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THE DETERMINATION OF PRIMARY EDUCATION MATHEMATICS TEACHERS' LITERACY LEVEL OF MEASUREMENT AND ASSESSMENT

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Abstract

The introduction of the new program in the academic year of 2005-2006 places a great emphasis on the new procedures in measurement and assessment. The measurement and assessment techniques used in the new program for elementary education are process and result-focused. It is known that the activities for a number of measurement and assessment techniques and methods which are already used or asked to be used in schools are, to a considerable extent, incomplete and insufficient. It is a necessity to determine whether or not measurement and assessment procedures are satisfactorily considered during the assessment process of students' knowledge and skills. The purpose of this study is to determine mathematics teachers' literacy level of measurement and assessment. The study, in which was used qualitative research method, was conducted in the academic year of 2008-2009 on twenty mathematics teachers employed in elementary-schools in the Province of Giresun. In the research was used a semi-structured interview form as a tool of data collection. The results indicated most of the mathematics teachers were satisfactorily acquainted with the concepts of measurement and assessment and that most of them were not knowledgeable enough about the concepts of validity and reliability. It was also found in the study that they didn't scientifically know how to ensure the validity and reliability of measurement instruments. Mathematics teachers establish their students' entry performance of mathematics through such particular procedures as question-answer, problem-solving, and questions from daily-life.

Key Words: *Mathematics teacher, measurement, assessment.*

İLKÖĞRETİM MATEMATİK ÖĞRETMENLERİNİN ÖLÇME DEĞERLENDİRME OKUR-YAZARLIK DÜZEYLERİNİN BELİRLENMESİ

Özet

2005-2006 Eğitim-Öğretim yılında yeni programa geçilmesi ile ölçme ve değerlendirmede yeni yaklaşımları ön plana çıkarmıştır. Yeni ilköğretim programında kullanılan ölçme değerlendirme metotları süreç ve sonuç odaklıdır. Okullarda uygulanan ve uygulanmak istenen birçok ölçme-değerlendirme yöntem ve tekniklerine yönelik etkinliklerin önemli ölçüde eksik ve yetersiz olduğu bilinmektedir. Öğrencilerin sahip oldukları bilgi ve becerileri değerlendirme sürecinde öğretmenler tarafından yeterince dikkate alınıp alınmadığının belirlenmesine ihtiyaç vardır. Bu çalışmanın amacı, matematik öğretmenlerinin ölçme ve değerlendirme konusundaki okur-yazarlık düzeylerini tespit etmektir. Bu çalışmada nitel araştırma yöntemi kullanılmıştır ve çalışma 2008-2009 öğretim yılında, Giresun ili ilköğretim okullarında görev yapan 20 matematik öğretmeni üzerinde uygulanmıştır. Veri toplama aracı olarak, araştırmada yarı yapılandırılmış mülakat formu kullanılmıştır. Sonuçlar, matematik öğretmenlerinin çoğunun genel olarak ölçme ve değerlendirme kavramlarını tanıdıklarını ve ancak geçerlilik ve güvenirlilik kavramları hakkında yeterli bilgiye sahip olmadıklarını göstermiştir. Ayrıca, bu öğretmenlerin, ölçme araçlarının geçerlik ve güvenirliğinin nasıl sağlanacağı konusunda da yeterli bilgiye sahip olmadıkları bulunmuştur. Matematik öğretmenleri öğrencilerin matematik ile ilgili önbilgilerini daha çok soru-cevap, problem çözdürme, günlük hayatla ilgili sorular tekniklerini kullanarak tespit etmektedirler.

Anahtar Sözcükler*: Matematik öğretmeni, ölçme, değerlendirme.*

Introduction

In a rapidly changing world, we live in an age of information boom, in which the teaching of mathematics is bound to play a key role in the future of societies. Today, mathematics remains to be an indispensable source for all other branches of sciences due to its vast variety of application, which caused teaching techniques to take a new form and thus created a new subject, that is, mathematics instruction. Hence, in every country it has already become an unquestionable conviction of each educational institution at any level that the teaching of mathematics is a strong necessity. It is also strongly thought by educational circles that the emphasis placed on mathematics in a curriculum of a nation is equal to that placed on language teaching (Çoban, 2002). In our traditional approach to teaching, mathematics is viewed as a field of study which is presented in a way in which topics are taught independently of each other, which does not answer daily needs, and which is composed of abstract principles or of the equations and functions that must be separately learned (Baki, 2006). Mathematics is, therefore, regarded by students as a difficult and tedious subject which can be understood only by heart.

For people who live in a society, mathematics education received at school has recently constituted a great part of the mathematics education they are likely to get throughout their further lives. Therefore, it is a strong necessity to educate individuals with a positive attitude to mathematics, who are self-confident in mathematics, agreeable in a group-work, able to employ mathematics in daily life as well as to solve a problem, and who are eager to share their solutions and feelings with others (Baki, 2006).

In a world of sudden developments, qualified man-power is directly proportional to a constant increase in the quality of mathematics teaching.
The efforts made for educational or instructional purposes are oriented only to the promotion of students' success. Measurement and assessment, which are parts of such instructional efforts, are of high importance with respect to increasing the success in teaching. Assessment of student learning requires the use of a number of techniques for measuring student achievement. But assessment is more than a collection of techniques. It is a process, a systematic process that plays a significant role in effective teaching (Linn & Gronlund, 1995). Emphasis was made on both learning process and the final or conclusive assessment of this process in the understanding of measurement and assessment in the new programs developed and a number of measurement and assessment procedures to be used in this process were suggested. Along with the application of new approaches to the measurement and assessment of such features as student performances, attitudes, values, and skills, the true understanding of the innovations and their application have recently gained importance (Çepni & Akyıldız, 2009). Only through assessment is understood whether or not students have managed to acquire the gains at level required. An assessment is made by using the data obtained at the end of

measurement. Hence, assessment is a term covering 'measurement'. It is known that the activities for a number of measurement-assessment techniques and methods employed or demanded to be employed at schools are considerably incomplete and insufficient. It has been observed that such techniques and methods are mostly ignored by teachers during the assessment of students' knowledge and skills.

In our country, activities for measurement and assessment are carried out in parallel with Bloom's Taxonomy. Recently developed educational programs are based on such approaches or theories as constructivist learning, multiplied cognition, and the development of scientific skills through project-based learning. Consequently, new approaches to measurement and assessment should be developed and practiced. Assessment is an activity that should be done to support the process of students' learning (Çepni, 2007). In order for the level of student success to be established, process-focused measurement and assessment activities based on performance development have recently gained importance in addition to measurement and assessment activities carried out at the end of each unit or lesson (Akyıldız, 2009). Our teachers are expected to use new measurement and assessment methods rather than conventional ones. For successful mathematics learning, it is highly important to identify whether or not teachers have sufficient knowledge and skills as to the new measurement and assessment techniques. One important reason for the failure in education and instruction is thought to be the application of incomplete and inappropriate activities for measurement and assessment (Yiğit and et al, 1998). This requires the investigation and determination of the measurement and assessment level of mathematics teachers' literacy. In sum, the reasons previously stated justify the need for such a study or research. The fundamental aim of this study is to determine the level of mathematics teachers' literacy as to measurement and assessment.

In developed countries, a massive number of studies have been conducted in order to establish the efficiency or productivity of new measurement and assessment techniques in terms of the objectives previously determined. The case is the same in our country, so the efficiency or productivity of measurement and assessment techniques should be questioned in order for the needs felt to be answered. Such research is thought to fill in a significant gap in the literature concerned. It is expected that the data to be obtained will not only help teachers review their knowledge as to the new techniques of measurement and assessment but also provide assistance for those doing academic research in the field concerned. In addition, this research is thought to initiate opportunities for new research, discussions, and thinking about the techniques of measurement and assessment which can be employed in mathematics classes.

In order to reach the goals previously stated, answers to the following questions ought to be inquired:

1. What do mathematics teachers think of the terms of measurement and assessment?

2. What methods of measurement and assessment do mathematics teachers prefer to employ in their classes?

3. What are the teachers' views about whether or not the actual success of students is clearly revealed thorough the measurement and assessment carried out at school?

4. What do mathematics teachers think of the concepts of validity and reliability?

5. How can ensure the validity and the reliability of the assessment instruments which have prepared?

6. What methods do mathematics teachers use to determine the preliminary or previously acquired knowledge?

7. What techniques of measurement and assessment do you employ to make an summative assessment?

8. What are the alternative methods of measurement and assessment mathematics teachers' use?

9. What do pay attention to when preparing a measurement instrument for mathematics class?

10. What are the measurement and assessment topics mathematics teachers need?

Method

In the sample of the research are included mathematics teachers employed at twenty randomly selected primary schools in different districts in the provincial area of Giresun in the academic year of 2007-2008. Depicting or illustrating a case as it is, the method of qualitative research was preferred as a research model (Karasar, 2002, p: 77). In the research, a semi-structured questionnaire form developed by the researcher to establish the techniques used by mathematics teachers for measurement and assessment was used as a tool of data collection. In the first step of developing the questionnaire, a trial form was prepared through literature scanning. The questionnaire was given the final form in parallel with the ideas and criticism directed by experts to the trial form. For the research to be conducted, mathematics teachers in primary schools listed in the research were requested to answer the questions asked by the researcher after a visit to each school, respectively. The data obtained from semi-structured interview questions in qualitative research were summed up through content analyses. In order for the validity of the data subjected to content analyses to be calculated, the same text should be coded in two different times with a certain number of data taken from among the data obtained. In this process, it is important to know whether or not the same word, statement or paragraph is coded in the same category. A compliance or consistency level of 80% between the categories is accepted to be

satisfactory for reliability (Türnüklü, 2000). In this research, it can be stated that a compliance percentage of 82% shows the content analyses made is reliable enough. After the data were coded, they were gathered under main themes and in the presentation of the data, frequency was used. Afterwards, comments were made in accordance with the frequencies. In the analysis of the data collected, frequency (f) analysis is to be made and the results obtained are to be presented in tables.

Results and Comments

In this section, the results obtained were presented in the table below and evaluated.

1. How to define measurement and assessment?

The first question was intended to get mathematics teachers to make a definition of the terms of 'measurement' and 'assessment'. According to their assessment on the basis of the correct answer, the answers given were categorized in such a way as to be "very satisfactory, satisfactory, partly satisfactory, and unsatisfactory".

Table 1: *Definitions as regards the terms of 'measurement' and 'assessment'*.

Measurement	f	%	Assessment	f	%
Very satisfactory	5	25	Very satisfactory	4	20
Satisfactory	9	45	Satisfactory	8	40
Partly satisfactory	4	20	Partly satisfactory	5	25
Unsatisfactory	2	10	Unsatisfactory	3	15
Total	20	100	Total	20	100

As seen in Table I, 70 % of mathematics teachers made a definition regarding the term of measurement such as observing the characteristic or the state of an object and stating the conclusion of the observation through a number or a symbol, including some other similar definitions. Likewise, 60% of mathematics teachers defined the term of assessment as making a decision or a judgment on something through some criteria as well as some other similar definitions. From the results obtained, it can be concluded that mathematics teachers' definitions as regards the terms of 'measurement' and 'assessment' are satisfactory despite the fact that some incomplete and mistaken definitions were made.

2. Which methods of 'measurement' and 'assessment' do you know?

Table 2: *Methods for the measurement-assessment of mathematics teachers' knowledge*

Methods	f	%	Methods	f	%
Classical examinations	20	100	Working Sheet	7	35
Multiple choice test	20	100	Concept Map	6	30
Question-Answer	16	80	Group assessment	6	30
Oral	15	75	Peer assessment	5	25
Filling-in-the gap	11	55	Self assessment	4	20
Equating test	10	50	Observation Technique	2	10
True-False	8	40	Interview Technique	2	10
Performance assessment	8	40	Portfolio	1	5
Project activities	7	35	Structured Grid	1	5

As seen in Table II, it was found that more than half of the mathematics teachers were informed of classical examinations (100%), multiple choice test (100%), question-answer (80%), oral (75%), and filling-in-the gap (55%). Furthermore, it was also found that 50 % of the mathematics teachers knew of equating test, 40 % of true-false test, 40 % of performance assessment, 35 % of project activities, 35 % of working sheet, 30 % of concept map and group assessment, 25 % of peer assessment, 20 % of self assessment, 10 % observation and interview technique and 5 % of portfolio and structured grid techniques. The results obtained indicate that mathematics teachers are less informed of alternative assessment methods than of classical assessment methods.

3. What are the measurement and assessment methods you use in mathematics class?

Table 3: *Measurement and assessment methods mathematics teachers use*

Methods	f	%	Methods	f	%
Classical examinations	20	100	Performance assessment	9	45
Multiple choice test	17	85	Project activities	7	35
Question-Answer	17	85	Group assessment	6	30
Oral	14	70	Concept map	4	20
Working sheet	11	55	Portfolio	2	10

As seen in Table III, it was found that mathematics teachers used such methods of measurement and assessment as classical examination (100%), multiple choice test (85%), question-answer (85%), oral (70%), working sheet (55%) more often than other instruments of measurement and assessment and that they also rarely used such other methods as performance assessment (45%), project activities and group assessment (30%), concept map (20%), and portfolio (10%). The results indicate that there exists a positive relation between the methods of measurement and assessment, which mathematics teachers know, and those they already use. Moreover, the results also show that mathematics teachers would

rather use traditional methods of measurement and assessment in their classes than use alternative ones. When mathematics teachers were asked why they used traditional instruments of measurement and assessment, they said they preferred them to see the students' top level skills and problem-solving skills, observe the students during the process, assess the students' entry behaviors, establish the students' level of readiness, see the students' weak and strong points throughout the process, make an objective assessment as well as for their high level of reliability and objectivity and being a student-centered assessment. They also added that they preferred these traditional methods because they found it quite easy to use them and they are well informed of them.

4. Do the examinations held for mathematics lesson reflect the actual success?

Table 4: *Success reflection levels in mathematics*

Methods	f	%
Completely reflecting	5	25
Reflecting	7	35
Partly reflecting	6	30
Not reflecting	2	10

As seen in Table 4, mathematics teachers think that in-class examinations completely reflect (25%), reflect (35%), partly reflect (30%), and do not reflect (10%) the actual success. When the mathematics teachers who think in-class examinations partly reflect or do not reflect the actual success were asked to give a reason for their such convictions, they stated that a teacher-centered education based on memorization were carried out at schools, the time allocated was limited, the class was not homogenous in terms of the students' level of intelligence, and that the curriculum was very intensive. They also gave such other reasons for their conviction as class atmosphere, shortage of source material, students' attitude to the kind of examination and test anxiety. They also maintained that only through alternative methods of measurement and assessment could the actual success in mathematics be established. Hence, one can make such a comment that alternative instruments of measurement and assessment are more student-centered and more actualistic than traditional ones.

5. What do you think the validity of a measurement method means?

Table 5: *Definitions for validity*

Validity	f	%
Very satisfactory	2	10
Satisfactory	6	30
Partly satisfactory	7	35
Unsatisfactory	5	25
Total	20	100

From the data in Table 5, it came to be clear that 10 % of mathematics teachers were correctly acquainted with the concept of validity and that 30 % of them gave almost correct answers, 35 % of them partly satisfactory answers and 25 % of them meaningless or incorrect answers. As known, validity is a degree of serving whatever purpose a measurement instrument is to be used for, a measurement degree of what we want to measure and the level of the ability to measure with no interference of other variables. It seems to be clear in general that mathematics teachers are not satisfactorily equipped with essential knowledge to define the concept of validity, which shows that teachers were not satisfactorily informed about the subject of validity throughout their educational process.

6. What do you think the reliability of a measurement method is?

Table 6: *Definitions regarding reliability*

Reliability	f	%
Very satisfactory	1	5
Satisfactory	7	35
Partly satisfactory	6	30
Unsatisfactory	6	30
Total	20	100

From the data in Table 6, it came to be clear that 5 % of mathematics teachers were correctly acquainted with the concept of reliability and that 35 % of them gave almost correct answers, 30 % of them partly satisfactory answers and 30 % of them meaningless or incorrect answers. As known, reliability is a degree of a measurement method being free of error and the level of measuring without an error. Reliability should also be stable, consistent and sensitive. As seen in Table 6, it is clear that mathematics teachers are not knowledgeable enough to make a definition of the term of reliability. It can, therefore, be stated that teachers are not satisfactorily aware of the fundamental aim of the term of reliability.

7. How can you ensure the validity and the reliability of the measurement tools which you have prepared?

Table 7: *The level of verifying validity and reliability*

Verification of Validity and reliability	f	%
Very satisfactory	2	10
Satisfactory	6	30
Partly satisfactory	4	20
Unsatisfactory	8	40
Total	20	100

As seen in Table 7, mathematics teachers established the level of validity and reliability of measurement methods as very satisfactory (10%), satisfactory (30%), partly satisfactory (20%), and unsatisfactory (40%). The data here indicate

that mathematics teachers are not knowledgeable enough to ensure validity and reliability.

8. How can you determine students' entry performance of mathematics?

Table 8: *The ways of determining mathematics teachers' entry performance*

Way of entry performance determination	f	%	Way of entry performance determination	f	%
Question-answer	18	90	Brainstorm	7	35
Making students solve a problem	12	60	Concept grid	5	25
Questions concerned with present- day life	10	50	Homework assignment	3	15
Working sheet	9	45	Discussion	2	10

Mathematics teachers stated that they determined students' entry performance through such procedures as question-answer (90% of mathematics teachers), problem-solving (60%), questions from present-day life (10%), working sheet (45%), brainstorming (35%), concept grid (25%), homework assignment (15%) and discussion (10%). As clearly seen in Table 8, when investigating students' entry performance, mathematics teachers would prefer to use traditional assessment techniques rather than alternative ones.

9. What do you pay attention to when preparing a measurement instrument?

Table 9: *Aspects to which attention is paid during the preparation of a measurement tool*.

Aspects to which attention is paid during the preparation of a measurement tool	f	%
Questions should:		
Cover the subject-matter	20	100
Be appropriate for students' level	18	90
Be of medium difficulty	17	85
Be in parallel with the gains	15	75
Be clear, concrete and understandable	14	70
Appeal to daily life	11	55
Be highly discriminative	9	45
Cover a great variety of areas	7	35
Be given sufficient amount of time	6	30
Be with short answers instead of too many questions	4	20
Be free form any mistake	3	15

As seen in Table 9, mathematics teachers pay attention to the fact that questions should cover the subject- matter (100% of mathematics teachers), be appropriate for students' level (90%), be of medium difficulty (85%), be in parallel with the gains (75%), be clear, concrete and understandable (70%), and appeal to

daily life (55%). Moreover, mathematics teachers at a rate of less than 50% stated that they paid attention to the fact that questions should be highly discriminative, cover a great variety of areas, be given sufficient amount of time, be with short answers instead of too many questions, and be free form any mistake. From the results obtained, we can conclude that mathematics teachers place value first on the validity of a measurement instrument and then on its reliability. As the results indicated, the most important feature a measurement tool should have is in parallel with the knowledge of validity.

10. Do you think you are satisfied with the matter of measurement and assessment? In what fields would you like to get involved in an in-service training program?

Mathematics teachers consider themselves to be satisfactory (30%), partly satisfactory (50%), and unsatisfactory (20%) for measurement and assessment. The results show that mathematics teachers' level of measurement and assessment are not satisfactory enough and that they do need an in-service training program for measurement and assessment.

Table 10: *Subject matters needed*

Subject matters needed	f	%
Alternative assessment techniques	14	70
Techniques for Information collection about an individual	13	65
Performance assessment	13	65
Portfolio assessment	11	55
Rubrics	10	50
Central tendency and reliability	10	50
Item analyses	9	45
Reliability and validity	7	35
Question/test preparation techniques	7	35
In-class assessment and marking	6	30
Assessment and measurement	3	15

As seen in Table 10, it is stated that 70% of mathematics teachers need to be informed about alternative assessment techniques, 65% about techniques for information collection about an individual, 55% about portfolio assessment, 50% about rubrics and central tendency, whereas a fewer number of teachers need to be informed of item analyses, reliability and validity, question/test techniques, in-class assessment and marking, and assessment and measurement. It is clearly seen that mathematics teachers are in need of alternative assessment methods rather than traditional ones. This is a case which indicates that mathematics teachers are not satisfactorily informed of alternative assessment methods and that they are eager to eliminate their shortage of knowledge of the area concerned. A solution to such a problem can be said to be of great importance in terms of mathematics teachers' professional development.

Conclusion, Discussion and Recommendations

There are various kinds of measurement instruments both teachers and students can use for the measurement of learning. However, in today's education, fundamental measurement tools with which will come out students' requirements and their special learning characters has gained importance. The usage of different measurement instruments is of high importance in terms of the reduction of the tension exerted by measurement on a student to a minimum extent. Measurement is dependent upon learning setting and the concept learned. However, it is clear from the experience that measurement provides us with information about the determination of students' requirements and their individual learning styles (Alkan, 2007).

The research results indicate that while most of the mathematics teachers are knowledgeable enough about the definition of measurement and assessment, some of them are not equipped with satisfactory knowledge of these two terms. This can be commented in such a way that teachers are not very much informed of the concepts of measurement and assessment. Most of the mathematics teachers stated that they used classical examinations, multiple-choice tests, question-answer, oral interview and working sheets for the assessment of their students' performance at certain intervals. However, it was also seen that some mathematics teachers used such assessment instruments as performance assessment, project activities, group assessment, concept map, portfolio for the assessment of their students' performance. The results obtained are seen to be in parallel with the results by Birgin (2007), Özsevgeç et al. (2004), Güven (2002) and Çakan (2004) about teachers' preference to use traditional measurement and assessment instruments rather than alternative ones though they are knowledgeable enough about alternative assessment and measurement tools. In addition, Doğan (2002) found in one of his study that in the faculty of educations, measurement and assessment aims to find out standard knowledge of mathematics using classical paper and pencil test commonly including theorem-proof question. Students point out that alternative assessment methods are rarely used.

Most of the mathematics teachers are in the opinion that the examinations held for mathematics classes reflect students' actual success. Some other mathematics teachers maintain that it is almost difficult to reflect students' actual success because content validity of these examinations is low, they are not process-focused and they are also based on memorization and the curriculum is very heavy. Brigin (2007)'s views also support this result.

Validity and reliability are inseparable characteristics of measurement instruments. It was seen that most of the mathematics teachers were not knowledgeable enough about the concepts of validity and reliability and that they also didn't scientifically know how to ensure the validity and reliability of the measurement tools they prepared. This is a case on which can be made such a comment that teachers didn't theoretically understand the concepts of validity and

reliability and therefore experienced failure in practice. Güven (2002) found in one of his study that teachers lacked satisfactory knowledge of this.

Mathematics teachers determine their students' entry performance of mathematics by using specifically such techniques as 'question and answer', 'problem-solving', and 'questions from daily life'. During the preparation of measurement instruments, mathematics teachers place emphasis on such particular matters as whether they cover the content, whether they are in compliance with students' level and their gains, whether they are moderate, whether they are open, understandable and related to daily life. A research conducted by Özsevgeç et al. (2004) also supports this study.

Most of the teachers involved in the research stated that they were not knowledgeable enough about assessment and measurement and that they asked to be informed about them. Mathematics teachers wonder the techniques other than the conventional assessment and measurement ones they already use and ask to get informed of how to correctly assess their students' learning. Among the subjects needed to be learned are the alternative assessment techniques in particular rather than traditional assessment methods. This result shows parallelism with the result by Birgin (2007) about teachers' need to be informed of alternative assessment and measurement.

Test and other procedures for measuring student learning are not intended as replacement for the teacher's informal observation and judgment. Rather, they are intended to complement and supplement the teacher's informal methods of obtaining information about students. The teacher is still the observer and decision maker. Measurement and assessment procedures merely provide more systematic, objective evidence on which to base instructional decision (Linn and Gronlund, 1995). It is evident from the Romberg, Zarinnia, Williams study and from other studies that the test exerts a powerful influence on teaching and learning. Tests are more than a simple instrument for measuring achievement. They are interactive with the learning environment since they communicate to teachers and students society' values about what students should learn. In considering the learning and teaching of mathematics, the assessment environment- including both large-scale and classroom forms of assessment- is clearly important (Webb, 1992).

They are the teachers who will use the new measurement and assessment procedures in the program introduced in the academic year of 2005-2006. It is, therefore, a must to have all teachers adopt the new measurement and assessment procedures in the program and gain effective knowledge and skills of measurement and assessment procedures. Furthermore, to deal with teachers' shortcomings of measurement and assessment knowledge and skills as well as to inform them of the new developments, in-service seminars should be organized in cooperation with the faculty and school in such a way as to promote the level of teachers' awareness of measurement and assessment. It is believed that these seminars will be highly beneficial if they are to be presented by experts. Teachers

tend to carry out measurement and assessment in cognitive domain. However, they should also be equipped with measurement and assessment skills in affective and psycho-motor domain. In Faculties of Education, teachers should be encouraged to carry out an in-class application of alternative assessment techniques in teacher-training classes.

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