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Research Article

Data Collection Methods on Learning Outcome, Student Achievement, and Academic Achievement

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Abstract

Learning outcome, student achievement, and academic achievement are some of the variables that get a lot of attention in educational research. Nevertheless, from several national studies collected there are inconsistencies in particular with regard to English terminology as well as inconsistencies in methods and instruments of data collection. Therefore, this study aims to explain the different methods of data collection research on learning outcome, achievement learning, and academic achievement. This study is a study desk study using literature review to explain the different methods of data collection on learning outcome, student achievement, and academic achievement. Based on the results of research can be concluded that the method of data collection of learning outcome, can be done through three ways, namely, perception survey, interview, and forum group discussion (FGD). While the instruments that can be used to collect data learning results are questionnaires, interview guides and minutes. Methods of collecting research data about student achievement can be done in two ways namely, (1) test and (2) non-test. Data collection methods of academic achievement can be done through documentation.

Keywords: data; learning outcome; student achievement; academic achievement

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Introduction

Learning outcome, student achievement, and academic achievement are some variables that are often the object of study in research. Especially research on education, these variables serve as a benchmark change in behavior. Nevertheless, there is no similar perception of the researchers especially in Indonesia for understanding the terminology, dimensions and collecting data methods on learning outcome (Arjanggi & Suprihatin, 2010; Purwatiningsi, 2013; Rahayu, Susanto, & Yulianti, 2011; Setiawan, 2008; Situmorang, 2013), student achievements (Deta, 2013, & Widha, 2013; Elis Mediawati, 2011; Hamdu & Agustina, 2011; Siagian, 2012; Syarif, 2012) and academic achievement (Rais, 2010; Warsito, 2009) on their research. The difference is evident from the translated terminology in English as well as the dimensions measured.

There are 3 interesting things that can be concluded and analyzed from the various research results in table 1. First, all researchers use the same instrument that is a matter of tests in taking data both learning outcome, student achievement, and academic achievement. Second, in its research methodology, there is only one research result (Purwatiningsi, 2013) which involves the learning objectives. Third, the data derived from test instruments in the form of values is used to measure all dimensions of both cognitive, affective and psychomotor. The first study on the variables of learning outcome was the application of contextual-based teaching problems to improve the biology learning outcome of grade X (ten) 2 high school (SMA) students of Singaraja laboratory (Setiawan, 2008). In

terminology, the results of learning in this study translated into English into mastery learning. Dimensions of learning outcome in this study include three things, namely (1) cognitive performance, (2) effective and (3) psychomotor. Objects in this study were teachers who participated in contextual teaching exercises consisting of (1) planning, (2) implementation, and (3) evaluation. The retrieval of data sourced from the teacher is done by observing the conformity of contextual teaching standard. Measurement of student learning outcome of cognitive aspects using test questions on (1) mastery of concepts, and (2) problem-solving performance. Measurement of effective and psychomotor aspects through an observation sheet of attitudes toward biology lessons and biology eaching, as well as skills in conducting laboratory activities. However, this study does not explain the learning objectives as well as the specific content of the biological subjects that are framed.

Table 1
Research on learning outcome, student achievement, and academic achievement.

Variable	Researchers	Years	Terminology in English	Inconsistency Measuring dimension	Instrument Used
Learning outcome	I Gusti Agung Nyoman Setiawan.	2008	Mastery learning	Cognitive, affective and psychomotor performance.	Test question and observation
	E. Rahayu, H. Susanto, D. Yulianti	2011	Student achievement	Cognitive, affective and psychomotor change.	Test question and observation
	Sri Purwatiningsi.	2013	Learning Outcome	Learning objectives achievement	Test question and observation
	Manihar Situmorang.	2013	-	Ability to answer questions	Test question
	Ruseno Arjanggi dan Titin Suprihatin	2010	Self-Regulated	Self-regulated	Test question and questionnaire
Student achievement	Ghullam Hamdu& Lisa Agustina.	2011	Student science performance	Self-regulation in receiving and rejecting information.	Instrument documentation.
	Elis Mediawati	2011	Student achievement	Cognitive, affective and psychomotor change	Pre-test and post-test question
	U.A. Deta, Suparmi, S. WidhaSuparmi, & S. Widha.	2013	Student achievement	Cognitive, affective and psychomotor performance.	Test question
	Izuddin Syarif.	2012	Student achievement	Mastery content.	Pre-test and post-test question
	Roida Eva Flora Siagian.	2015	Academic achievement	Problem-solving through the deductive approach to learning.	Test question.
Academic achievement	Hadi Warsito	2009	Achievement of academic	Grade-point average (GPA)	Observation document
	Muh. Rais	2010	Academic achievement	Cognitive, affective and psychomotor performance	Pre test and post test question.

The second study on learning outcome view science learning with process skill approach to improve learning outcome and creative thinking ability of students (Rahayu et al., 2011). In terminology, the results of learning in this study translated into English into student achievement. Dimensions of learning outcome in this study include three things, namely, (1) changes in cognitive aspects, (2) affective and (3) psychomotor. This research is a classroom action research conducted in three cycles. The data were collected through two ways: (1) test to measure the cognitive ability and creative thinking of the students, (2) non-test in the form of LKS to know the student process skill and observation sheet to assess affective, psychomotor students during the learning implementation and to assess thinking ability creative students. In this second study, the learning objectives and the specific content of subjects were also not explained.

The third study on learning outcome views the application of guided discovery methods to improve student learning outcome in surface area and beam volume (Purwatiningsi, 2013). In terminology, learning outcome in this study is translated into English into learning the outcome. Learning outcome in this study is measured through the achievement of learning objectives. The study is also a classroom action research consisting of five stages: (1) student orientation on the problem, (2) organizing students in learning, (3) guiding individual and group investigations, (4) presenting/presenting work results, and (5) evaluate the success of student learning. Learning result data obtained through written test, observation, interview and field notes. In contrast to previous

research, in this study, the purpose of learning is explained as follows. In cycle I students are expected to find the surface beam surface formula and the students can determine the surface area of the beam. In cycle II students are expected to find the beam volume formula and students can determine the volume of the beam.

The fourth study on learning outcome views the development of high school chemistry textbooks through instructional innovation and character education integration to improve student learning outcome (Situmorang, 2013). In this fourth study, the learning outcome is not translated into English so there is no term terminology. Dimensions of learning results in this study are measured through the ability to answer questions. The research consists of five stages: (1) development of chemical materials, (2) chemical material innovation, (3) character education integration, (4) evaluation of book content standard, (5) book use. In the last stage, the learning result data is taken through pre-test and post-test. While the questionnaire used to collect data on the quality of textbooks. In this fourth study, the learning objectives, as well as the specific content of the chemistry lesson, were not explained. The fifth study on learning outcome view method of peer tutor learning improves learning outcome based on self-regulation. This study equates the results of learning by self-regulation including terminology in English. Self-regulation is measured through 3 dimensions: (1) self-confidence control, (2) learning management strategy, (3) resource efficacy. Specifically, this study describes the content learned by students but not explained the purpose of learning. Data collection is done through test questions operated in pre-test and post-test and questionnaire.

Based on the five research above, it can be concluded that there is the inconsistency in learning result concept which becomes a study. The inconsistency can be analyzed from four things, namely, (1) the difference of the English term used to translate the learning result, (2) the lack of clarity of the learning objectives becoming the learning result object, (3) the dimension of the learning result variable, and (4) methods of obtaining data. The difference of the English term used to translate the learning result is clearly seen where one researcher called the result of learning as mastery learning (Setiawan, 2008), other researchers call it student achievement (Rahayu et al., 2011), there is also a mention of learning outcome (Purwatiningsi, 2013), and others equate it with self-regulated (Arjanggi & Suprihatin, 2010). The five studies above are basically classroom action research, but there are interesting things that need to be discussed in terms of learning objectives because of the five studies, only one study explains the learning objectives. Though research that did a study to result from learning (learning outcome) (Sideeg, 2016). References used by the researcher above are mostly English references, however, there are interesting things that need to be discussed because the dimensions used to measure one term there are still significant differences. In addition, the method used to obtain data is also inconsistent because some researchers use the test questions and observation sheets, while other researchers used the questionnaire.

The first research on the variable of student achievement views the influence of students' learning motivation on the natural science student achievement (IPA) in elementary school (a case study of fourth-grade students of Tarumanagara sub-district Tawang city of Tasikmalaya) (Hamdu & Agustina, 2011). In terminology, science student achievement in this research is translated into English into student science performance. In this study, student achievement is the level of humanity that students have in accepting, rejecting and assessing the information obtained in the learning process. This study also considers that one's student achievement in accordance with the success rate of something in learning the subject matter expressed in the form of grades or report cards of each field of study after experiencing the process of teaching and learning. Student achievement can be known after evaluation. The results of the evaluation can show the high or low student achievement. Therefore it can be concluded that the method of data collection is done through documentation. The second study on the variable of student achievement views the learning of financial accounting through comic media to improve student achievement (Elis Mediawati, 2011). In terminology, student achievement in this research is translated into English into student achievement. In this study, student achievement is a change of knowledge, attitude, and skill. The method used in this research is the preliminary test design method-the final test of the random sample control group.

Therefore it can be concluded that the instrument used to collect data is a matter of test. However, the learning objectives in this study were not specifically explained.

The third study on student achievement variable view the influence of guided inquiry method and project, creativity, and science process skill to student achievement (Deta et al., 2013). In terminology, student achievement in this research is translated into English into student achievement. In this study, there are two dimensions that are used as a reference to measure student achievement, namely (1) cognitive, affective and psychomotor achievement in (2) skill of scientific method, creativity, and science process. The instrument used to collect data is a matter of test. Nevertheless, the learning objectives in this study were not specifically described. The fourth study on the variable of student achievement views the influence of blended learning model on motivation and student achievement of vocational high school students (Syarif, 2012). In terminology, student achievement in this research is translated into English into student achievement. In this study, student achievement of student achievement is defined as a business or activity of children to master the lesson material given by teachers at school. The data on student achievement is obtained from pretest and posttest through test instrument. This study also does not specifically explain the purpose of learning.

The fifth study on the variable of student achievement views the influence of students' interest and study habits on mathematics student achievement (Siagian, 2012). In terminology, student achievement in this research is translated into English as academic achievement. The student achievement of the study in this study gives emphasis on the dimension of cognitive aspect (knowledge). Therefore, the instrument used to collect data is a matter of test. Based on the above five research can be concluded that there is an inconsistency concept of student achievement that becomes study. The inconsistency can be analyzed from three things, namely (1) the difference of the English term used to translate the student achievement, (2) the dimension of student achievement variable, and (3) the method of obtaining the data. The difference of the English term used to translate the learning result is clearly seen where one researcher called the result of learning as student science performance (Hamdu & Agustina, 2011), other researchers call it student achievement (Deta et al., 2013; Elis Mediawati, 2011), there is also a mention of student achievement (Sharif, 2012), and there are also like with academic achievement (Siagian, 2012). References used by the researcher above are mostly English references, however, there are interesting things that need to be discussed because the dimensions used to measure one term there are still significant differences. Some researchers also use this type of classroom action research. In addition, the method used to obtain data is also inconsistent because some researchers use the test questions while other researchers use the documentation sheet.

The first study on the variables of academic achievement is the relationship between self-efficacy with academic adjustment and academic achievement (Warsito, 2009). In terminology, academic achievement in this research translated into English into an achievement of academic. Data of academic achievement is obtained from the index of achievement cumulative (GPA). Methods of data collection using documentation. The second study on the variable of academic achievement is a model of project-based-learning as an effort to increase student academic achievement (Rais, 2010). In terminology, academic achievement in this research is translated into English as academic achievement. Instruments used to collect academic achievement data is a matter of pretest and posttest.

Based on the above two research can be concluded that there is an inconsistency concept of academic achievement which becomes study. The inconsistency can be analyzed from three things, namely (1) the difference of the English term used to translate the academic achievement, (2) the dimension of the academic achievement variable, and (3) the method of obtaining the data. The difference of the English term used to translate the learning result is clearly seen in which one researcher mentions the achievement of academic (Warsito, 2009), and other researchers call it academic achievement (Rais, 2010). The interesting thing to discuss is that the dimensions used to measure academic achievement are different. This difference leads to differences in data retrieval where one of the researchers retrieves data through documentation, while other researchers use the test instrument. Based on the above description can be analyzed that there is no consistency of

understanding of methods of data collection of learning the outcome, student achievement in learning and academic achievement. Therefore, this study aims to explain the different methods of data collection research on learning outcome, achievement learning, and academic achievement. Understanding the method of data collection is expected to contribute to research on learning outcome, achievement, and academic achievement.

Method

Participants

This study is a study desk study using literature review to explain the different methods of data collection on learning outcome, student achievement, and academic achievement. This research is motivated by the alleged inconsistency in understanding the concept of learning outcome, student achievement, and academic achievement.

Procedure and Instrument

The research steps were conducted through three stages: (1) collecting the results of domestic research on learning outcome, student achievement and academic achievement, (2) analyzing the terminology, dimensions and data collection methods, and (3) collecting international research results to explain the definition of learning outcome, student achievements and achievements academic and data collection methods.

Result and Discussion

Collecting data

Data can be interpreted as something that has no meaning for the recipient and still requires the existence of a processing. The data can have a state, image, sound, letters, numbers, math, language or other symbols that we can use as a material to see the environment, objects, events or a concept (Sugiyono, 2014). Data is identical with methods, instruments, and data collection techniques. Data collection methods are techniques or methods used to collect data. The method designates a method so that it can be demonstrated its use through (1) the questionnaire, (2) the interview, (3) the observation, (4) the test, (5) the documentation and so on. The data collection instrument is a tool used to collect data. Because it is a tool, according to Arikunto the instrument can be (1) checklist, (2) questionnaire (open/closed questionnaire), (3) interview guide, (4) camera photo and others. The three data collection techniques commonly used are (1) questionnaire, (2) observation and (3) interview (Arikunto, 2010).

Student achievement

Definition of the concept of student achievement is not much disclosed because the term is a general term used in research. However, there are general indicators that can be used to identify it. Performance indicators generally refer to student performance in academics such as reading, art, or math (Okpala, Okpala, & Smith, 2001), science and history measured by achievement tests (Cunningham, 2012). Student achievement is a measurable learning outcome (Klein, Hamilton, McCaffrey, Stecher, Robyn, & Burroughs, 2000). Student achievement leads to specific abilities expressed in learning objectives such as reading and counting (Darling-Hammond, 2000). In other words, students are considered achievers if they can achieve specific learning objectives through certain criteria. For example, students have achievement count at the first level if can operationalize multiplication numbers 1 to 10 with number 2. Or students are considered to have achievement count at second level if able to concrete number 1 to 10 with number 3. To be able to observe, of course, needed a certain instrument. Therefore, the researchers agreed on two methods that can be used to obtain the data that is a test and non-test.

Learning outcome

Some researchers interpret learning outcome as statements about what students expect to know, understand and or can be done at the end of learning (Donnelly & Fitzmaurice, 2005; Ulfvarson & Oxelmark, 2012). The statement implies that learning outcome is not about what the teacher can give, but rather what students can show at the end of the module or learning. The conclusion is that learning outcome is more directed to what the students want (Spronken-Smith, Walker, Batchelor, Steen, & Angelo, 2012). If the desire is met, then the increased chance of learning motivation will be greater so that will increase the achievement of learning objectives. Therefore, learning outcome should be written with respect to descriptor-level calculations relevant to the level of learning, and in accordance with standard content in government standard regulations.

Other researchers say that learning outcome is a statement about what is expected to be known, understood and or mastered by students to be demonstrated or demonstrated after completing the learning process (Declan, 2012). Therefore the learning outcome emphasize two things: (1) focus on what the student will achieve, so that the learning outcome does not just focus on the content of the subject matter being taught, and (2) the learning outcome focus on the performance, the response or the ability shown or demonstrated by students after learning activities (Nahar & Safar, 2016). The ability (ability) by Bloom is defined as a combination of knowledge and skill or can be written in the form of equation as knowledge + skill = ability (Bloom, Englehard, Furst, Hill, & Krathwohl, 1956). Some other researchers also agree that learning outcome is statements that describe the abilities, knowledge, and skills that students hope to develop (Hughes, 2013, P.Driscoll, 2000; Spronken-smith et al., 2012). In more detail, these abilities can be categorized into five forms: (1) procedural intellectual skills (declarative knowledge), (2) knowledge (verbal information), (3) cognitive strategies (executive control processes), (4) motor skills, and (5) attitude (Gagne, 1984).

Various definitions of learning outcome conclude that learning outcome is statements written or delivered in the form of learning objectives (Faulkner, 2016). Therefore, there is a general structure in writing that is agreed upon by researchers (Nahar & Safar, 2016). For example, there is a statement "After completing the learning, students are expected to explain situations that require choices when students are confronted with a scarcity of certain goods" (Council for Economic Education, 2010). The first example is research on Inquiry-based learning (IBL) which is considered capable of being used as a teaching approach that can improve student learning outcome (Hughes, 2013). Surveys are conducted on students on certain subjects in various disciplines and grade levels. All kinds of lessons applying for IBL are rated well by students as they encourage the learning process and learning outcome that students desire in line with well-designed inquiry experiences. Survey instruments are used to evaluate students' perceptions of the extent to which they utilize the learning process and the realization of the conformity of learning outcome with the inquiry course philosophy. The nature of the survey questions comes from a literature review of the desired process and learning outcome through an inquiry approach. The survey has four sections. The first part uses Bloom's taxonomy and asks students to assess the extent to which the course encourages them to engage in activities such as memorization, explaining, analyzing, applying, evaluating/assessing, creating, reflecting, and others. Thus, this first part aims to enable students to think about the type of learning expected. The third section asks for open comments about three or four aspects that are considered important. The last part is collecting data.

The second example is research on the development of criterion-based reference tools assessing knowledge of nursing and competence in clinical practice (Ulfvarson & Oxelmark, 2012). This study aims to see the contribution of assessment tools that have been developed in measuring the desired learning outcome. Furthermore, if the goal is achieved it is necessary to ensure that the skills of the nurse are safe and professional. Data collection method used in this research is a focus group discussion (FGD) and interview. The FGD was followed by lecturers, practitioners, and students. The FGD discusses the advantages and disadvantages of current learning outcome. Further data collection using an interview method with students. This method is used to experience the knowledge, attitude, and skills that students want to learn. From the description can be concluded that the method that can be used to collect data of learning result is survey and FGD. While the

instruments used to collect data learning results are questionnaires, minutes and interview guides. Based on some research can be described as the process of collecting data of learning result as follows (Figure 1).

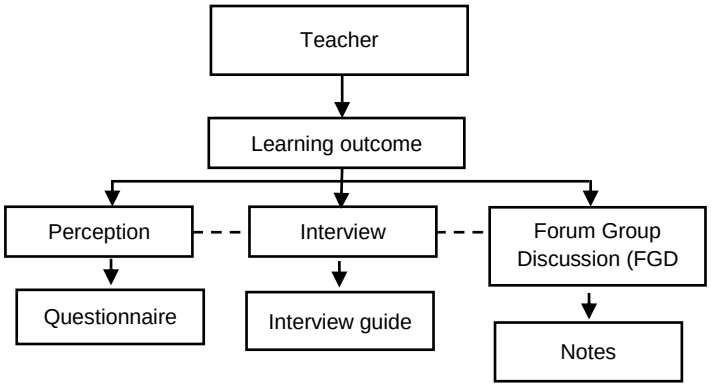

Figure 1. Data collection process on Learning outcome

Figure 1 shows that the learning outcome is statements that teachers, teachers or governments can make. In order for the purpose of learning to meet the desires of students, it is necessary to collect data both derived from the perception and the results of student interviews and opinions from various circles through FGD. Research on student achievement should directly lead to the ability to speak be the object of study. For example, efforts to improve the ability to operationalize the multiplication of integers 1 to 10 with number 2. Some researchers identify there are at least two methods that can be used to collect data on student achievement in learning that is, (1) the average score of students on performance in learning outcome and (2) the percentage that students can achieve at each school at different levels (Okpala et al., 2001). Based on the illustration it can be concluded that the method used to collect data on student achievement is documentation.

Academic achievement is a quantitative data generated by students from the assessment process of learning outcome in a learning (Slavin, 2005). In Indonesia, the academic achievement scores are generally recorded in the report cards or study cards distributed each semester by the school for all classes (Castelli, Hillman, Buck, & Erwin, 2007; Okpala et al., 2001). A report card is a learning result card that contains quantitative data throughout the course of learning from the beginning to the end of the school year. Therefore, research on academic achievement is closely related to student achievement in learning because academic achievement is a combination of more than one student achievement. This data is collected to then be analyzed so as to produce certain conclusions. Academic achievement does not necessarily take the form of quantitative data or numbers. Some of the schools that used the study sites used to grade or predicate to report on student achievement (Fuligni, 1997). Nevertheless, the measurement can still be done using the coding method. For example school X uses predicate A to E to report student achievement where A reflects excellent academic achievement, good B, C is good enough, D is not good and E fails. Through the coding system, the researcher can use the nominal or ordinal scale to mark or grade the grade.

Data derived from official school reports (report cards). while the report is general or covers all subjects. Therefore, there are at least 2 things that need to be considered in this study that is, (1) subjects, and (2) level/class. Using this foundation, researchers generally cite specific academic achievements such as mathematics achievement of grade 1 primary school (Fuligni, 1997). Some researchers collect student academic achievement data from the recent average grade in the third grade of junior high school. This data is also used to predict final academic achievement (Caprara, Barbaranelli, Steca, & Malone, 2006). The final academic achievement here is the score that students get during the final exam at the senior high school level. To assess student achievement, use the final exam score at the end of the third year of junior high school. Therefore, the data on academic achievement in Indonesia can be obtained from national final exam scores.

Research on academic achievement generally involves the influence of internal factors (motivation) and external factors (family socioeconomic conditions). Data collection method of academic achievement can be illustrated through the title of research "the influence of socio-economic status of a family on academic achievement". Levine & Levine presents five levels in the socioeconomic structure of (1) upper or upper level, (2) upper middle or upper middle, (3) lower-middle or lower middle, (4) upper working upper, lower working lower-level workers (Slavin, 2005). From the title, there are at least 4 things that need to be explained specifically namely, (1) the location of research, (2) subjects, and (3) levels and units of education. For example, the study was conducted at a senior high school (SMA) level in Y district. The number of senior high schools in the district is 125 schools. The researchers also determined that the scores taken were the value of the final examination results of grade X, XI and XII in the subjects of mathematics.

Conclusion

The learning outcome is a statement about what the student expects to know, understand and or can be done at the end of the lesson. Therefore, research on learning outcome leads to the conformity of statements regarding the knowledge, attitudes, and skills that teachers expect as the learning objectives and desires of the students. Methods of data collection research on learning outcomes can be done in three ways, namely, perceptual surveys, interviews, and FGD. While the instruments that can be used to collect data learning results are questionnaires, interview guides and minutes. Student achievement is the result of learning that can be measured through achievement indicators generally refers to student performance in the academic field. There are two different terms that must be understood by researchers relating to research on achievement that is, (1) student achievement (student achievement) and (2) students achievement (student achievement). These differences have an impact on the determination of the population where the student's student achievement does not pay attention to the characteristics of the students so that leads to the comparative hypothesis while the student achievement pays attention to the characteristics of students so that leads to the associative hypothesis. Methods of collecting research data about student achievement can be done in two ways namely, (1) test and (2) non-test. Academic achievement is a quantitative data generated by students from the assessment process (assessment) of learning outcome in a learning that generally forms a report. In Indonesia, the report is generally called the report card or study card. Methods of collecting research data on academic achievement can be done through documentation.

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