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PEDAGOGICAL COMPETENCE OF BIOLOGY TEACHERS IN SECONDARY SCHOOL

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Abstract:
The present study aims at investigating biology teachers on pedagogical competence in secondary schools in Jember regency. Pedagogical competence as of the teachers' competence has been mandated by Government Regulation of Indonesia Number 19 Year 2005 Article 28 which states that teacher must possess academic qualification and competence as the learning agent, healthy both physically and mentally, and be able to achieve national education goal. This study is qualitative which employs questionnaire to collect the teachers' profiles as the data of the research. The questionnaire consists of 20 items which covers aspects of 1) Preparation (3 indicators items); 2) Instructional Planning (3 indicators of items); 3) Instructional Implementation (4 indicators items); 4) the Use of Instructional Media (3 indicator items); and 5) Conducting Instructional Evaluation (2 indicator items). The study reveals that the teachers' perception on pedagogical competence is fair (the average score is 3.86).

Keywords: pedagogical competence, biology teachers, secondary school

1. Introduction

The very essential and required skills in the corporate world of the 21st century are problem solving, communication, collaboration (AACTE, 2010), learning skill, critical thinking (Benson, 2012), ethics, technical skill, and variously working (Stein et al., 2003). This is in line with the Framework for 21st Century Learning (2008) which states that students" learning skills and innovations required for a more and more complex life

and working environment in the 21st century are: 1) Creativity and Innovation, 2) Critical Thinking and Problem Solving, and 3) Communication and Collaboration.

Skills as expected in the 21st century can also be carried out in learning Biology, where Biology as a field of science provides a variety of learning experiences to understand the concept through the process of science and produce the attitude and creativity (Ibrahim, 2013), with ICT- based to facilitate the teaching of science (Schnittka & Bell, 2009).

In Indonesia, as a part of the Asean Economic Community (AEC), the skills are carried out through scientific inquiry learning to foster the ability to think, work and behave scientifically and communicate it as an important aspect of life skills. Therefore, it is necessary that teachers prepare the materials well and evaluate learning achievement for feedback and reflection for themselves and learners. The school should always prepare programs and activities that are in line with changing; changing needs and demands of a changing and developing society. In addition, it also adjusts teaching and learning methods in accordance with the needs of the development of science and technology (Masyhud, 2015). Expert teachers are effective and experienced teachers, who have developed various solutions of problems in class, their knowledge of the extensive process and content of teaching and well organized (Woolfolk, 2008).

This research is conducted, therefore, to know Biology teachers' pedagogical competence teaching in Junior high school (SMP/MTs) and Senior High School (SMA/MA) from self-perspective carried out in Biology learning to prepare learners in the 21st century and AEC.

2. Research Method

This is a qualitative research by collecting data as the technique with purposive sampling technique by considering:

1. Biology teacher teaching in four secondary schools (SMP / MTs) and in six high schools (SMA / MA) in Jember District,
2. He/She is willing to fill up the questionnaire, and
3. The schools are in corporation with Biology Department (Major) of Teacher Training and Education Faculty of University of Muhammadiyah Jember, held on October 2016.

The data collecting instrument used a questionnaire with scale 5. The questionnaire used to know biology teachers' pedagogical competence are20 items comprising: 1) Preparation with 3 indicators items, 2) Instructional Planning with 3 indicators items, 3) Instructional Implementation with 4 indicators items, 4) The Use of Instructional Media with 3 indicators items, and 5) Conducting Instructional Evaluation with 2 indicators items (modified from Uno, 2012). The data is the score from the questionnaire resulted from the biology teachers and is analyzed according to qualitative descriptive.

3. Result and Discussion

There are 10 Biology teachers who are willing to fill up and return the questionnaire coming from 10 schools. The schools of the teachers can be classified into: 1) 6 teachers of Senior High School (SMA), 2) 2 teachers of Junior high school (SMP), 3) 2 teachers of Junior high school (MTs) (Table 1). Among the ten schools, the school status are six state schools and four private schools.

Table 1: The Biology Teachers' Schools

No.	School	Total
1	Senior High School (SMA)	6
2	Junior high school (SMP)	2
3	Junior high school (MTs)	2

n.b.: N=10.

The mean score of the Biology teachers‟ pedagogical competence teaching in Senior High School (SMA) is 78,33 or the mean score of each indicator item is 3,91 or is completed as 4 (categorized as **"often"** to do or **"**good**"**). The mean score of the Biology teachers‟ pedagogical competence teaching in Junior high school (SMP) is 79,5 or the mean score of each indicator item is 3,975 or is completed as 4 (categorized as **"often"** to do or **"good"**). While The mean score of the Biology teachers‟ pedagogical competence teaching in Junior high school (MTs) is 71,5 or the mean score of each indicator item is 3,575 or is completed as 4 (categorized as **"often"** to do or **"good"**) (Table 2).

Table 2: Mean Score of the Biology Teachers' Pedagogical Competence

No.	School	Range of Score	Mean Score
1	Senior High School (SMA)	72-87	78.33
2	Junior high school (SMP)	79-80	79.5
3	Junior high school (MTs)	69-74	71.5

n.b.: maximum score: 100.

Based on the mean score of each indicator group, the result shows that: 1) Preparation is 11.5 with 3.83 as the mean score, 2) Instructional Planning is 10.4 with 3.46 as the mean score, 3) Instructional Implementation is 16.5 with 4.12 as the mean score, 4) The Use of Instructional Media is 11.4 with 3.80 as the mean score, and 5) Conducting Instructional Evaluation is 7.8 with 3.90 as the mean score (Table 3).

However, the use of media based Information and Communication Technology in particular, the mean score is 3.6 and the range of score is 2-5. The mean score of 3.6 shows that Biology teachers using the media based Information and Communication Technology is "seldom" to "often".

Table 3: Biology Teachers' Pedagogical Competence

No.	Pedagogical Competence	Score		
		Range	Mean	Per Indicator
1	Preparation (3 indicators)	9-14	11.5	3.83
2	Plan (3 indicators)	9-12	10.4	3.46
3	Implementation (4 indicators)	15-19	16.5	4.12
4	Use of Instructional Media (3 indicators)	9-15	11.4	3.80
5	Conducting Instructional Evaluation (2 indicators)	6-10	7.8	3.90
	Total	69-87	77.2	3.86

n.b.: maximum score of indicator: 5.

Based on the data analysis, Biology teachers' pedagogical competence per indicator is only around 3.86 or less than the score of a good category. The Biology teachers" preparation in biology learning obtained a mean score of 3.83. While for the instructional planning, the mean score is 3.46; implementation is 4.12; use of media is 3.80; and instructional evaluation at the end of the study is 3.90. Among the scores mentioned, they are generally still less than good, except on implementation with good score. This shows that the biology teachers' pedagogical competence is below "good" and above "enough".

Those professional teachers are those mastering seven fields of professional knowledge. 1) academic subjects they teach (master content of material taught) 2) General teaching strategies for all subjects (such as the principle of class management, effective teaching and evaluation) 3) Appropriate curriculum materials and models of teaching for the subject matter and taught class 4) knowledge of the specific subject (e.g, strategy or specific ways to teach certain students, to teach certain concepts) 5) characteristics and cultural background of students 6) management or students setting (eg, in pairs, small groups, teams, class, school, and society), and 7) suggestions and aim of teaching.

The results of Lubis' research (2012) are basically biology teacher has been able to draw up lesson plans well, its total mean score of Senior High School (SMA) Biology teachers on aspects of assessment is X (2.81±1.33). Classroom observation results show the total mean score of Biology teachers on aspects of assessment is X (3.60±1.13). In addition, the mean score of the highest aspects of assessment is X (4.25±1.38) to aspects of the pre-learning assessment and the mean score of the lowest aspects of assessment is X (3.00±1.06) to the aspects of the process and the assessments of learning outcomes and X (3.00±1.30) to the aspects of assessment of learning cover. A peer assessment results demonstrate personal competence and social competence of Biology teachers who have passed the certification is good, and the student questionnaire shows good results as well. In the personal competence, the mean score of the aspects of assessment is X (4.11±0.50) on teachers' questionnaire and in the social competence, the mean score of the aspects of assessment is X (4.01±0.51) on the teacher questionnaire. This study has implications for the importance of sustainable development for certified biology teachers.

Whereas the process of Biology learning prepared by teachers with good or adequate pedagogical competence will result learners in accordance with the purpose of education. This is like the result of Rachmawati's research (2007) that teachers who apply the student worksheet with inquiry learning were effective in increasing the students' activity and achievement. In the process of class learning, the very urgent thing a teacher needs to do is seeking or creating a good teaching and learning conditions. With good learning conditions, it is expected that learning process will take place well too (Munandar, 2013). Good learning process to minimize the possibility of failures and errors in learning. Therefore, it is important for a teacher to have the ability of creating good teaching and learning conditions and to achieve an optimal level of effectiveness in instructional activity class processing capability is one factor that a teacher needs to master, in addition to other factors. The success of a teachers' teaching is not only directly related to teaching and learning, for example purposes... Besides, Cain and Evans (1990 in Nuryani, 2005) state that science contains four things: 1) content or products, 2) process or method, 3) attitudes, and 4) technology. If science contains four terms, then when learning science students have to undergo four points. Thus in learning science, students should not only learn the product, but also the aspects of the process, attitudes, and technology for students to truly understand the science as a whole. But barriers ICT in teaching and learning included lack of knowledge and skills, unclear expectations and insufficient feedback (Park & Ertmer, 2008). To learn to be a good (highly qualified) teacher, the person needs to be exposed to different contexts and pre-service teachers need opportunities to practice their acquired skills within these contexts (Botha & Reddy, 2011). To that end, Biology teachers' pedagogical competence is indispensable in the process of teaching and learning biology.

4. Conclusion

The result of the research is concluded that Biology teachers' pedagogical competence in Jember is 3.86 (or categorized as above enough and below good). The details are: the mean score of preparation is 3.83; planning is 3.46; implementation is 4.12; use of instructional media is 3.80; and evaluation of learning is 3.90. While ICT-based learning media usage by is 3.6

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