., 2013), and also a blend conception of other four aspects: assessment effects on teaching, on learning, on students' certification of learning, and on teachers' accountability (Remesal, 2011). This witnesses the complexity of classroom assessment and shows the limitations of the conception of the functions of classroom assessment based on strict dichotomous distinctions, such as the opposition of "summative assessment" versus "formative assessment" would be.

The conception of classroom assessment that relies on the idea to improve both teaching and students' learning help teachers adjust their instruction to student's needs and help students to perceive what they should improve upon and how (Monteiro et al., 2021; Veldhuis et al., 2013). Thus, teachers who commonly understand that assessment is useful, provide information and improve the classroom climate use formative assessment (such as providing feedback and adapting instruction) more often than summative assessment (such as determining progress or establishing level groups; Veldhuis et al., 2013).

Generally, studying teachers' conceptions is essential, as it relates to knowledge and beliefs which impact teaching practices, including classroom assessment. However, these different conceptions of classroom assessment by teachers lead to different assessment practices. Conceptions that assessment improves learning and teaching lead teachers to the practice of formative assessment and teachers who have a conception of having students with responsibility for their learning (a conception of assessment for accountability) will favor the formal, summative assessment methods (Opre, 2015) and thus, such teachers practice assessment of learning in their classrooms (Monteiro et al., 2021). Therefore, teachers' assessment practices as a result of their conceptions of assessment play a significant role in the students' learning progress. In this relation, several authors assert that assessment practices make a difference in students' learning and understanding (Alkharusi, 2008; Monteiro et al., 2021; Zhao et al., 2016).

1.3. Classroom assessment practices

Several studies show that mixed and variety of assessment approaches would be used in a classroom as learning is multidimensional and cannot be adequately measured by one instrument (Monteiro et al., 2021; Rivera-Lacia, 2019; Veldhuis et al., 2013). Suurtamm et al. (2010) subscribed to this in propagating the idea that classroom assessments such as quizzes, performance tasks, observation of students and the responses of students in a class are social practices that provide continual insights and information to support student learning and influence teacher practice must be embedded in instruction so that meaningful learning could take place. It is obvious that quality classroom assessment can provide information to students, teachers, parents, and systems in effective and useful ways. To be helpful, however, it must be broad-ranging, collecting a variety of information using a variety of activities before, during, and after a teaching time (Callingham, 2010). So, teachers can be obliged to use a variety of assessment methods and types to deliver students multiple chances to show what they learned (know) and can do.

Thus, teachers' assessment practices are taken as important pedagogical elements that refer to assessment activities, types and methods employed by the teachers in assessing students' performance in their classes (Brown, 2017). These practices are fixed on the purposes of classroom assessment of whether to gauge how much students have learned or how they managed with other students in the class; or whether an assessment is done to measure effective classroom instruction or the intention to inform various stakeholders about the progress of students in a specific subject (Rivera-Lacia, 2019). It comprises an array of assessment tasks or activities accomplished by the teacher and students in their classrooms that can be categorized under assessment of learning or summative assessment techniques (e.g., paper-pencil tests, mid-term or final exams, etc.); assessment for learning or formative assessment practices (e.g., class works, observation of student works, providing constructive feedback, questioning, etc.); assessment as learning (e.g., self and peer assessments that help students to monitor their learning and give personal feedback); and assessment to learning (refers to the reporting of assessment results (Gonzales & Fuggan, 2012; Monteiro et al., 2021; Rivera-Lacia, 2019; Siarova et al., 2017; Zhang & Burry-stock, 2003).

Assessment for learning focuses on determining the progress of the students by giving short quizzes, providing feedback, and other activities during instruction to improve student learning (Ferrara et al., 2020; Monteiro et al., 2021). Assessment of learning refers to assessment activities that determine how the students are performing in terms of achieving the desired learning outcome and how they compare with other students (Mamaru, 2014; Monteiro et al., 2021). Assessment as learning refers to giving of task-based activities that allow knowledge and learning formation which is crucial in helping students to become lifelong learners. This also allows students to monitor their learning and give personal feedback (Mamaru, 2014). The fourth dimension, assessment to learning, refers to the reporting of assessment results to students, parents, and other stakeholders, such as other teachers, and schools (Davis & Neitzel, 2011; Rivera-Lacia, 2019). This dimension is also related to the assessment of learning since it also aims to inform the parents about their children's achievements.

Assessment practices can also be discussed in terms of traditional and alternative forms. Teachers use a wide variety of traditional (class exercises, tests, homework, and others) and alternative (oral presentations, discussions, interview, group work, project work, observation, and participation) forms of assessment (Dagdag & Dagdag, 2020; Nabie et al., 2013) that can be served as summative purposes-determining progress or establishing level groups and/or formative purposes (Veldhuis et al., 2013). Many teachers prefer to use traditional summative assessment forms rather than the alternative assessment methods because they are restricted by class time and skill to collect students' responses and/or give timely feedback in their classrooms (Nabie et al., 2013). However, Zhao & his colleagues found that teachers used almost all classroom assessment techniques suggested in the teacher's guide (e.g., asking students to explain or discuss their solutions, observing students' performance in terms of correctness, strategies, and mistakes) as supplementary exercises, which are an approach to formative assessment fitted to the topics or objectives of their fixed lesson plans in their practice (Zhao et al., 2016).

In a nut shell, teachers' knowledge of classroom assessment practices plays a crucial role as it covers a wide range of issues and teachers' belief systems. These belief systems are an integral part of informing their general teaching praxis. In other words, the teachers' classroom assessment practices are associated with what they know and what they believe in assessment and education (Dagdag & Dagdag, 2020). Thus, teachers conduct their assessment practices influenced by their respective conceptions and purposes on assessment (Rural, 2021). However, the relationships between teachers' conceptions and practices are viewed from different perspectives (i.e., conceptions influence practice, or practice influence conceptions), which are very complex, and can influence one another (Opre, 2015). Moreover, there was also a misalignment between assessment conceptions and practices reported in previous studies (Barnes et al., 2017; Monteiro et al., 2021).

Therefore, studies on the conceptions of assessment bring important contributions to how teachers understand assessment and how these conceptions influence their practice. For teachers to teach students in a good way, they have to know what students can and cannot do in their education. Thus, knowledge and belief regarding assessment work is a basis for the conception of assessment. Knowledge about the purpose of assessment, techniques of assessment, and the content of the assessment work are crucial in constructing the teachers' conception of assessment (Opre, 2015). Through the collection of knowledge of assessment, teachers' conception of assessment is then can be constructed as the ground belief of the nature of the assessment to be conducted in classrooms (Mustafa & Manaf, 2019). Therefore, teachers are required to develop conceptions of classroom assessment that align with practices recommended by experts in educational assessment and different literature such as using multiple assessment methods for formative classroom practice; informing assessment results to students clearly; providing constructive, informative and timely feedback to students, and so on (Alkharusi, 2008; Davis & Neitzel, 2011; Mamaru, 2014; Monteiro et al., 2021; Suurtamm et al., 2010) by participating in professional development programs (Andersson & Palm, 2018).

Moreover, several studies were also conducted on classroom assessment in Ethiopia and contributed different results in the field. As an example, the finding of World Bank's SABER country report about classroom assessment practices in Ethiopia found that classroom assessment suffers from extensive weaknesses, and its use to support student learning was very limited (World Bank, 2009). Further, other investigations have also identified many issues with the way classroom assessment has been understood and practiced. Some of them revealed classroom assessment was understood and practiced as continuous testing in English classes (Yigzaw, 2013); was inconsistent across different settings, dominated by traditional assessment practices (e.g., tests, homework, assignment) and sometimes it was used for formality, and less aligned with student learning and curriculum plan (Bihonegn, 2018; Bezabih et al., 2019; Mikre, 2010; Sintayehu 2016). Additionally, the qualitative analysis of national learning assessment system (ANLAS) in Ethiopia endorses that aligning classroom assessment with the curriculum standards (competencies) and making classroom assessment part of the instruction are key areas that require improvement (Demessie et al., 2019). On the other hand, continuous classroom assessment, feedback provision, and report on student learning are paid attention by the ministry of education of Ethiopia (MoE, 2012) as a professional practice of all teachers in the country.

Thus, to the best of researchers' knowledge, studies concerning mathematics teachers' assessment conceptions and the relationship between their practices were not investigated at primary schools in Ethiopia. But the study of teachers' conceptions and practices about classroom assessment is a critical issue in the field of assessment research and has wide-ranging implications for policy and practice in education. Moreover, teachers' conceptions concerning classroom assessment are one of several factors on which the assessment method teachers choose to disclose their students' learning processes depends; and these conceptions may be specific for mathematics education because not all types of knowledge and skills are equally important to assess (Veldhuis et al., 2013). Hence, studies exploring mathematics teachers' classroom assessment conceptions and practices and their relationship would have been conducted to fill this gap. Therefore, the current study is an attempt to shed light on this issue (i.e., conceptions and practices of classroom assessments) by collecting survey data from primary school mathematics teachers in Jimma zone, Ethiopia. Thus, this study is significant in disclosing the current mathematics teachers' conceptions and practices of classroom assessment to make them aware and plan to solve the existing problems indicated by different studies (e.g., Bihonegn, 2018; Demessie et al., 2019; Yigzaw, 2013). It is delimited to the ideas, values, and beliefs these teachers have toward what classroom assessment is (i.e., what they think it is and how it is structured), what it is for (i.e., its purpose), and their perceived practices of different assessment types and methods in their mathematics classrooms. Accordingly, this study was intended to answer the following basic research questions;

(1) What are primary school mathematics teachers' conceptions of classroom assessment?
(2) What are the current assessment types practiced by primary school mathematics teachers?
(3) What is the relationship between primary school mathematics teachers' conceptions and practices of classroom assessment?

2. Methodology

2.1. Research design

This study employed a cross-sectional survey design, which is the most popular form of survey design used in education. In addition, Creswell asserts that this design help researcher collect data from the sampled participants at one point in time that can examine their current attitudes, beliefs, and opinions, which are ways in which individuals think about issues or practices, which are their actual behaviors.

2.2. Sample and sampling techniques

The target population of this study was 1065 teachers teaching mathematics in government primary schools of Jimma zone and town, Oromia regional state, Ethiopia during the academic year of 2020/2021. Jimma zone and town were identified as the target area because of the researchers' familiarity with the locale. According to the recorded data from Jimma zone and town education offices, there were 905 and 15, totally 920 government primary schools (Grade 1-Grade 8) in Jimma zone and town administrations respectively during the 2020/2021 academic year. Since sample size might also be constrained by cost—in terms of time, money, the number of researchers, and resources (Cohen et al., 2007), we selected 93 schools from 905 government primary schools found in 17 woreda (district) administrations in Jimma zone. At least three schools were selected from each woreda administration based on their proximity to the woreda towns. For instance, three schools were selected from Gumay woreda, which is the smallest number of schools selected from all 17 woredas and eight schools were selected from Karsa woreda administration, which is the maximum number of schools selected from the 17 woreda administrations. Additionally, five schools were selected from Jimma town administration using a simple random sampling method. Since mathematics teachers were few; the researchers selected all of them from the selected schools (Cohen et al., 2007). Accordingly, from a total of 287 mathematics teachers who participated in the study, 228 (male = 138, female = 90) of them filled out the questionnaire properly and returned it to the researchers. Fourteen respondents' data were removed from the overall results due to partial survey completion and 45 teachers did not return the questionnaire, which resulted in an 80% response rate.

The age of sample teachers ranging from 21 to 50 years old, while a majority of them (52.2%) were between 26 and 30 years of age. Regarding their educational level, a large number of the sample teachers (78.9%) had a diploma, 20.6% had bachelor's degrees and only one teacher had a master's degree. Furthermore, a majority (43.9%) of sample teachers had teaching experiences that ranged between 6 years and 10 years, followed by the teachers (18.4%) with teaching experience that ranged from 11 years to 15 years. Very few (5.3%) of the sample mathematics teachers have above 25 years of teaching experience.

2.3. Data collection instruments

To answer the research questions, a validated survey was used. The survey consists of three sections. The first section includes demographic questions about the participants' background (age, gender, years of experience, level of education, and teaching load per week). The second section comprises 27 Likert-type items scored on a positively packed agreement rating scale from 1 to 6 (*1 – strongly disagree, 2 – mostly disagree, 3 – slightly agree, 4 – moderately agree, 5 – mostly agree, and 6 – strongly agree*) options that address conceptions of assessment. Positive packing helps to increase variance when it is likely that participant teachers are positively biased toward a phenomenon (Brown, 2004) when they are asked to evaluate the assessment practices of the

school in which they work (Brown et al., 2019). The revised scale on Conceptions of Assessment Abridged III (Brown, 2006, 2017) was used to measure the four assessment conceptions (assessment for learning or improvement, assessment for student certification, assessment for school accountability, and assessment is irrelevant) and teachers' level of agreement or support for each conception. This scale was used by different researchers (Azis, 2015; Pastore, 2020), because it is a valid measure of teachers' conceptions of assessment and, thus, it can be used within research programs around assessment (Brown, 2006, 2017) like in this study.

The third section is a set of 18 items regarding primary school mathematics teachers' classroom assessment practices scored on a 5-point Likert type response scale ranging from 1 to 5 (*1 – never; 2 – rarely; 3 – occasionally; 4 – very frequently; 5 – always*) and describing the frequency of doing an assessment activity. This generally refers to the assessment activities and types practiced by the teacher respondents in their mathematics classrooms for different purposes. This assessment practices portion of the instrument was adapted from Rivera-Lacia's study (Rivera-Lacia, 2019), named as Preferred Classroom Assessment Practice (PCAP) scale. The scale consists of items about teacher's practices of classroom assessments for different purposes such as assessment as learning (six items), assessment of learning (four), assessment to learning (four items), and assessment for learning (four items).

For this study, some of these items were modified by the researchers based on different literature (Brown, 2017; Calveric, 2010; Christoforidou & Xirafidou, 2014; MoE, 2018; Siarova et al., 2017; Zhang & Burry-stock, 2003) to tailor it into the context of the study area. For example, the item stated "*Determine how students can learn on their own in class*" under assessment as learning subgroup in Rivera-Lacia's study seems to method of teaching and learning than a method of assessing students learning in our context. Hence, we modified this item as "*Determine how students can prepare questions and ask each other or answer by themselves"* because this assessment activity is considered to be practiced in our context.

This third section of the questionnaire also contains one open-ended question that asks teacher respondents to describe assessment methods they frequently use (practice) in their mathematics classes. The data obtained from this open-ended question were intended to supplement or triangulate the result found from the assessment practice items.

2.4. Validity and reliability of the instrument

A pilot study was conducted to ensure the reliability and validity of the instrument. The teachers included in the pilot study were taken from three schools out of the sample schools included in this study. The reliabilities of the pilot data of the questionnaire were 0.758 for conceptions of assessment items and 0.702 for assessment practices items that indicate greater reliability (Pallant, 2010). To check validity, the items were given to a group of instructors in the areas of educational measurement, psychology, English & local languages from Jimma College of Teachers Education and Jimma University. They were asked to judge the clarity of wording and the appropriateness of each item and its relevance to the construct being measured. Their feedback was used for further refinement of the items that were translated to the local language (Afan Oromo).

2.5. Procedures

In this study, for a better understanding of items, all the measures were translated into the local language (Afan Oromo) and back translations were also made by two lecturers, one from the Afan Oromo department and the other from the English language department from Jimma College of Teachers' Education. Based on their comments, the Afan Oromo version questionnaire was improved by modifying or replacing some items that were found to be quite vague. Afterward, the content of the survey questionnaire and the wording of the items were examined by a group of lecturers who are teaching in the Department of Teacher Education and Curriculum Studies at Jimma College of Teachers' Education. A debriefing meeting with these lecturers was conducted, where they provided feedback on whether the Afan Oromo version survey content was representative of all the possible questions about mathematics teachers' conceptions and perceived

practices of classroom assessment. Based on their feedback, the researchers incorporated some comments and made some changes in the survey scale and the wording of items.

Finally, the administration of the questionnaire was done after getting approval from the Jimma University, respective *woreda* education offices, and school officials found in sampled schools. Following this, informed verbal consent was obtained from all participants before the administration of the questionnaire. The researchers had provided orientation to the mathematics teachers as to the nature and purpose of the instruments and attempted to make the participants feel at ease. Then, the instrument was administered to participants during their free periods with close supervision of the researchers.

2.6. Methods of data analysis

The participants' responses to the survey were entered into the statistical software, SPSS version 20. Specifically, data from the second and third sections of the questionnaire, which were about assessment conceptions and practices of mathematics teachers, were analysed using descriptive statistics such as frequencies, means, and standard deviations. We used Brown's (2006) previously identified assessment conception subgroups (assessment for improvement, assessment for student accountability, assessment for school accountability, and assessment as irrelevant) and Rivera-Lacia's (2019) assessment practice subgroups (assessment as learning; assessment of learning; assessment for learning; and assessment to learning) to analyse the data. Therefore, descriptive statistics for these teachers' assessment conceptions and perceived practices category were calculated and analysed to answer research questions one and two. Moreover, the data collected by the open-ended question in the survey were analysed by using narratives to supplement the quantitative result to answer research question two. Inferential statistics were conducted to examine the relationship between the assessment conceptions categories and assessment practices subgroups. Results from this statistical analysis were used by the researchers to determine whether a positive, zero or negative relationship existed between teachers' assessment conceptions and practices subgroups. The correlation of overall teachers' assessment conceptions and practices was also calculated by transforming the categories of both variables using SPSS software to answer research question three. Implication of the result was also discussed based on the correlation values found & their respective interpretations.

3. Results

Before proceeding to further analyses, incorrect or out-of-range values, missing values, and assumptions recommended by the inferential statistics were checked in order to ease the interpretation of the findings. Then, the results of this study are presented and discussed based on the guiding research questions as follows.

In response to the first research question, "What are mathematics teachers' conceptions about classroom assessment?" the researchers used descriptive statistics to determine the means, standard deviations, and frequencies of the four main assessment conceptions: assessment for school accountability, assessment for student accountability, assessment for improvement, and assessment is irrelevant and the results reported in Table 1. The mean scores ranged from 3.54 to 5.08 suggesting that average levels of assessment conceptions revealed some variability. These results were not widely different and participants tended to answer *"Mostly Agree"* to accountability and improvement assessment conceptions. Moreover, the irrelevance conception gained the lowest response (M = 3.34, SD = .828) and participants were more likely to answer "*Slight Agreement*" level among other variables.

Table 1. Descriptive statistics for conception subgroups

		School accountability	Student accountability	Assessment improves education	Assessment is irrelevant
N	Valid	228	228	228	228
	Missing	0	0	0	0
Mean		5.00	5.08	4.81	3.34
Std. Deviation		.802	.788	.616	.828
Skewness		−1.363	−1.418	−1.115	−.386
Std. Error of Skewness		.161	.161	.161	.161

To answer the second research question, "What are the current assessment types practiced by primary school mathematics teachers?" the researchers again used descriptive statistics to determine the means, standard deviations, and frequencies of the four subgroups of assessment practices: assessment as learning, assessment of learning, assessment to learning and assessment for learning as shown in Table 2.

Table 2. Descriptive statistics for assessment practices subgroups

		Assessment as learning	Assessment of learning	Assessment to learning	Assessment for learning
N	Valid	228	228	228	228
	Missing	0	0	0	0
Mean		4.23	4.30	3.80	4.11
Std. Deviation		.552	.584	.808	.576
Skewness		−1.255	−1.165	−.727	−.767
Std. Error of Skewness		.161	.161	.161	.161

The mean scores ranged from 3.80 to 4.30 suggesting that the average levels of perceived assessment practices of the teachers are almost similar. Assessment of learning ($M = 4.30$, SD = .584) resulted in the highest rating followed by assessment as learning (M = 4.23, SD = .552) and assessment for learning (M = 4.11, SD = .576) respectively. On the other hand, the perceived practice of assessment to learning gained the lowest rating from the respondents (M = 3.80, SD = .808).

These mean values are not widely different and thus teachers reported they tended to practice these assessment types (assessment as learning, assessment of learning, assessment to learning, and assessment for learning) *very frequently* in their mathematics classes. This shows that primary school mathematics teachers in the study area perceived practicing a mixed and diversity of assessment types in their classrooms as learning is multidimensional and cannot be sufficiently measured by one instrument.

Table 3. Assessment methods frequently used by mathematics teachers

	Assessment methods used	*N* (%)
	Mid-term and final exam	180 (96.8)
	Homework	102(54.8)
	Classwork/activity	97(52.2)

(*Continued*)

Table3. (*Continued*)

	Assessment methods used	*N* (%)
	Test	96(51.6)
	Oral questions	94(50.5)
	Written questions	86(46.2)
	(Written) feedback	56(30.1)
	Observation of student work	43(23.1)
	Quiz	38(20.4)
	Assignment	10(5.4)
	Project	7(3.8)
	Interview	2(1.1)

This result can be supplemented with the result presented in Table 3, in which the 186 (82%) of participant teachers replied to the open-ended question asked to describe assessment methods they frequently used (practiced) in their mathematics classes.

While the rating scale items in the questionnaire provide an indication of types of assessment practices, the open-ended question was extremely valuable in providing specific examples of what assessment methods were used by the respondents. Generally, the teachers reported they used twelve different assessment methods in their mathematics classrooms. Among them, mid-term and final exams were used by almost all teachers but less than 5% of the teachers who participated in this study used project and interview methods to assess their students. Moreover, more than 50% of the teachers used homework, classwork/activity, pencil-and-paper tests, and oral questions to assess their students, which are traditional assessment methods (Nabie et al., 2013). However, classroom assessment methods such as feedback, observation of students' work, pencil-and-paper quiz, and projects which are formative assessment methods (Mamaru, 2014) were used by a few teachers (<30%).

Data analysis also focused on the relationship between teachers' conceptions of assessment categories and their perceived assessment practices subgroups. Since the collected data were ordinal and also they were not normally distributed, a Spearman correlation was computed to examine the relationship between conceptions and perceived practices of teachers' classroom assessment subgroups.

As can be seen from Table 4, teachers' accountability (school & students) and improvement assessment conception subgroups were found to be significantly and positively correlated at 0.01 levels with all four teachers' perceived assessment practices subgroups (i.e., assessment as learning, assessment of learning, assessment to learning and assessment for learning); though small correlation values represent weakest relationship (Tabachnick & Fidell, 2013) among the variables.

Table 4. Correlations of assessment conceptions and assessment practices subgroups

Assessment conceptions		Assessment as learning	Assessment of learning	Assessment to learning	Assessment for learning
School Accountability	*R*	.317**	.184**	.237**	.226**
	Sig. (2-tailed)	.000	.005	.000	.001
	N	228	228	228	228
Student Accountability	*R*	.279**	.231**	.290**	.289**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	228	228	228

(*Continued*)

Table 4. (*Continued*)

Assessment conceptions		Assessment as learning	Assessment of learning	Assessment to learning	Assessment for learning
Assessment Improves Education	*R*	.299**	.287**	.298**	.308**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	228	228	228
Assessment is Irrelevant	*R*	.133*	.030	.323**	.166*
	Sig. (2-tailed)	.045	.657	.000	.012
	N	228	228	228	228

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

In addition to this, the relationship between primary school mathematics teachers' overall conception and practice of classroom assessment was also analysed (Table 5).

Table 5. Correlations of overall assessment conceptions and assessment practices

			Conception	Practice
Spearman's rho	Conception	Correlation Coefficient	1	.523**
		Sig. (2-tailed)	.	.000
		N	228	228
	Practice	Correlation Coefficient	.523**	1
		Sig. (2-tailed)	.000	.
		N	228	228

**Correlation is significant at the 0.01 level (2-tailed).

As can be seen from Table 5, there is a moderate and positive relationship between teachers' conception of assessment and their perceived assessment practices ($R = .523$, $N = 228$, $p < .001$).

4. Discussion

4.1. Conceptions of classroom assessment

The highest mean values about teachers' student and school accountability conceptions of assessment suggest that mathematics teachers at primary schools in Jimma zone and Jimma town consider and believe classroom assessment purpose in relation to accountability (student and school) than improvement. This result was initially expected given the culture of accountability under the Ethiopian educational system. However, in the classroom context, the first goal of assessment is essentially formative and learning improvement in nature (Mikre, 2010). The slight agreement of teachers to the irrelevance conception of assessment also indicates that the respondents showed a comparatively low level of agreement with this conception. The conception of assessment as irrelevant represents teachers who view assessment as unrelated to the work of teachers and students (Brown, 2004). Brown (2004) noted that teachers who agree with this assessment conception reject assessment due to its perceived destructive impact upon their autonomy and student learning and exclude the importance of teachers' intuitive evaluations, student-teacher relationship, and in-depth knowledge of curriculum and pedagogy.

The result of this study is similar to that of Rural (2021), who studied junior high-school mathematics teachers' conception of assessment and found a high level of agreement with the conception of accountability (school & student) and improvement but in contradiction with the irrelevance conception where the respondents showed a high level of disagreement. However, in the study of Mirian and Zulnaidi (2020) mathematics teachers slightly agreed with the irrelevance conception of assessment as in this study.

This finding might be explained by the fact that the nature and culture of the Ethiopian educational system are more mark-oriented rather than learning-oriented (Belay, 2016). The competitive nature of the educational system encourages this idea and believes that a good student is the one who obtains good scores because the examination results reflect the quality and worth of the individual students. Summative assessment approach or traditional assessment approach (tests and examinations) has been mostly used in this educational system for a long time; therefore, the final score becomes the ultimate goal in the educational system. In fact, Ethiopian society considers assessment as marks. Thus, if a student acquired a good mark, then, everybody supposes that this student is eligible to promote to the next level. This notion encourages students to exert further effort to obtain higher marks at school and even in national examinations. Moreover, teachers also seriously undertake the responsibility to prepare their students for such examinations, hence helping their students obtain higher scores than others even by assigning marks to non-achievement factors such as classroom attendances and students' behaviors (Belay, 2016; Zhang & Burry-stock, 2003) are evidence of the result of this study.

4.2. Perceived assessment practices of mathematics teachers

Since respondent teachers hold mixed assessment conceptions (see Table 1), this result suggests that different conceptions of classroom assessment by teachers lead to different assessment practices as was also found in other studies (e.g., Dagdag & Dagdag, 2020; Monteiro et al., 2021; Rural, 2021). Besides, teachers' accountability conception of assessment and their perceived practice of assessment of learning resulted in the highest rating can suggest teachers' classroom assessment practices are associated with what they know and what they believe on assessment. But, if assessment practices are related mostly to accountability, students develop a more passive role in their learning process (Remesal, 2011). The result found from open-ended question also indicates that mathematics teachers practiced different assessment methods in their mathematics classes to assess their students, though very few of them used project and interviews rarely as was also found in the study of Van den Heuvel-Panhuizen et al. (2021).

To realize each student's knowledge, skills, and routine application, teachers need to use a variety of assessment tasks to assess their students. Today's mathematics curriculum goals go well beyond simply content knowledge and skills to include critical thinking and working mathematically, effective communication of mathematical ideas and findings, mathematical modelling, and so on. This breadth of expectations requires the use of different assessment tasks and strategies that enable students to demonstrate the full extent of their learning, including understanding, accuracy, reasoning, and problem solving. Therefore, teachers need to be focused on formative assessment approaches because solving problems and investigating mathematical ideas usually require more time and students frequently benefit by working with peers. Such experiences should be assessed using different strategies such as projects, presentations, teacher observation, and discussion with students to provide feedback though few of these strategies were least practiced by teachers who participated in this study (see Table 3).

4.3. Relationships between teachers' conception and practices of classroom assessment

Teachers' assessment practices can be affected by their conceptions and vice versa (Brown et al., 2019). From this viewpoint, studying the relationship between teachers' conceptions & practices of classroom assessment attract researchers' attention in order to understand how assessment users

conceive of classroom assessment in an educational environment. This study also indicated that teachers' conception of classroom assessment is related to how they use it in their classroom practice.

More specifically, the slightly high relationship between teachers' school accountability conception of assessment and assessment as learning than other assessment types indicates that teachers who practice providing task-based activities that allow knowledge and learning formation more frequently allow students to monitor their learning and give personal feedback (Mamaru, 2014; Rivera-Lacia, 2019). Also, the relatively high relationship between teachers' improvement conception of assessment and assessment for learning than other assessment types indicates that teachers who believe and consider assessment as useful and improves instruction use formative assessment such as providing feedback and adapting instruction, often than other assessment types such as summative assessments (Mamaru, 2014).

It was also found that a very weak positive relationship was detected between teachers' assessment conception as irrelevant and their practice of assessment of learning (R = .030, N = 228, p > .01). However, this irrelevant conception of assessment is weakly and positively correlated significantly with the purpose of assessment to learning (R = .323, N = 228, p < .001). This indicates that teachers who believe and consider assessment as irrelevant can practice it for the purpose of reporting of assessment results to students, parents, and other stakeholders, such as schools.

Again, the correlation value between overall teachers' assessment conception and practices (R = .523, N = 228, p < .001) implies that mathematics teachers who have a better conception of assessment (i.e. accountability and improvement conception) can also practice it in a better way in their classrooms. Moreover, the value of the correlation coefficient squared (called the coefficient of determination, R^2 = 0.273) 27.3% indicates a measure of the amount of variability in teachers' assessment practice that is shared by their conception (Field, 2009). Thus, although teachers' assessment conception was moderately correlated with their perceived practices, it can account for only 27.3% of the variation in their practices. To put this value into view, this leaves 72.7% of the variability still to be explained/accounted for by other variables such as students' conceptions of assessment (Opre, 2015) and the structure of the educational system (Remesal, 2011).

Generally, this finding is similar to that of a prior study (Veldhuis et al., 2013) which concluded that the conceptions that teachers have about classroom assessment influence their practices but is contrary to that of Monteiro et al. (2021) which teachers assessment practices did not always reflect their beliefs.

5. Conclusions and implications

This study was designed to examine primary school mathematics teachers' conceptions and practices of classroom assessment. The results indicated that teachers have a stronger agreement for the accountability and improvement conceptions of assessment and a low level of agreement with the irrelevant conception of assessment as they relate to the assessments that take place in their classrooms. This slight agreement with the irrelevant conception of assessment leads those teachers to ignore and reject assessing students in their classrooms. Thus, they tend to assign marks to students based on non-achievement factors such as classroom attendances for the purpose of reporting and this was one of the main factors for the failure of the quality of our education.

Moreover, though the respondents of this study perceived to practice all assessment types very frequently in their mathematics classes, practice of assessment of learning is gained the highest mean value and the practice of assessment to learning gained the lowest mean value. This is due to the fact that assessment of learning (summative assessment) is mostly applied by all teachers at the end of a teaching period or a term, commonly because of their certification and accountability conception. From the result of the open-ended items, it is also possible to conclude almost

all teachers are practicing summative assessment types such as mid-term and final exams. But, in order to promote meaningful learning, it is necessary to introduce changes that make teachers' assessment practices more formative, because many students may not succeed from summative assessment and evaluation only.

The correlation result found between teachers' assessment conceptions and practices (subgroups) reveals that the conceptions that teachers have about classroom assessment influenced their assessment practices and it can account for only 27.3% of the variation in their practices. Thus, 72.7% of the variability is to be explained/accounted for by other variables. So, we suggest that other studies need to be conducted to examine these variables. Moreover, to develop an assessment conception for improvement, it can be recommended that teachers need to be performed through more collaborative practices (e.g., professional development programs). Sharing positive experiences of assessment in collaborative settings result in higher awareness of the relationship between assessment practices and conceptions (Siarova et al., 2017). Furthermore, it can also be suggested that teachers need to develop an improvement conception of classroom assessment to practice assessment for the purpose of providing feedback and adapting instruction. These findings have implications for better educational practice as well as future research to ensure quality education specifically in our country.

6. Limitations

The study was constrained by some factors. First, the coronavirus disease (COVID-19) pandemic in Ethiopia, like in the other part of the world, hindered us from observing the teachers' actual classroom assessment practices, which could have provided additional information about mathematics teachers' actual practice of classroom assessment. Therefore, it should be noted that the generalizability of the specific results of this study is limited by the use of a self-report survey and also the sample schools included. Further studies may use classroom observations and interviews to analyse mathematics teachers' classroom assessment conceptions and practices. Also, the survey would be conducted with more representative sample across the region or the country.

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