



## Pedagogical and Professional Competencies of State Junior High School Science Teachers in Kendal District

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### Abstract

The competence of science teachers in the teaching and learning process is an important factor in determining the success of the science teaching and learning process in schools. Science teachers must meet competency standards including pedagogical competencies and professional competencies.. This study aims to analyze the pedagogical and professional competencies of state junior high school science teachers in Kendal District. The type of research used is a mixed method using a sequential explanatory model. Quantitative and qualitative research is carried out sequentially, where qualitative data plays a role to prove, deepen, and expand quantitative data that has been obtained at an early stage. The source of the data came from 10 state junior high school science teachers (4 science teachers in accredited A, 4 science teachers in accredited B, 2 science teachers in accredited C) in Kendal District. Data collection in this study using questionnaire methods, interviews, tests, and documentation. The results showed that the competencies of state junior high school science teachers in Kendal District were in a fairly good category. The percentage level of pedagogical competence of science teachers is 73% and professional competence is 73%. Overall, the competencies of state junior high school science teachers in Kendal are included in the fairly good category with a percentage of 73%.

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## INTRODUCTION

Based on the Law of the Republic of Indonesia No. 14 of 2005 concerning teachers and lecturers, it is stated that quality education is very dependent on the capacity of educational units in transforming students to obtain added value, both in terms of aspects of thought, taste, heart and body. Of the many components of education, teachers and lecturers are very important and strategic factors in efforts to increase education in each education unit. In this regard, Minister of National Education Number 16 of 2007 concerning pedagogical and professional competencies expected to be achieved by a Natural Science teacher (IPA) includes teachers who can understand the concepts, laws, and theories of science and their application flexibly. Furthermore, the teacher understands the thinking process of science in learning natural processes and phenomena and the teacher can understand the relationships between various branches and the relationship of science with mathematics and technology, especially those that can be found in everyday life.

Teachers must be more creative in developing learning so students do not feel bored in learning activities that will have an impact on science learning outcomes. Therefore, teacher competence is considered to have an effect on science learning outcomes. This is in accordance with previous research conducted by Inayah (2013) which states that teacher competence affects learning outcomes by 40.9%. Pedagogic competence is the competency that is in the teacher related to the ability of the teacher to manage learning, mastery of material, understanding of students, use of IT, use of learning models, curriculum development in the learning process, evaluation of learning and development of potential students in the learning process activities in school. Competence is closely related to the teacher as a profession, namely professional competence. Professional competencies are expected to be fulfilled, namely the teacher

must master effective learning methods, must be able to model the learning unit, be able to understand the curriculum well, be able to teach in the classroom, be able to model students, provide useful instructions, master the techniques of giving guidance and counseling, able to compile and implement learning ability assessment procedures. Therefore professional competence must be owned by every teacher in order to be able to improve student learning outcomes. This is consistent with the research conducted by Irshad (2013) that the magnitude of the influence of teacher professional competence on student learning outcomes is 24.1%, and the magnitude of the influence of learning facilities on student learning outcomes is 17.4%.

Some studies on teacher competency that have been done include Harlufi (2016), the study was intended to find information about the implementation of teacher performance assessment (PKG) at MTs N Kendal. Starting from the period in the implementation of teacher performance assessment (PKG), the method used by the implementing team and follow-up from the results of teacher performance evaluation (PKG) as an effort to increase the competence of educators at MTs N Kendal. In the study studied were teachers who were related to teacher performance, while in this study the study was teachers whose relation to pedagogic competence and professional competence.

Research from Akhyak et al. (2013) states that the implementation of pedagogical competencies is for the intellectual, emotional and moral development of students. The research contributed a theoretical foundation in this study. The method used in the study is a qualitative method. The research subjects were students while in this study the subjects were teachers. The equation is to do research on teacher competence.

The study from Sengottuvel et al. (2015) states that effective teachers and professional competencies are very important factors that can set a better education standard. The research contributes to the theory used in this

study which is about teacher competency variables. The research method used in the study is a qualitative method. The research subjects were students while in this study the subjects were teachers. The equation is to do research on teacher competence.

The study from Olatunji (2013) states that 20% of the sample research results are useful for the sustainability of pedagogical development of all lecturers. The study provides a variable on pedagogic competence. The research method used in the study is a qualitative method. The research subjects were students while in this study the subjects were teachers. The same thing is to do research on the pedagogic competence of teachers.

Research from Afidah et al. (2012). The purpose of the study was to determine the professional competency level of high school Biology teachers in Pemalang District after passing certification. This study used descriptive qualitative method. The population used in this study were 25 high school teachers in Pemalang District who had been certified and the sample used was 11 teachers taken by purposive sampling. Data is collected from observation, interviews and documentation. The results showed that the level of mastery of the teacher's material was very high, the level of teaching skills was high, and the level of suitability of the implementation of learning with lesson plans.

Research from Rahayu et al. (2012). The study aims to describe pedagogical and personality competence of biology teachers certified educators in SMA N 3 Semarang. This study uses a qualitative approach design case study. Data collection is done by observation, interviews, and documents. Data analysis activities include collecting, reducing, presenting, and verifying data. The results of the study show that pedagogic competence is still interpreted differently by biology teachers in expressing the management of biological learning. The RPP structure of biology is good but not detailed, and is not fully used as a reference for teacher learning.

Research from Winarsih & Mulyani (2012). The research aims to improve the professionalism of science teachers through lesson study activities, in order to be able to carry out effective and quality learning, using the Problem Based Instruction (PBI) model with the Surrounding Natural Exploration (JAS) approach. This research has been successful; 1) increasing the professionalism of SMP Negeri 30 Semarang science teachers, 2) developing learning tools, 3) improving student learning outcomes, and 4) increasing student activities. The conclusion is that LS can improve teacher professionalism, improve the process and student learning outcomes. Suggestions from this study are that the implementation of lesson study needs to be developed in schools to improve the quality of learning by teachers in order to become professional teachers.

From some of the above research results on teacher competence, this study aims to analyze the extent of the pedagogical and professional competence of state junior high school science teachers in Kendal District. The benefits of this research are to be able to provide feedback in an effort to improve and develop teacher competencies in both pedagogical and professional competencies.

## METHODS

The type of research used is a mixed method using a sequential explanatory model. Quantitative and qualitative research is carried out sequentially, where qualitative data plays a role to prove, deepen, and expand quantitative data that has been obtained at an early stage. The source of the data came from 10 state junior high school science teachers (4 science teachers in accredited A of state junior high schools, 4 science teachers in accredited B of state junior high schools, 2 science teachers in accredited C of state junior high schools) in Kendal District. Data collection in this study using questionnaire methods, interviews, tests, and documentation. Furthermore, the instruments and research plan were prepared

for data collection, then permits were taken to the Kendal District Education Office. The validity of the research data was tested using validity and reliability tests for quantitative data and triangulation techniques for qualitative data. The data collected was analyzed using the Miles & Huberman (2009) model which included the data reduction stage, the data presentation stage, and the stages of drawing conclusions and verification.

**RESULTS AND DISCUSSION**

**Pedagogic Competence of State Junior High School Science Teachers in Kendal District**

The results of the study that will be presented are descriptions of pedagogic competencies and professional competencies of science teachers obtained based on the results of questionnaires, tests and interviews. The results of the recapitulation of questionnaire data regarding the pedagogical competencies of science teachers can be seen in Table 1.

**Table 1.** Results of Questionnaire Data on Pedagogic Competencies in State Junior High School Science Teachers in Kendal District

No.	Indicators	Percentage (%)	Criteria
1.	Mastery of students' character from physical, moral, spiritual, social, cultural, emotional, and intellectual aspects.	68	Enough
2.	Mastery of learning theory and educational learning principles.	75	Enough
3.	Develop a curriculum related to the subjects taught.	81	Good
4.	Organizing	75	Enough

5.	educational learning. Using information and communication technology for the benefit of learning. Facilitating the development of potential students to actualize their various potentials.	71	Enough
6.	Communicate effectively, empathically and politely with students.	70	Enough
7.	Organizing assessment and evaluation of learning processes and results.	76	Enough
8.	Use the results of assessment and evaluation for the benefit of learning.	71	Enough
9.	Reflective take action to improve the quality of learning	70	Enough
Average		73	Enough

In general, the pedagogical competencies of science teachers in State Junior High Schools in Kendal District are included in the criteria quite well. The pedagogical competencies of science teachers in this study are described in 10 indicators, namely:

**Mastery of student characteristics**

The first indicator measured is the ability of science teachers in mastering the characteristics of students. Teachers' understanding of students includes: (1) understanding the characteristics of students related to physical, intellectual, social-emotional, moral, spiritual and socio-cultural aspects, (2) understanding the potential of students in science subjects, (3) have initial teaching provision of students in science subjects, (4) understand the learning difficulties of students in science subjects. Teacher's understanding of students on criteria is quite good with a percentage of 68%. Information on the ability of teachers in mastering the characteristics of learners is obtained from questionnaires statement items 1 and 2, namely understanding the characters, giving tests or statements to identify the potential and initial learning provision of students. On indicators of understanding characteristics of all aspects, the average percentage obtained is 64%. This percentage shows that science teachers do not understand all students from all aspects. Pedagogical competencies of science teachers are indeed classified as fairly good criteria, but the percentage obtained is classified as low in the range of 61% -80%. Information on the ability of science teachers to understand the characteristics of students is also supported by the results of interviews with informants, they revealed that science teachers understand the characteristics of students enough, but some students feel that understanding is not yet deep and comprehensive to all students

### **Mastery of learning theory and learning principles**

Mastery of science learning theory can be seen from the ability to understand various learning theories and learning principles that educate and establish various approaches, strategies, methods and creative learning techniques that educate. Teacher's mastery of learning theory and learning principles is quite good (75%). Data obtained from filling out the questionnaire shows the first indicator regarding the use of theory and the principle of

learning that educates a percentage of 80%. While the second indicator regarding the use of various learning methods and techniques gets a percentage of 70%.

### **Curriculum development**

The ability of teachers to develop the curriculum in accordance with the characteristics of students is considered good with a percentage of 81%. The indicators of curriculum development in the questionnaire are outlined in two statements, namely the giving of experience by involving students in the process of finding the concept, which is 78% and the use of various methods in assessing the percentage of 85%. The data is equipped with the results of interviews with two questions about how the teacher adjusts the learning material to the character of the students and how the teacher evaluates students. Based on the teacher competence questionnaire, science teachers are good enough to involve students to find the concept of learning through question and answer, discussion and practicum. This shows that the teacher provides learning experiences to students by involving them during the process of finding a concept. Involving students in finding a concept makes students better understand the concept, not just memorizing it and they can apply the concept in everyday life.

### **Organizing educational learning**

Teacher competency in carrying out educational learning is included in the category in the fairly good category with a percentage of 75%. In the questionnaire the competency of educating education providers is outlined in two statements, namely the delivery of order before outside classroom learning activities and varied use of media and sources. The data is also supported by data from interviews with informants. Not all processes for implementing learning carried out by teachers can be perceived by students, as well as the preparation of learning designs. So that in this case the students perceive the competence of the teacher in conducting learning that educates in the

classroom, laboratory or field by paying attention to the safety standards of students and the use of media and learning resources that are relevant to the characteristics of students to achieve intact learning goals.

#### **Use of technology in learning**

Teacher competency in utilizing information and communication technology in learning is categorized by students on the criteria quite well with a percentage of 72%. The ability of teachers to use technology can indirectly improve student learning motivation and make it easier for students to learn science material. competence in using technology in learning is elaborated through two statements in the questionnaire, namely whether science teachers use information technology and whether science teachers need the help of others when using information technology, and equipped with interview data to find out how the information technology used and used in science teachers learning.

#### **Facilitating the development of potential students**

Based on the teacher's competency questionnaire it is known that teacher competence in facilitating the development of potential students to actualize various competencies possessed is quite good at a percentage of 70%. Science teachers are quite good at conducting learning activities that demand students' creativity, and hold varied learning activities so they can know the potential of students.

#### **Communicate effectively**

Communication between teachers and students is quite good with a percentage of 76%, this shows that students assume that their science teachers are able to communicate effectively, empathically, politely and are able to provide good and relevant responses to the opinions or questions of students. The competency of science teachers on filling out questionnaires is translated into two statements, namely the ability to communicate effectively

gets a percentage of 82% and the ability to express opinion clearly gets a percentage of 70%. This percentage shows that communicating effectively with science teachers is considered good and expresses opinions clearly.

#### **Organizing assessment and evaluation of learning outcomes**

The ability of teachers to carry out assessments and evaluations of learning outcomes includes conducting assessments and evaluating the process of learning outcomes on an ongoing basis, evaluating and effectiveness of learning processes and outcomes, and evaluating remedial programs and enrichments, using assessment results in the learning process. The percentage of teacher competence in conducting assessments and evaluations of learning outcomes is quite good at 70%.

#### **Take advantage of evaluation and assessment results**

The teacher utilizes the results of evaluation and assessment to determine the completeness of student learning, designing remedial programs and enrichment, to be conveyed to interested parties, and as the constituent material for the design of learning that will be carried out later so as to improve the quality of learning. The results of the questionnaire analysis showed that the teacher was quite good at utilizing the results of evaluation and assessment for the benefit of learning in the percentage of 71%.

#### **Perform reflective action**

Reflective activity is the assessment or feedback of students on learning and the teacher after following a series of learning processes in a certain period of time. Reflection activities in learning aim to improve the quality of learning that follows. Reflection can be done in the learning process, learning methods and also on how to teach the teacher. Reflection can be done only by students or together with the teacher. Teacher competency in this case gets quite good criteria with a percentage of 68%.

**Professional Competence of State Junior High School Science Teachers in Kendal District.**

Professional competency data obtained from the questionnaire method, interviews and documentation. The indicator is referring to the Republic of Indonesia Minister of National Education Regulation No. 16 of 2007 The results of the recapitulation of questionnaire data regarding the professional competence of science teachers can be seen in Table 2.

**Table 2.** Results of Questionnaire Data on Professional Competencies for State Junior High School Science Teachers in Kendal District

No.	Indicators	Percentage (%)	Criteria
1.	Mastering the material, structure and concepts and scientific mindset that supports the subjects taught.	74	Enough
2.	Mastering the standards of competence and basic competencies of the subjects	75	Enough

taught.

3.	Develop creative learning materials that are taught.	73	Enough
4.	Develop sustainable learning professionalism by conducting reflective activities.	74	Enough
5.	Use information and communication technology for self-development.	70	Enough
Average		73	Enough

Professional competency in teachers in this study was seen from State Junior High School science teachers in Kendal District. Professional competencies of science teachers in this study are described in 5 indicators, namely:

**Mastering the material, structure, concept and scientific mindset that supports the subjects taught**

Based on the results of the questionnaire, the professional competence of science teachers in the indicators of mastering the material, structure, concepts, and scientific mindset in science is quite good with a percentage of 74%. The first indicator measured in this competency is the teacher's ability to understand concepts, laws, and theories of science and their application flexibly. Based on the results of filling in the competency questionnaire the teacher understands and applies the concepts, laws, and theories of science perceived by students by 73% in the fairly good category. Teachers who master the material, structure and scientific concepts of science subjects well will make it easier for teachers to provide appropriate assistance if learning problems arise

faced by students. The inability to master subject concepts can be fatal for students, especially if the wrong concepts are then taught to students. The subjects of science which are the fields of the science group are very complex subjects. The structure of the science material is not the same as other subjects, so that in understanding the natural processes or symptoms that occur there is a need to think about the science to understand it. Teacher's competence in understanding the thinking process of science in learning natural processes and symptoms, is perceived by students in a perception questionnaire of 75% with a fairly good category. The data shows that the teacher is good enough in understanding the thinking process of science in learning the processes and symptoms of nature, so that when explaining to students is clear and easy to understand.

#### **Mastering the standards of competence and basic competencies of the subjects taught**

It includes three things: understanding the competency standards of the subjects taught, basic competence taught, the learning objectives taught. The teacher must convey SK, KD and learning objectives to students to understand it. Based on the results of filling out the questionnaire obtained a percentage of 75%. But it is known in the results of interviews that some teachers did not deliver it because it is usually already listed in the study companion book.

#### **Develop creative learning materials that are taught**

Including choosing learning material that is able to match the level of development of students and process material creatively. The results of filling out the questionnaire about teacher professional competence in this case obtained a percentage of 73% in the fairly good category. Then there are 2 indicators in this case, namely choosing learning material that is able to match the level of development of students (73%) and processing material creatively (72%). Submission of creative material must also be adapted to the

development of students, so that students are not only interested and not bored, but easy to understand the material conveyed by the teacher.

#### **Develop professionalism on an ongoing basis by taking reflective action**

In this case the percentage is 74% in the fairly good category. There are several aspects, namely reflecting on one's own performance continuously, utilizing the results of reflection in order to increase professionalism, conduct classroom action assessments, and keep abreast of current developments by learning from various learning sources. This is obtained by the value of the questionnaire statement with a percentage of 70% in the fairly good category.

#### **Utilizing information and communication technology in self-development**

Based on the results of the questionnaire, the competence of teachers in utilizing technology and communication is in a fairly good category with a percentage of 70%. Even though it is included in the fairly good category, the percentage obtained is not too high at the maximum limit of the fairly good category, which is 80%. Based on the results of teacher interviews, it is known that this is due to the use of technology and communication in learning that has not been evenly distributed in Kendal District. Some schools with more complete facilities make it very easy for teachers and students to use information and communication technology as sources and learning media, but some schools with limited facilities cannot freely use information and communication technology. Special effort is needed from teachers who teach in schools with limited facilities to continue to use information and communication technology in learning.

#### **CONCLUSION**

The pedagogical competency of state junior high school science teachers in Kendal District is included in the fairly good category with a percentage of 73%. Based on the



analysis, pedagogical competence in developing curriculum is in good category, as well as for competency in mastering the character of students, mastering learning theory, conducting educational learning, utilizing information technology, facilitating the development of potential students, communicating effectively, conducting assessments and evaluations, and conducting reflective action in a fairly good category.

The professional competency of natural science teachers in six State Junior High Schools in Kendal District as a whole is quite good with a percentage of 73%. Overall indicators in professional competency are considered to be quite good, there are no indicators that are felt to be poor in the professional competencies of natural science teachers in six State Junior High Schools in Kendal District.

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