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The Correlation between the Character and Self-Efficacy of Pre-service Biology Teachers

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Abstract: Self-efficacy has a positive influence on students' character values. The current study explored the correlation between the character and self-efficacy of pre-service biology teachers. This study used a correlation research method and involved all biology education students from Ternate, North Maluku, Indonesia. The research sample comprised 120 biology education students from IAIN Ternate and STIKIP Kie Raha, Ternate, North Maluku. The research instruments were divided into types: (1) a questionnaire and observation sheets to evaluate student character and (2) a questionnaire and observation sheets to measure student self-efficacy. All instruments had undergone expert and empirical validation processes and reliability tests. The study results revealead a significant correlation between students' self-efficacy and character with $r_{calculated}$ of 0.917 and a significance value of 0.000 < 0.05. This finding suggests that increased self-efficacy may lead to an increase in student character. The results of this study can contribute to efforts to strengthen students' character and self-efficacy through applying a learning model.

Keywords: Character; Correlation; Pre-service biology teachers; Self-efficacy; Students'

Introduction

Self-efficacy is crucial in improving student academic achievement (Diseth, 2011; Israel, 2007). Students with high self-efficacy tend to have high self-confidence when facing complex problems. They are more enthusiastic about finding alternative solutions and are more patient in solving problems. Students with high self-efficacy have high persistence for success and are intrinsically interested in completing tasks (Sungur & Gungoren, 2009). Self-efficacy can stimulate students to do tasks effectively. Students with high self-efficacy are proactive, competitive, and creative. Therefore, it is much easier for them to improve their learning outcomes (Fuller et al., 2018).

Self-efficacy is essential in increasing students' learning motivation (Sadi & Uyar, 2013). Someone who has high self-efficacy and self-confidence will be able to perform tasks and learning activities efficiently, show high self-confidence in achieving academically and demonstrate exemplary scientific attitudes (Suyanto, 2011). Self-efficacy can positively affect students' ability to determine and make decisions and increase their confidence in learning (Zheng et al., 2018). Learners who have high self-motivation will focus on the details of learning achievement goals and show strong self-efficacy in trying to achieve these goals (Nurwendah & Suyanto, 2019). Self-efficacy contributes positively to academic achievement and prepares students for future professional skills (Altunoğlu & Education, 2022).

There is a correlation between character and learning achievement, where character values, such as spiritual values, honesty, discipline, responsibility and hard work, can determine student learning achievement (Jamaluddin et al., 2021). Motivation, self-efficacy, and self-regulation are essential affective components in cognitive processes and conceptual changes (Tang & Neber, 2008). A person with low self-efficacy is more likely to avoid and ignore challenging assignments, complain quickly with limited task time, and give up

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easily on tasks that are considered difficult (Bakti et al., 2022).

Education in Indonesia needs to build student character according to the nation's culture. Student character can be shaped not only through a series of learning activities but also through living habits that contain religious values, honesty, discipline, tolerance, hard work, peace-loving values, responsibility and environmental awareness (Halek et al., 2021; Hidayati et al., 2020; Nada et al., 2021). Good character is not formed spontaneously but is developed over time through teaching, learning and examples of continuous practice.

The cultivation of good character in students plays a vital role in helping them counteract negative influences from the media and other external sources (Pala, 2011). Educators can be a representative example for students, primarily to support the development of certain values such as honesty, discipline, and responsibility. Meanwhile, to develop values of caring for the environment, social care and creativity, teachers need to set certain conditions and situations where students can show behavior that shows these values. Certain character strengths such as love of learning, passion, hope, and persistence, are substantially and positively related to academic self-efficacy, satisfaction and learning achievement (Weber & Harzer, 2022). Based on this, it is important to instill character strengthening gradually through the learning process in the classroom.

Moral intelligence refers to an individual's ability to distinguish between right and wrong. Moral beliefs allow a person to behave in a way that is right and guided by justice, self-control, empathy, kindness, tolerance, respect, and conscience (Borba, 2002). Moral intelligence and its components need to be developed in students, as they will affect all aspects of their lives, the quality of their relationships, skills, and productivity in the future (Abdellatif, 2022). Moral intelligence relates to individual cognitive abilities. There is a positive and significant relationship between moral intelligence and student achievement (Beheshtifar et al., 2011). By cultivating character and self-efficacy in learning, it is hoped that students will have a strong foundation of moral intelligence so that they can have a positive effect on social cognitive development.

Educators play a key role in building students' self-efficacy through the application of appropriate learning models, approaches, or methods in the classroom (Toharudin et al., 2019). Likewise, educators need to choose the right learning method to build student character. The RQANI learning model integrates science concepts with Islamic values (Amin et al., 2022). The steps of the RQANI model provide opportunities for students to be actively involved in learning. Appropriate learning designs can improve student competence, including learning independence (El-Rumi, 2022). The application of the right learning model is expected to contribute to strengthening character and self-efficacy.

Regression analysis shows that self-efficacy strongly predicts academic performance (Aurah, 2013). High self-efficacy is associated with deeper material processing (Pintrich, 1999). Self-efficacy affects learners' decision-making and actions (Aguilera-Hermida, 2020; Ingole & Pandya, 2016). There is a positive correlation between educator self-efficacy and student self-efficacy in the biology classroom (Ahmed et al., 2021). Several previous studies used self-efficacy as a predictor of academic achievement, social life (İlhan, 2014) and students' attitudes towards the environment (Huang, 2016). Strengthening strong self-efficacy is expected to increase learning outcomes and meaningful learning experiences for students.

Research that examines the correlation between character and student self-efficacy in biology learning is rarely done. Therefore, this study aimed to identify the correlation between pre-service biology teachers' character traits and self-efficacy. This research is expected to contribute to improving the quality of graduate biology teacher candidates.

Method

The present study used a correlational research method. The population comprised all biology education students in the city of Ternate, North Maluku, Indonesia. The research sample contained 120 students from the department of biology education at IAIN Ternate and STIKIP Kie Raha, Ternate, North Maluku. This study was conducted in the odd semester of 2020/2021. An experimental study preceded the correlational analysis. Table 1 shows the experimental research design.

This experiment was follows by a correlational analysis which revealed the correlation between students' character and self-efficacy. The procedures of the correlational study consisted of: (1) determining research variable, X for character and Y for self-efficacy; (2) determining indicators for each variable; (3) identifying instruments to measure the indicators; (4) developing the blueprint of the instruments; (5) organizing questions for each variable and the answer to each question; (6) determining criteria for alternative answers; (7) validating the instruments; (8) collecting the data; (9) calculating the correlation between X and Y.

Table 1. The Pretest Postest Nonequivalent Control Group Design

Group	Pretest	Treatment	Postest
E	O_1	X	O_2
K	O_3	-	O_4

Notes
E : experimental group (taught with RQANI)
K : control group (taught with conventional methods)
O_1 : pretest score of the experimental group
O_2 : post-test score of the experimental group
O_3 : pretest score of the control group
O_4 : post-test score of the control group
X : RQANI implementation

The research instruments were divided into two categories, (1) a questionnaire and observation sheets to measure students' character; (2) a questionnaire and observation sheets to measure students' self-efficacy. Both instruments had undergone expert and empirical validation as well as reliability test. The validation results showed that the instruments were reliable for data collection. Data analysis was performed using descriptive and inferential statistics.

Results and Discussion

Correlation analysis was used to investigate the correlation between research variables. Table 2 shows the results of the correlation analysis.

Table 2. Correlation Analysis Results

		Post-test Self-Efficacy	Post-test Character
Post-test Self Efficacy	Pearson Correlation	1	.917**
	Sig. (2-tailed)		.000
	N	120	120
Post-test Character	Pearson Correlation	.917***	1
	Sig. (2-tailed)	.000	
	N	120	120

**. Correlation is significant at the 0.01 level (2-tailed)

The correlation analysis results (Table 1) revealed a significant relationship between self-efficacy and student character, with $r_{calculated}$ of 0.917 and a significance value of 0.000 < 0.05. This finding indicated that increased self-efficacy could lead to an increase in student character. Adequate self-confidence strengthened the character of the participants. Students in this study showed a more disciplined attitude, respected time, and were responsible in carrying out practicum assignments. In addition, they were also honest and diligent in completing assignments and reports. They also demonstrated concern for and adherence to ethics and laboratory work rules. Students with high self-efficacy showed high integrity; thus, they could complete challenging tasks. They also possessed good collaboration skills, establishing good communication in groups. Students' character needs to be trained early on and consistently through classroom learning activities and scientific steps.

The RQANI learning model applied in this study was proven to be able to train students' self-confidence so that they could develop high self-efficacy in their potential and learning involvement. Participants' cognitive understanding was increased through reading and persistence in completing tasks. They were also encouraged to increase interest in reading, so that they could develop their thinking skills in the process of solving problems. The RQANI learning model trained participants' perseverance, attitudes, and honesty in constructing scientific knowledge and insights. Academic self-efficacy includes beliefs about achieving tasks in specific academic fields (Altunsoy et al., 2010). Evaluation of academic self-efficacy in the classroom environment allows for assessing students' beliefs about their competence to carry out certain academic activities (Dorman, 2001).

The Questioning stage in RQANI encouraged the research participants to actively ask questions and be critical of a phenomenon related to the lesson. They were trained to be sensitive and responsive to the environment around them. Besides, the participants were also motivated to ask questions and argue, but had to show respect for different viewpoints in class discussions. They learned to help each other and work together to achieve success together. Each group member's success was the success of the group, so they could understand the meaning of cooperation, tolerance and integrity. Self-efficacy is belief in one's ability to organize and execute actions to achieve desired results successfully. Self-efficacy is one of the most powerful and reliable predictors of successful problem-solving (Bandura & Health, 1986). Self-efficacy, in the end, is considered a cognitive paradigm that bridges knowledge and action (Ahmed et al., 2021).

In addition, the Answering stage in RQANI allowed the research participants to be critical of each answer to the question raised in the previous stage. They were trained to be confident in answering questions or questions given by the lecturer. Participants were encouraged to be honest and objective in stating the results of learning investigations or practicum activities. At this stage, they also learned how to manage their own capacities in collaborating with group members and collaborating to achieve optimal learning success.

Once the participants' self-regulation capacity increased, their level of self-efficacy also improved. Self-efficacy allows students to deal with a new learning process. Students with high self-regulated skills can manage learning more effectively than those with lower self-regulated skills (Pajares & Schunk, 2001). If students believe that they will be successful, they will develop more skills and behaviors that encourage achieving that

success (Pajares & Schunk, 2001). Self-regulated skills are the ability to control one's cognition, behaviour, and motivation in achieving certain goals (Wolters et al., 2005).

The elaboration stage in RQANI allowed the participants to discuss in groups. At this stage, the participants were trained to develop a good self-concept to help each other and support peers in solving group problems. They were also encouraged to develop a sense of empathy for colleagues who experience difficulties in learning. They were taught to complement each other and work hand in hand to help friends understand concepts. They were also trained to have a strong concern for the surrounding environment. Student character can be explicitly depicted in learning steps that are designed in the form of values, abilities, beliefs, morality, emotional control, and behaviors/attitudes that are directly or indirectly related to the nature of the subject matter (Gusmaweti, 2015). Character building in the classroom can be interpreted as an effort to plan and implement learning strategies or models aimed at developing academic abilities and building student character (Sari et al., 2021).

The integration stage in RQANI provided opportunities for participants to look for relationships between classroom lessons and Al-Quran values. This stage trained the participants to be responsible and grateful for all the blessings they received from God. This gratitude sparked the enthusiasm of students to continue studying diligently and increased their self-confidence and self-efficacy in learning. During this phase, students became more determined to achieve more optimal learning targets and academic achievements.

There is a positive correlation between academic achievement and self-efficacy (Hampton & Mason, 2003; Zajacova et al., 2005). When the academic achievement of prospective teachers increases, their self-efficacy also increases (Yavuzer & Koç, 2002). Self-efficacy can affect how knowledge and skills are acquired and vice versa (Pajares, 2002). Biology teachers should not only teach knowledge and memorization to their students, but also prepare the younger generation to have physical resilience, quality ways of thinking, and good attitudes towards natural and social environment (Pala, 2011).

Knowledge is a very important factor in shaping one's actions, because student behavior based on knowledge will be better than that which is not based on knowledge (Gusti et al., 2015). Educators play an essential role in helping students understand and instill the values of caring for the environment. Equipped with these characters, students will be able to process, manage and preserve the environment wisely, and carry out these values throughout their lives (Sya'ban, 2014).

Students with high self-efficacy already have confidence in their ability to carry out tasks properly. They have confidence in facing difficult tasks and feel confident in their ability to solve all the problems they face (Rosdiana et al., 2020). Students who have a high level of self-efficacy can focus on learning. They can plan learning strategies, seek motivation, and monitor their progress. They can take responsibility for their work and evaluate their understanding. In addition, it is believed that students who can manage time for learning and set a good learning environment can achieve greater learning success. Successful students are those who have strong self-efficacy in learning and in academic performance (Sadi & Uyar, 2013).

Conclusion

The results of this study indicated a correlation between self-efficacy and character of pre-service biology teachers. Future researchers should examine the correlation between these variables for students from different departments of with students from different levels of education.

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Conflicts of Interest
The author declares no conflict of interest.

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