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DEVELOPING INSTRUMENT TO MEASURE RELIGIOSITY AND OTHER AFFECTIVE DOMAIN IN TEACHING AND LEARNING MATHEMATICS

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Abstract

Mathematics is a universal knowledge that useful for human life. Competence in mathematics learning is not only focused on the cognitive domain, but also on affective domain. The problem that occurs is assessment difficulties in teacher-oriented of various competences. Based on various sources, the difficulties faced by teachers are an assessment to measure religiosity and other affective domain, such as self-confidence, responsibility, curiosity, honesty, discipline, and so on. This issue does not only occur in implementation of 2013 Curriculum, but also in general case. It is happened because of the teachers' assessment. It is laid on cognitive domain only, without assessing through descriptive and qualitative. The assessment difficulty by using descriptive and qualitative was the large number of students in each classroom, so it took a long time to asses. Further, teachers need an effort to solve this problem. In this paper, the researcher explains about how to develop assessment instrument for measuring religiosity and other affective domain in teaching and learning mathematics. The first step of development starts by reviewing the theory of religiosity and other affective domain to get aspects or indicators about it. Then, the aspects or indicators that have been gotten can be developed as a kind of assessment technique which appropriate for measuring religiosity and affective domain.

Keywords: developing, religiosity, affective, learning mathematics

INTRODUCTION

Mathematics is a universal knowledge that useful for human life. Mathematics courses should be offered for all students from primary schools, to give learners a leading to be success with the ability to think logically, analytical, systematic, critical, innovative and creative, as well as the ability to work together. Competence is needed so that learners have ability to acquire, manage, and use information for a better life in a state of ever-changing, uncertain, and very competitive. Competence in mathematics learning is not only focused on the cognitive domain, but also on affective domain.

The problem that occurs is assessment difficulty in teacher-oriented of various competences. Based on various sources, the difficulties faced by teachers are an assessment to measure religiosity and other affective domain, such as self-confidence, responsibility, curiosity, honesty, discipline, and so on. This issue does not only occur in implementation of 2013 Curriculum, but also in general case. It is happened because nowadays the teachers only assess based on cognitive domain, without assess by using descriptive. In addition, if the large number of students in a class, it will take a very long time to do a descriptive assessment.

From those problems faced by teachers in assessing descriptively, it requires an effort to help resolve the issue. This paper will explain how to develop an instrument to measure religiosity and other affective domain in mathematics learning.

EXPLANATION

A. Mathematics Achievement

National Council of Teachers of Mathematics (2000) explains that students should learn math through understanding and active building new knowledge from experience and knowledge that has been previously owned in mathematics learning. The main standard in mathematics instruction contained in NCTM (2000) is the ability of problem solving, communication, connection, reasoning, and representation. The fifth of these standards have an important role in the mathematics curriculum.

Standard of content Permendiknas (2006) states that the mathematics courses are expected to make the learners have the following capabilities: 1) understanding mathematics concepts, explaining the relation between them and applying concepts in problem solving; 2) using reasoning skill in the pattern, doing mathematical manipulation, making generalizations, compiling evidence, or explaining ideas and mathematical statements; 3) solving problems including understand the problem, devise a mathematical model, solve the model and interpret the obtained solution; 4) communicating ideas with symbols, tables, diagrams, or other media to clarify the problem situation; and 5) having respect for the usefulness of mathematics in life, which has a curiosity, attention, interest in studying mathematics, and confidence in problem solving.

While the purpose of mathematics learning by Permendikbud (2014) are: 1) understanding mathematics concepts, explaining the relation between them and applying concepts in problem solving; 2) using the pattern as hypothesis in solving problems, and making generalizations based on data; 3) using reasoning to make mathematical manipulation, and analyze components in mathematics problem solving context and beyond mathematics; 4) communicating ideas, reasoning and able to formulate mathematical proof by using complete sentences, symbols, tables, diagrams, or other media to clarify the problem situation; 5) having respect for the usefulness of mathematics in life, which has a curiosity, attention, interest in studying mathematics, and confidence in problem solving; 6) having attitude and behavior in accordance with the values in mathematics and learning, such as obey the principle, consistent, upholding the agreement, tolerance, respect the opinions, polite, democracy, tenacious, resilient, creative, appreciate the universality, cooperation, fair, honest, conscientious, meticulous, etc; 7) performing motor activities that use mathematical knowledge; and 8) Using simple aids and technology to perform mathematical activities.

Based on NCTM, standards of content Curriculum 2006, and Curriculum 2013, it can be concluded that the results of learning mathematics is not only focused on cognitive domain, but also on affective domain. Affective learning outcomes in mathematics may include religiosity, curiosity, and self-confidence.

B. Religiosity and Other Affective Domain

Krathwohl (1964) explains affective domain can describe learning objectives that emphasize a feeling tone, an emotion, or a degree of acceptance or rejection. Affective objectives vary from simple attention to selected phenomena to complex but internally consistent qualities of character and conscience. We found a large number of such objectives in the literature expressed as interests, attitudes, appreciations, values, and emotional sets or biases. Affective learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study.

This domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. The five major categories are listed from the simplest behavior to the most complex (1) Receiving is being aware of or sensitive to the existence of certain ideas, material, or phenomena and being willing to tolerate them. Examples include: to differentiate, to accept, to listen (for), to respond. (2) Responding is committed in some small measure to the ideas, materials, or phenomena involved by actively responding to them. Examples are: to comply with, to follow, to commend, to volunteer, to spend leisure time in, to acclaim. (3) Valuing is willing to be perceived by others as valuing certain ideas, materials, or phenomena. Examples include: to increase measured proficiency in, to relinquish, to subsidize, to support, to debate. (4) Organization is to relate the value to those already held and bring it into a harmonious and internally consistent philosophy. Examples are: to discuss, to theorize, to formulate, to balance, to examine. (5) Characterization by value or value set is to act consistently in accordance with the values he or she has internalized. Examples include: to revise, to require, to be rated high in the value, to avoid, to resist, to manage, to resolve.

Based on the categories of affective domain, affective domain that will be studied in this paper is religiosity, curiosity, and self-confidence.

1. Religiosity

   Religiosity is a condition that comes to a person who encouraged him to behave in accordance with the level of adherence to religion (Jalaluddin, 2012). Religiosity does not only occur when performing ritual, but also other activities coming from internal strength. Not only the activities that can be seen, but also the activities that can't be seen and occur in person's heart (Ancok & Suroso, 2011).

   Religiosity is a unified comprehensive elements, which make a person called religious people (being religious), and not just claim to have faith (having religion). Daradjat (Jalaluddin, 2012) suggested the term religious consciousness and religious experience. Religious consciousness is a religious aspect that was in the mind and can be tested through introspection, or it can be said as the mental aspect of religious activity. While the religious experience is an element in the sense of awareness of their beliefs, which led to the belief that feelings generated by the action.

   According to Glock& Stark (1968), there are five dimensions of religiosity:

   a. Ideological dimension
      The ideological dimension gives recognition to the fact that all religions expect that the religious person should hold certain beliefs which followers are expected to adhere to.
   b. Ritualistic dimension
      The ritualistic dimension involves the worship experience that is involved in community.
   c. Experiential dimension
      The experiential dimension focuses on the personal faith experience, perhaps a transcendent encounter.
   d. Intellectual dimension
      The intellectual dimension has to do with the expectation that the religious person will be informed and knowledgeable about the basic tenets of his faith and sacred scriptures.
   e. Consequential dimension
      The consequential dimension includes religious prescriptions which determine attitudes of the adherents as a consequence of their religious belief.

   According to Poloutzian (1996), the classification of Glock and Stark are split into five dimensions of religiosity representative enough to reveal religiosity. The fifth aspect of religiosity above is the higher one's appreciation and implementation of the fifth aspect, the higher level of religiosity. The religiosity level of someone can be seen by their daily attitudes and behavior with lead to the guidance of religion.

2. Curiosity

Curiosity is the desire to learn something in order to obtain new information or knowledge. Learning is not just knowing, but exploring knowledge to find new knowledge in the learning process. McEllmeel (2002) explains curiosity is a desire to learn, investigate, or know. It is an interest leading to exploration or inquiry. Then, Zuss (2008) explains the critical curiosity I am sponsoring is engaged in making new relations between emergent ideas, perception, concept, and representations.In mathematics learning, curiosity is needed to obtain relations concepts learned and are being studied, thus making a new concept. The curiosity is not only to knowledge, but also for other things. Curiosity on the learning process in the classroom must be controlled so it can focus on knowledge.

Curiosity often described by various terms, but all have the intention or the same meaning. Loewenstein (Elliot, 2000) explains curiosity is a cognitively based emotion that occurs when a student recognizes a discrepancy or conflict between what he or she believes to be true about the world and what turns out actually to be true. Students are believed to feel curious about events that they can neither make sense of nor explain fully. In addition, curiosity occurs when students encounter unexpected, novel, and unpredictable objects. Together with Loewenstein's opinion, Stones (1984) explains in various experiments the satisfaction of curiosity has been found to be reinforcing, so that there does really seem to be justification for viewing the need to explore the environment as real and legitimate reinforce.

Based on the various opinions, it can be concluded that curiosity is a cognitive emotion when someone gets or conflict that gave rise to the desire to learn, investigate, and knowing is broad and deep. In behavior can be demonstrated by the activity or activities to explore, manipulate, or coordinate existing cognitive structure with a new way to understand the broader knowledge and depth. The aspects or indicators of curiosity is the desire to learn, investigate, and coordinate existing cognitive structures (known) with reality.

3. Self-confidence

Self-confidence is very important and needs to be implanted in a person of the learners. Yoder & Proctor (1988) explains self-confidence is the active, effective expression of inner feeling of self-worth, self-esteem and self-understanding. Furthermore, Willis (Gufron & Rini, 2014) explains confidence is the belief that one is able to cope with a problem with the best situation and can give you something nice for someone else. With confidence, when people face the problem can be resolved if it has confidence and can provide something of value to others. While Lauster (Gufron & Rini, 2014) revealed that the confidence gained from the experience of life. Confidence is one of the aspects of personality in the form of a belief in the ability of a person that is not influenced by others and can act according to the will, happy, optimistic, quite tolerant and responsible. Someone who believes in themselves will be able to resolve the problems and gained from the experience of everyday life.

Self-confidence provides the opportunity for a person to develop themselves to achieve something to be desired. This is confirmed by Manning & Curtis (2003) that explains confidence is one's ability gives the leader inner strength to overcome difficult tasks. Then, McElmeel (2002) explains confidence is a faith or belief in one self and one's own abilities to succeed. It is the belief that one will act in a right, proper, or effective manner. Furthermore, Stevenson (2006) revealed self-confidence means knowing what you are good at and what you are not good at. When you try and fail, you find that having survived failure gives you more confidence that you will do better next time.

Based on some opinions about self-confidence, it can be concluded that self-confidence is to believe in them, bold, and not influenced by others in order to overcome or deal with the problems being faced in appropriate conditions. The aspects or indicators of confidence are self-assurance, bold, and not easily influenced by others.

C. Developing Instrument and Assessment

1. Definition of assessment

Anderson (2003) explains assessment is the process of gathering information to make informed decisions. Before anyone engages in assessment, he or she must know why the assessment is being made (the purpose), what information is needed (the timing), and how the information is best collected (the method).

Furthermore, Astin (1993) explains the term assessment can refer two very different activities: (a) the mere gathering of information (measurement) and (b) the utilization of that information for institutional and individual improvement (evaluation). Then, Kellaghan & Greaney (2001) explain the term assessment may be used in education to refer to any procedure or activity that is designed to collect information about the knowledge, attitudes, or skills of a learner or group of learner.

In the context of learning, assessment means gathering information about students that can be used to aid teachers in the decision-making process. In a line, Black & William (1998) explains assessment refers to all those activities undertaken by teachers and by their students in assessing themselves that provide information to be used as feedback to modify teaching and learning activities.

Based on above description, it can be concluded that the learning assessment is a systematic series of activities process of gathering information about aspects inherent with self-learners. The information includes the knowledge, attitudes, skills, potential and limitations of students to serve as the basis for determining the activities that need to be taken further in the learning process.

2. Purposes and kinds of assessment

Assessment of learning as an assessment which can be used to help teachers and learners in setting the stages of learning that should be achieved, and identify the strengths and weaknesses of each. This is appropriate with Jackman's opinion (2011) that basic purpose of assessment are (1) determining the extent to which students have mastered specific knowledge or skill-specific skills, (2) diagnosing weaknesses and advantages possessed by learners, and (3) designing appropriate teaching purposes. Weeden, Winter & Broadfoot (2002) asserts assessment lies at the heart of this process. It can provide a framework in which educational objectives may be set and pupil's progress charted and expressed. It can yield a basic for planning the next steps in response to children's needs. It should be an integral part of the educational process, continually providing both "feedback and feed forward". It therefore needs to be incorporated systematically into teaching strategies and practices at all level.

According to CEA@Islington (2003), the purposes of assessment is providing insight into pupils' learning for both pupils and teachers, promoting success for all, supporting the target process, enable continuous reflection on what pupils know now and what they need to know next (feedback and feed forward), measuring what is valued, promoting immediate intervention and linking judgments to learning intentions, and raise standards by taking pupils to the edges of capability.

Based on the above opinion, it can be stated that the purpose of assessment learning is monitoring the progress of learners, diagnosing the needs of learners, and planning instruction. Then, the purpose of the development assessment in mathematics learning is monitoring the progress of learners or seeing the achievement of learner's competence.

Although a single assessment may be used for many purposes, it may not be equally effective for them all. Same with the above statement, Stecher (1997) explains that it is the kind of assessment should be adapted to the specific of each of the purpose or competencies to be assessed.

The kinds of assessment can be divided according to the time of execution According to the time of execution; assessment consists of formative and summative assessment (Weeden, Winter & Broadfood, 2002). Formative assessment is assessment which is part of the process of teaching and learning (assessment for learning), so that

the collected information related to the learning process. The application of this assessment can use the observation, interviews, portfolios, and self-assessment. Then, summative assessment is the process of summing up or checking what has been learned at the end of a particular stage of learning (assessment of learning). It oriented to assess using the test and non-test instruments.

3. Data collection technique

By looking at the aspects or indicators of religiosity and other affective domain, data collection techniques for religiosity and other affective domain is by observation and self-assessment.

Ebel & Frisbie (1991) explain observation is a fundamental medium for obtaining information that cannot be acquired in any other ways. Observation schedules and check lists are useful devices for directing our attention to certain behavior to observe. It can be concluded that the observation is how that is done to obtain information about how a person behaves. Furthermore, Ebel & Frisbie (1991) explain that the tool can be used to make observations is observation schedules, checklists, and rating scales. Planned observation calls for the use of a schedule, chart, or record form to direct the observer's attention and to facilitate the creation of a permanent record of what was seen. A checklist is a set of phrases or statements that describe either the essential steps in a procedure or the most important elements of a product. Then, rating scale is a method of recording how frequently a certain behavior occur or how high in quality a characteristic seems to be.

According to Wiggins (1999) self-assessment is an intrinsic part (importance) of the various programs that aim to help people to be more responsible for their own work. It means that the self-assessment is an assessment technique that involves a person to take responsibility for themselves to assess the process and the results of their work experience. Reys (1998) explains that the students are good appraiser (the best assessor) to feelings their own work. When students assess their own work, it is the responsibility of their own learning. Therefore, teachers can begin the process of self-assessment by allowing student to validate their own ideas or answers the results of their work. Weeden, Winter & Broadfood (2002) define self-assessment as a review process that involves the learner in reflecting on past experience, seeking to remember and understand what took place, and attempting to gain a clearer idea of what has been learned or achieved. Then, AAIA (2001) explainsself-assessment as all activities conducted within and outside the classroom that allows students to reflect on what has been taught and compare it with a set of criteria. Furthermore, Dikel (2006) explains self-assessment as a process that causes a person to learn better about themselves, such as what you liked, what you did not like, and how the tendency to react to certain situations.

According to Oppenheim (1966), the scale that can be used to get data with observation is a checklist, ratings, and inventories. Checklist contains terms which the respondent understands and which more briefly and succinctly express his views than answers to open-ended question. Rating gives a numerical value to some kind of judgment. Then inventory is essentially a list that the respondent is asked to mark or check in a particular ways. While the technique can be used to get data with a self-assessment is questionnaire. The scale used is the Thurstone, Likert, and Guttman scale.

4. Developing instrument to measure religiosity and other affective domain

The following are the step can be done to develop instruments religiosity and other affective domain.

a. Constructing theory (reviewing theory)

According to Kerlinger (2003), a theory is a set of assumptions, concepts, construct, definitions and propositions to explain social phenomena systematically by way of formulating the relationship between variables. The theory not only show that the round part presented holistically, but also not just a presentation of the concept of disaggregated and fragmented, so the concept will be interesting to study.

b. Determining indicators / aspects

Indicators are variables that indicate or show a tendency situation that can be used to measure the change. Proposed changes refer to the achievement of competencies to be measured.

c. Determining the data collection techniques
After determining the indicators, the next step is to determine data collection techniques. Data collection techniques that do should be simple, practical, and economical.

d. Developing statement (item)
The final step in developing instrument is arranging a statement item. Statement should use a sentence that is easily understood and not cause a double meaning. Here are some examples of items developed statements.
Example of religiosity statement is I pray before and after study, I appreciate friends who are studying their religion, and I make good relationship with all friends in the class. Example of curiosity statement is I try to understand the learning topic taught by teachers, I do my homework assigned by the teacher by reading textbooks, and I relate the learning topic presented by teachers with my previous concept. Example of confidence statement is I feel can do my homework without the other's help, I dare to express my opinions in discussion, and I appreciate my friends' opinion in discussion though disagree with me.

CONCLUSION AND SUGGGESTION

Instruments for measuring religiosity and affective domain can be developed by studying various theories about religiosity and affective. The aim of examining theories is to get aspects or indicators that followed by determining suitable data collection techniques. The suitable data collection techniques are the observation and self-assessment.

In this founding, from developing this instrument can help teachers conduct assessments in mathematics learning, particularly in assessing religiosity and other affective domains. However, there are some things need to be considered in preparing and developing instruments to measure religiosity and affective domains, namely (1) accuracy in the preparation of the construct theory in order to obtain aspects or indicators to be measured, (2) pay attention to the rules or preparation techniques item statements, and (3) the selection of suitable data collection techniques, which fulfill the criteria of simple, practical, and economical.

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