



**IMPLEMENTATION THE PEDAGOGICAL CONTENT
KNOWLEDGE (PCK) OF PHYSIC TEACHER BASED-ON
STUDENTS LEARNING OUTCOMES
AT SMAN 4 BANDA ACEH**

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Abstract

One of the factors of low student learning outcomes on physic learning coursed lack of ability teachers in effecting the pedagogic practice and knowing subject matter in the learning environment. Pedagogical content knowledge (PCK) is the blending of pedagogical knowledge and content knowledge which must have by teachers in realizing learning objectives. This research aims to showed the implementation pedagogical content knowledge (PCK) of physic teacher based on students learning outcomes on measurement and magnitude material at class of X IA₄ SMAN 4 Banda Aceh. Outcomes of this research are: the average value of students learning outcomes is 80 with description the PCK of physic teacher are 95% teacher have understood students of characteristics in learning process, 67% teacher success in planning of learning, 70% teacher success in implementing learning activities, 67% teacher success in evaluating learning outcomes, 75% teacher has been able developing the potentials of the students, and 75% teacher has mastered the science of substances.

Keywords: *Pedagogical content knowledge, Physic Teacher, Students Learning Outcomes*

A. Introduction

Physic is one of branch of science which becomes based-on advanced technologies development. Physic considered as difficult lesson because there are many and complex formulas here. This is in line with Hadayanto research at some of SMP and SMA in Bandung as quoted by Sarwi (2014), over half (56%) of students less enjoys physic learning, and then Depdiknas said that direction of physic learning are tend recitation, verbal and unrelated with students life. Low interest and student's knowledge on physic learning may be caused lack of ability teachers in effecting pedagogic practice and knowing subject matter in learning environment.

Cannot be denied that the role of teacher in physic learning process cannot be replaced by any media role. Because "Teacher are on the front row who relate directly with students" (Kunandar, 2010: v). For students, teacher is the most important factor in learning because the teacher determine what is taught and how is taught on class. As professionals, teacher should have four competencies; there are pedagogic competence, personality competence, social competence, and professional competence. This is mentioned in Government Regulation 19 of Number and 2005 of Year about National Education Standard.

But in reality learning of practice not all teachers master those competences. Based-on Survey United Nations Educational, Scientific, and Cultural Organization (UNESCO) about education quality in developing countries Asia Pacific, Indonesia ranks 10 out of 14 countries and teachers' quality at the level of 14 of the 14 developing countries (Gumilar 2013). Of course the teacher quality of low will affect on students learning outcomes.

In 1986, Shulman introduced a competence that should own by science teacher so that helping student in achieving learning objectives. The competence called the pedagogical content knowledge (PCK). "PCK is the ways of representing and formulating the subject that make it comprehensible to others" Shulman (1995) in Turnuklu (2007). Next, Cochran, et al.(1993) formulate the Pedagogical content Knowledge/PCK as: "Concern the manner in which teachers relate their subject matter knowledge (what they know about what they teach) to their pedagogical knowledge (what they know about teaching) and how subject matter knowledge is a part of the process of pedagogical reasoning".

Physic teacher at SMAN 4 Banda Aceh have different competences of PCK. Most of implement learning looks more mechanical and less pedagogic aspects so that students tend to be pessimistic and less has his own world. This is of course impact on student learning outcomes. If student lack of spirit in following the lesson, then aims of education will not be achieved. So, this research aims to show how the implementation pedagogical content knowledge (PCK) of physic teacher based-on student learning outcomes at SMAN 4 Banda Aceh.

B. Method

1. Learning Outcomes

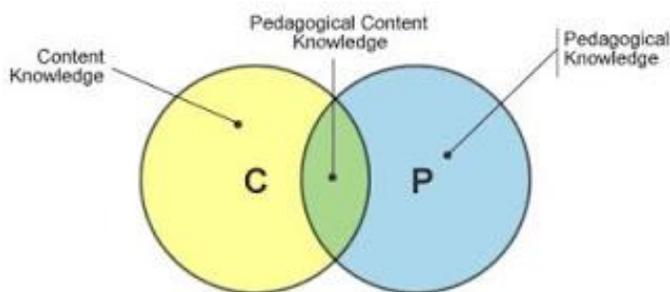
Learning is a process was doing by someone to get the new behavior changes overall. According to Sudjana (2005:22), "Learning outcomes is abilities that are owned by student after they get learning experience". Learning outcomes could be interpreted as the student results obtained after they were learning shown with change in behavior in terms cognitive, affective, and psychomotor.

2. Pedagogical Content Knowledge (PCK)

Science learning never be separated from content knowledge and pedagogical knowledge. Siregar (2003) said "Science learning is a phenomenon of science in pedagogic environment". When a science of teacher teaching, so that he represented amalgams of content knowledge and pedagogical, and Shulman (1986) called that as pedagogical content knowledge (PCK). Lee Shulman is the first person spark PCK of idea in 1896 which emphasizes learning materials in teaching research, especially about science. According to Shulman in James C. Kaufman (2015: 414), pedagogical content knowledge is "The blending of content and pedagogical into an understanding of how particular topics, problems, or issues are organized, represent, and adapted to the diverse interest and abilities of learners, and presented for instruction". And Shuell dan Shulman (Eggen dan Kauchak, 2007) interpreted that "PCK is the ways of representing and formulating the subject that make it comprehensible to others'... 'an understanding of what makes the learning of specific topics easy or difficult; the conceptions and preconceptions that

students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons'. One of the factors that enable effective teachers is their rich pedagogical content knowledge (PCK) (Loughran, Berry & Mulhall, 2006), a special blend of content knowledge and pedagogical knowledge that is built up over time and experience.

PCK consists of several components interconnected. Below there is a diagram components of PCK:



Picture 1. Component of Pedagogical Content Knowledge

From the diagram above looks that pedagogical content knowledge is sliced of content knowledge (CK) and pedagogical knowledge (PK). "Content is the best subject matter that is to be learned" (Koehler in Jimoyiannis (2010: 599)). Based-on Journal of Research on Technology in Education (2009: 397) explain "Content cover knowledge attitude, theory, idea, framework of thinking, method of verification, and evidence. Pedagogical knowledge is the ways and teaching process which cover knowledge about classroom management, evaluation, plan of learning, and learning activities.

Besides that, according to Anwar (2010), PCK described in seven components, there are:

- a. Knowledge about students
- b. Knowledge about curriculum standard
- c. Mastery about learning actives
- d. Knowledge about evaluation
- e. Knowledge about teaching resources
- f. Knowledge about subject matter
- g. Knowledge about learning objectives

C. Research Finding

This is including in to descriptive research, because here we described teacher competence based-on PCK components in learning on magnitude and measurement material. Samples in this research are student's class of X IA₄ at SMAN 4 Banda Aceh. Data collections have been done by multiple choice tests to see students learning outcomes and observation of pedagogical content knowledge (PCK) of physic teacher by using observation sheets on learning process. The observation sheets compiled by researcher with reference to the experts and then spelled out in the statements by using liker scale. Every statements given scores very good = 4, good = 3, medium = 2, bad = 1.

D. Discussion

Based-on results of research obtained data of students learning outcomes about magnitude and measurement material like on the table 1 and data abilities of PCK physic teacher like on the table 2 below:

Table 1. Data of Students Learning Outcomes, X IA₄ SMAN 4 Banda Aceh.

No.	Learning Outcome of Value
(1)	(2)
1	85
2	75
3	89
4	80
5	75
6	80
7	90
8	80
9	85
10	75
11	95
12	80
13	85
14	80
15	85
16	75
17	80

18	95
(1)	(2)
19	70
20	85
21	85
22	85
23	70
24	65
25	95
26	75
27	75
28	85
29	80
<i>Avarage Value</i>	80

Source: Data Processing, 2015

Below is the pedagogical content knowledge ability of physic teacher on learning process about magnitude and measurement material:

Table 2 Distribution of PCK Value of Physic Teacher, X IA₄ SMAN 4 Banda Aceh

Competence	Sub Competence Observed	Indicators	Observation of Value	Percentage of Value
(1)	(2)	(3)	(4)	(5)
Pedagogic Competence	1. Mastery students characteristics	a. Understanding of students characteristics b. Identification students' characteristics in arms cognitive, affective and psychomotor.	19	95 %
	2. Plan Learning	a. Plan learning and compiling of RPP b. Determine of KI, KD and indicators c. Describe learning objectives d. Choose of	16	67 %

Professional Competence		material e. Determine of method f. Allocate of time		
	3. Implement learning activities	a. Dialogic b. Interesting c. Up-to-date d. Active	14	70 %
	4. Evaluation	a. Set evaluation technical b. Choose evaluation aspect	8	67 %
	5. Developing potentials of students	a. In learning b. Talent and interest	9	75 %
	6. Mastering of scientific substances	a. Mastering of subject matter b. Mastering of up-to-date subject matter c. Understanding basic concepts of science	24	75%

Source: Data Processing, 2015

There are descriptions of pedagogical content knowledge of physic teacher at SMAN 4 Banda Aceh about magnitude and measurement material based-on the seven components of pedagogic competence and professional competence.

1. Pedagogic Competence

a. Comprehension about student's characteristics

Comprehension about student's characteristics including cognitive, affective, and psychomotor. Based-on results observation, teacher yet fully understand about learning characteristic every student nevertheless teachers have sought doing individual approach to students, it is by way of teacher coming to students and explain the matter that has not been understood by the students. The teacher's ways can help students who did not dare to ask about the matter that have not understood. Besides that, teacher know more about how to

learn every students so that it is make it easier for teachers in choosing learning method appropriate with students ability. In learning, teacher have given equal opportunities to students without see their physical and psychological deficiencies, learning control well, create a learning conducive atmosphere so that the students can learn orderly. Results observation showed 95% teacher have understood about student's characteristic in learning.

b. Plan of learning

Plan of learning including preparation of RPP, determine of KI, KD and indicators, choose of material, choose of learning method right, and allocate of time. From the learning observed, teacher have prepared of teaching materials before coming on classroom, nevertheless the teaching materials not yet fully like curriculum standard used at SMAN 4 Banda Aceh it is curriculum 2013. Plan of learning was prepared by teacher not using yet scientific approach, elaboration of indicators only knowledge level (C1) while basic competence must be achieved on magnitude and measurement is understand the nature of physic and physic principles so that only C1 level not enough, teacher also do not tell about learning objectives to students as a results nothing emphasis on materials must be understood by students. Nevertheless in learning teacher have used audio-visual media to increasing student interest and knowledge students. In control learning of time, teacher doing with good like coming and out of classroom timely. The success of teacher in plan of learning only reached 67%.

c. Implement learning activities

Implement learning activities including active learning, interesting learning, dialogic learning, and up-to-date learning. Active learning can attract the attention of students so that created high enthusiasm learning, dialogic learning can push the students to learn appropriate with their skills, and up-to-date learning is connecting the materials with the up-to-date matter or information. Learning have happened on classroom is teacher-centered, it is mean teacher more active than students. Nevertheless, teacher has done efforts to increase active students in learning by using experiment

method. Experiment method helping active students, critical thinking and capable of problems solving with their skills. Nevertheless, teacher less detail preparing work sheets for students so that students difficult doing experiment. Teacher often communicating the new information about magnitude and measurement like application in technology. Based-on results observation, the success of teacher to implement learning activities is 70%.

d. Evaluate learning outcomes

Evaluations of learning outcomes was given by teacher like task home, exercises, and pre-test before doing experiment on laboratorial. From the results observations have not seen yet the teacher analyzes of difficult material to know weakness students for the purposes or remedial and enrichment. Assessment of evaluation only measure cognitive, while affective and psychomotor still less. Only 67% Skills of teacher in evaluating students learning outcomes.

e. Developing potentials of students

Developing potentials of students including interest and talent students in physic learning especially on magnitude and measurement material. In this case teacher invites students to create output from physic learning in the form of simple technology and collected at the end of semester. When we are observations, the output still in processing. These activities can attack student's interest and teacher can develop the talent of students. In this form, 75% teacher has been able in developing potentials of students.

2. Professional Competence

a. Mastering scientific substances

Mastering scientific substances including mastery of subject, mastery of up-to-date subject and understanding basic concepts of science. The results showed physic teacher knowing of material very good, explain subject with good and systematic, knowing structure and guidance of subject with good, the subject who was explained by teacher can be understood by students, and teacher can answer of quotations from

students. But, limited of time cause the material physics who is telling by teacher less detail. Based-on the results of observation 75% teacher have mastered substances of science.

PCK ability of physics teacher above determines the levels of students learning outcomes. Analysis of students learning outcomes about magnitude and measurement obtained average of value is 80. The values of students learning outcomes describe about implementation the pedagogical content knowledge of physics teacher on magnitude and measurement material. Based-on PCK ability of physics teacher and the value of students learning outcomes above can be told if PCK of physics teacher the better so that students learning outcomes also getting better. This is appropriate like Abell (2008) said in International Journal of Science Education, "teachers who have high of PCK ability, can be predicted the level of achievement of students is too high".

E. Conclusion.

The average value of students learning outcomes on magnitude and measurement material is 80 and description of pedagogical content knowledge (PCK) of physics teacher as follows: 95% teacher have understood about students characteristic in learning, The success of teacher in plan of learning only reached 67%, The success of teacher to implement learning activities is 70%, Only 67% Skills of teacher in evaluating students learning outcomes, 75% teacher has been able in developing potentials of students, 75% teacher have mastered substances of science.

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