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Analysis of Teacher Competency with a Non-Linear Education Background in Biology Learning

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ABSTRACT
This study aims to analyze the competence of teachers who have a non-linear educational background with the subject of Biology in the context of learning in schools. The research was conducted in a madrasah involving a biology teacher and 24 tenth-grade students as respondents. The method used is descriptive with qualitative and quantitative approaches through interviews and questionnaires. The results of the questionnaire showed that, in general, the competence of biology teachers with inappropriate educational backgrounds was considered quite good by students, with an average percentage of 72.9% in the good category. However, it was found that there was a tendency that students to feel more helped, motivated, and understand the material better when learning was carried out by teachers who had a background in biology education. Teachers with appropriate educational backgrounds are considered superior in terms of mastery of materials, implementation of practicums, the use of teaching aids, and learning approaches that are relevant to the characteristics of science. These findings show the importance of the suitability of teachers' educational backgrounds to the subjects taught, especially in concept-based and practice-based learning. Even if teachers with inappropriate backgrounds still show proper competence, continuous professional development efforts are needed to improve the quality of equal learning.

Keywords: *Teacher Competence; Non-Linear; Biology Learning*

INTRODUCTION
Education is a very important thing in producing a superior generation. Education plays a role in equipping students with the knowledge and skills needed to face their roles in the future. As a means to educate the life of the nation and form skilled human resources, education is a very important main need. The success of educational institutions in achieving learning goals is greatly influenced by the role of teachers. In the current era, teachers are required to be able to adapt and be sensitive to various changes, especially those related to the development of science and technology. As educators, teachers have the responsibility to continue to develop their knowledge, improve the quality of teaching, and update the methods used in order to deliver material that is relevant to the development of the times (Syata et al., 2024).

Problems or problematics are all forms of problems that require tracing the root of the problem in order to find solutions so as not to cause negative impacts in the future. According to the Great Dictionary of the Indonesian Language, problematics is defined as something that causes problems or things that have not been solved, namely problems (Alga et al., 2023). The world of education in Indonesia still has many kinds of educational problems, such as non-linear teacher education, expensive education costs, and low-quality education (S&P 2022).

The problem known as teacher education is not linear; that is, if a teacher teaches outside his or her scientific field. The non-linear relationship between the teacher's scientific background and the subjects taught can cause various problems, such as a low understanding of the importance of a systematic learning approach, limited knowledge about the curriculum or learning standards, and obstacles in terms of time and availability of resources (Wulandari et al., 2024).

Rapid changes in curriculum, teaching methods, and student needs demand that teachers be more responsive and flexible. This condition emphasizes the importance of teachers' adaptability in dealing with the diversity and dynamics of student learning needs. Mastery of knowledge by teachers has an important role in deepening the delivery of material to students, so that the teacher's linearity factor becomes an urgency that needs to be developed in the world of education (Wulandari et al., 2024).

In the world of education, the role of teachers is needed as a facilitator who determines the success of the learning process. In the 21st century, education requires teachers to have superior academic competence because teacher competence greatly determines the quality of learning in the classroom. The competence and educational background possessed by teachers are very influential on the understanding of the material and the effectiveness in delivering the material to students. This is because the mastery and delivery of teaching materials by teachers is generally influenced by the suitability between the scientific field owned and the subjects taught (Indriani & Kuswanto, 2021).

Competence is a combination of knowledge, skills, values, and attitudes that are reflected in the way a person thinks and acts. In addition, competence can also be interpreted as the ability to master tasks, skills, attitudes, and rewards needed to support success (Ramaliya, 2018). Thus, competence includes task mastery, skill ability, positive attitude, and rewards that play an important role in achieving success. Meanwhile, according to Law No. 14 of 2005, article 1, paragraph 10 concerning Teachers and Lecturers, competence is a set of knowledge, skills, and behaviors that must be possessed, lived, and mastered by teachers or lecturers in carrying out professional duties. Thus, teacher competence is the ability possessed by an educator, including knowledge, skills, thinking ability, adaptability, attitude, and values that are believed to carry out their professional duties as a teacher.

According to Law No. 14 of 2005 concerning teachers and lecturers, article 10, paragraph (1), teacher competence includes pedagogic competence, personality competence, social competence, and professional competence. This research emphasizes two aspects of teacher competence that will be discussed, namely pedagogic and professional competence in teachers or teachers. Pedagogy can be interpreted as an approach in education that is based on understanding child psychology. The purpose of this approach is to support students in undergoing the learning process. Meanwhile, pedagogic competence is a set of abilities that teachers must possess related to knowledge and skills in the art of teaching. Professional competencies include various abilities needed to form themselves as a professional teacher. This competency includes expertise or mastery in their field, namely mastering teaching materials and their learning methods, having responsibility for the tasks undertaken, and establishing a sense of togetherness with fellow teachers (Ramaliya, 2018).

Based on the results of interviews conducted by the researcher with the Biology subject teacher at Islamic Senior High School Al-Ihsan Kalijaring, a problem was identified that the Biology subject teacher has a non-linear educational background. The Biology teacher at Islamic Senior High School Al-Ihsan Kalijaring is a teacher with a background in mathematics education. The thing that caused the teacher to be able to teach biology subjects was the mandate given by his teacher when he was in high school to replace his profession as a Biology teacher at the madrasah starting in early 2020. At first, biology teachers felt challenged because they felt that they had not mastered the biology material thoroughly. However, with this mandate, it can encourage biology teachers to continue to learn and adapt in different fields. In understanding the concept of biology, teachers are more interested in using practicum-based learning methods. In addition, during the learning process, teachers also always associate biology material with daily life so that students do not feel bored and can understand the material that has been learned easily. With a non-linear educational background, this is not something that has a negative influence on the competence of teachers. In improving competence in teaching biology, teachers always learn independently through reference books, such as Erlangga package books and *YouTube*. In addition, the madrasah also provides support in the infrastructure of the MIPA laboratory needed by teachers to carry out practicum learning. From the background presented, the purpose of this study is to analyze the competence of teachers with a non-linear educational background in biology learning at Islamic Senior High School Al-Ihsan Kalijaring.

METHOD

The research was conducted at Islamic Senior High School Al-Ihsan Kalijaring with 24 research subjects of biology teachers and class X students. This type of research is qualitative with a type of descriptive analysis method. The research techniques used in this study were interviews and taking student response questionnaires. The type of data needed includes qualitative data in the form of interview results and quantitative data, namely data in the form of numbers, such as the number of students and the results of quantitative questionnaires. The assessment scores used in the questionnaire distributed were (1) Strongly Disagree, (2) Disagree, (3) Doubtful, (4) Agree, and (5) Strongly Agree. The data obtained from the student response questionnaire was then analyzed by calculating the percentage of student response scores with the formula (1) and categorized based on the percentage in Table 1, which has been modified from Farida et al. (2024).

$$P=\frac{\sum R}{N} x\ 100\% \quad (1)$$

Information:
P = percentage of student responses
∑R = total respondent answer score
N = highest score
(Farida et al., 2024)

Table 1. Practicality Percentage Criteria

Yes	Percentage Criteria	Level of Practicality
1	81<P≤100%	Excellent
2	61<P≤80%	Good
3	41<P≤60%	Pretty Good
4	20<P≤40%	Not Good
5	0%<P≤20%	Very Bad

RESULT AND DISCUSSION

Data was obtained through the distribution of questionnaires to students, which contained several statements related to the professional and pedagogic competence of teachers in biology learning.

Results

From the results of the recapitulation of the questionnaire data in Table 2, an average percentage of 72.9% was obtained, which is included in the "Good" category. This shows that, in general, students consider that biology teachers, both with linear and non-linear backgrounds, have sufficient competence in delivering subject matter. However, some statements show a tendency that students feel more helped and motivated when Biology learning is carried out by teachers with a linear educational background.

Table 2. Student Response Survey Results

Yes	Statement	Xi	F					Percentage	Criterion
			STS	TS	RR	S	SS		
1	Biology teachers at school are able to explain the subject matter clearly.	120	3	4	1	10	6	70%	Good
2	Biology teachers at school are able to answer students' questions related to Biology.	120	1	3	5	5	10	76,6%	Good
3	Biology learning is easier to understand when taught by teachers with a background in Biology education (PPL teachers).	120	2	0	10	4	7	69,1%	Good
4	Biology teachers in schools are able to relate the subject matter to daily life	120	1	4	1	13	5	74,1%	Good

Yes	Statement	Xi	F					Percentage	Criterion
			STS	TS	RR	S	SS		
5	PPL teachers (with a background in Biology education) are more competent in using practicum methods and teaching aids.	120	2	2	28	3	9	72,5%	Good
6	Biology teachers in schools have an interesting way of teaching, even though their educational backgrounds are different.	120	3	3	4	6	8	70,8%	Good
7	The competence of PPL teachers is more in line with the needs of Biology learning.	120	3	3	2	3	13	76,6%	Good
8	I feel more motivated to study Biology if taught by a teacher with a background in Biology education.	120	4	1	2	8	9	74,1%	Good
Average Percentage Amount								72,9%	Good

In general, the results of the questionnaire showed that all statements had a "Good" rating category, with percentages ranging from 69.1% to 76.6%, and an overall average of 72.9%. The highest percentage is found in statements numbers 2 and 7, which is 76.6%, which indicates that teachers have the ability to answer students' questions and that the competence of PPL teachers is considered more in accordance with the needs of Biology learning. Meanwhile, the lowest percentage appeared in statement number 3 with a score of 69.1%, which shows that students consider biology learning easier to understand when taught by teachers with a background in Biology education (Field Experience Practice teachers).

Discussion

Based on table 2 of the results of the student response questionnaire, the results of students' perceptions of the competence of biology teachers at Islamic Senior High School Al-Ihsan Kalijaring, especially teachers with educational backgrounds, were obtained non-linearly with an average percentage of 72.9% with the criterion of "Good". In statement 1, "Biology teachers in schools are able to explain the subject matter clearly," obtained a percentage of 70% with good criteria. This shows that most students assess biology teachers who have an educational background Non-linear able to explain the material clearly, but it cannot be said to be 100% so there is still room for teachers to improve their competence in terms of explaining the material taught. According to Princess (2021), Teachers who have an educational background in Non-linear tend to have limitations in mastering essential biological concepts. The lack of teacher competence in delivering material will indirectly affect the level of understanding and learning outcomes of students. It is supported by Setyoningsih & Hariyatmi (2023) in their research, which states that the clarity in explaining the material is greatly influenced by pedagogical content knowledge (PCK), which is formed through linear education and science-based teaching practice experience.

2nd statement, "Biology teachers in schools were able to answer students' questions related to Biology" obtained a percentage of 76.6% with the criterion of "Good", indicating that most students felt that the biology teacher was quite capable of answering every question asked during the learning process. The ability to answer this question can be caused by the teacher's basic mastery of biological material sufficiently. According to Handayani et al (2023), Teachers who have an educational background in Non-linear can conduct learning independently and participate in training in order to demonstrate proper professional competence in answering students' questions. In addition, the teacher's teaching experience is also an important factor, so that teachers have a good communication strategy and anticipate various types of student questions. In line with research, Wiranti (2021) states that the teaching experience has a positive

effect on the teacher's level of confidence when answering students' questions, even though their educational background is not in accordance with the field they teach. In addition, teachers can also take advantage of digital technology and teaching resources, such as learning videos, the internet, and other digital media. This can help teachers in providing effective, precise, and relevant answers to students' questions (Tondang & Arwita, 2020).

The 3rd statement, "Biology learning is easier to understand when taught by teachers with a background in Biology education (Field Experience Practice teachers)" obtained the lowest percentage, namely 69.1% with the criterion of "Good". This shows that some students feel that there is a difference in understanding between learning carried out by biology teachers with non-linear backgrounds and Field Experience Practice teachers (PPL) with a biology education background. These differences can be caused by several factors, such as a linear educational background that allows PPL teachers to have a deeper mastery of biological concepts, for example, in explaining terms and the relationship between biological concepts. According to Carrots (2022), the quality of teacher education has a significant impact on the way material is delivered and the level of student understanding, especially in science education. However, when viewed from the total percentage that showed a score of 69.1%, it shows that the learning carried out by PPL teachers has not been able to fully improve students' understanding of the material taught. This can be caused by several factors, such as the limited time of Field Experience Practice teacher involvement, the way of delivering material that has not been optimal, or students are still adapting to new learning methods.

The 4th statement, "Biology teachers in schools are able to relate subject matter to daily life," obtained a percentage of 74.1% with the criterion of "Good". This statement indicates that biology teachers who have a non-linear educational background are quite able to connect the subject matter with the daily life situations of students. This kind of approach is very important in biology learning because it can increase the relevance of the material to the real experience of the students. However, these results do not yet reflect a striking advantage, which means that teachers with non-linear backgrounds may still need additional training or reinforcement of the material to be able to relate biological concepts to the realities of life more optimally. According to Rahmawati (in Firda et al., 2023), context-based learning can increase students' enthusiasm for doing practice questions. In addition, when the teacher delivers the material, the students show great curiosity. Students' motivation to learn also increases through the provision of interesting tasks and the creation of a pleasant learning atmosphere, such as through experimental activities and discussions.

The 5th statement, " Field Experience Practice teachers (with a background in Biology education) are more competent in using practicum methods and teaching aids," obtained a percentage of 72.5% with the criterion of "Good". This shows that PPL teachers who have a background in biology education have quite good abilities in carrying out practicum-based learning and the use of teaching aids. This statement shows that students recognize that teachers with a background in biology education (linear) have better abilities in the implementation of practice and the use of teaching aids, which is an important element in learning biology as an empirically based science. This condition also implies that teachers with non-linear backgrounds tend to have difficulty in implementing practical aspects of learning, likely due to limited laboratory experience or lack of specialized training in the field. Practicum has an important role in building a deep understanding of Biology concepts. Linear teachers are generally more competent, so they are more professional in doing their duties as teachers. Therefore, it is important for a teacher to have a linear qualification to support the feasibility and quality of each educator and the teaching process. It will be better if the teacher has a linear educational academic qualification in accordance with the scientific field and expertise in the teaching place (July 2022).

The 6th statement, "biology teachers in schools have an interesting way of teaching despite different educational backgrounds," obtained a percentage of 70.8% with the criterion of "Good". This shows that most students consider teachers to be able to create an interesting learning atmosphere, even though they have an educational background that is not linear with the subject of biology. This can happen due to factors such as teaching experience, creativity in delivering material, and the use of a variety of learning methods that are tailored to the characteristics of students. According to Squirrels & Squirrels (2020), Teachers must have pedagogic competence to be able to master learning theories and principles, and be able to create an interesting and educational learning process.

The 7th statement, "The competence of Field Experience Practice teachers is more in accordance with the needs of Biology learning," obtained a percentage of 76.6% with the criterion of "Good". This shows that most students consider that Field Experience Practice teachers who have a biology education background are better able to meet the needs of biology learning compared to teachers who have a non-biology educational background. This can be explained through several important aspects that affect the effectiveness of learning, especially in the context of science subjects such as Biology. Field Experience Practice teachers generally have gained a strong mastery of content during the lecture period. They not only understand the concepts of biology theoretically, but are also trained to relate those theories to laboratory practice and real-life phenomena. This ability allows Field Experience Practice teachers to answer questions in depth, provide detailed explanations, and guide students in practicum and scientific investigation activities. In addition, Field Experience Practice teachers are also equipped with pedagogical content knowledge (PCK), which is the skill in teaching Biology material with an approach that is in accordance with the characteristics of students and subjects. They tend to be more skilled in designing learning strategies that encourage active student engagement, such as experimentation, discussion, and the use of visual media.

The 8th statement, "I feel more motivated to learn Biology if taught by a teacher with a background in biology education," obtained a percentage of 74.1% with the criterion of "Good". The increase in student motivation when taught by teachers with a background in Biology education reflects a positive perception of the teacher's competence and self-confidence in delivering material. Teachers who have a deep mastery of their field of knowledge are generally more confident in teaching and able to provide detailed answers to students' questions, thus building students' trust and helping to encourage their enthusiasm for learning. Teachers with high pedagogic competence are able to present material in an attractive, efficient, and in accordance with the characteristics of students. This competency includes a strong understanding of the subject matter, so that teachers can relate various concepts clearly and respond to students' questions in depth. This contributes to increased motivation and student participation in the learning process. Collaboration between pedagogic abilities and effective classroom management will create an interactive and supportive learning atmosphere (Hendrawan et al., 2025).

This data reflects that biology teachers with non-linear backgrounds have shown sufficient competence in the implementation of learning, although in certain aspects there is still a tendency to excel teachers with a background in biology education. These findings are the basis for further analysis of the relationship between teachers' educational backgrounds and the quality of biology learning in schools.

CONCLUSIONS

From the results of the questionnaire given to 24 students and the analysis of each indicator, it can be concluded that Biology teachers at Islamic Senior High School Al-Ihsan Kalijaring, who come from a non-linear educational background, have quite good competence, with an average score of 72.9%, which is included in the "Good" category. This shows that students generally assess the teacher as capable of carrying out their duties, such as delivering materials, answering questions, and creating a pleasant learning atmosphere.

However, from the eight statements in the questionnaire, there is a tendency that students feel more helped, more motivated, and understand the material better when taught by Field Experience Practice teachers who have a background in Biology (linear) education. This can be seen from the high percentage in the statement related to the ability of Field Experience Practice teachers to answer questions, the use of teaching aids and practicums, and their contribution to increasing student learning motivation.

These findings show that teachers with a linear education background have certain advantages, especially in material mastery, skills in laboratory practice, and content-based pedagogic skills (PCK) that are in accordance with the characteristics of science, especially Biology. On the other hand, non-linear teachers are still able to carry out learning quite well, but still need reinforcement in terms of concept understanding, practical skills, and the ability to relate material to real context in order to match the quality of teachers with linear backgrounds.

Therefore, the right strategies are needed, such as continuous training, professional mentoring, and competency improvement focused on the field of study, in order to improve the quality of Biology learning by teachers with non-linear backgrounds.

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