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## Micro Teaching as Efficient Technique to Increase Self-Efficacy of Prospective Biology Teacher: Evidence from First Year Teacher

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### Article History:

Received date: May 20 2024

Received in revised from: August 28 2024

Accepted date: October 7 2024

Available online: October 14 2024

### Citation:

Marlina, R., Suwono, H., Yuenyong, C., Ibrohim, Pamungkas, R., & Hamdani. 2024. Micro teaching as efficient technique to increase self-efficacy of prospective biology teacher: evidence from first year teacher. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education)*, 12(4):769-785

**Abstract.** This study focuses on the perspective of prospective teachers on the development of self-efficacy during teaching practice in micro teaching and also during real teaching. The problem in this study is what factors influence the development of self-efficacy during micro teaching and real teaching? The purpose of this study is to describe the factors that contribute to the development of self-efficacy during micro teaching and real teaching. This study uses a descriptive qualitative method. The participants of the study were first-year biology teachers who had taken micro teaching courses at college. The instruments used included questionnaires and interview sheets. The results obtained were that during micro teaching, prospective teachers had high self-efficacy in three factors, namely performance experience, other people's experiences, and social support. Meanwhile, after teaching at school (real teaching), the factors that support the development of self-efficacy are physiological and emotional states. In order for self-efficacy to develop well during real teaching, it can be concluded that micro teaching is an efficient technique in improving the self-efficacy of prospective biology teachers. It is necessary to form a learning community in schools that can be used as a forum for teachers to collaborate with each other in finding efficient strategies in teaching. This can support the development of teacher self-efficacy.

**Keywords:** self-efficacy, micro teaching, real teaching, preservice biology teacher

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## Introduction

Often prospective teachers feel discouraged when designing and implementing teaching exercises because they feel difficult and nervous when in front of the class (Yulianti et al., 2021). Therefore, prospective teachers need to be trained to develop self-confidence or commonly known as self-efficacy (Banas & York, 2014; Simsek & Yazar, 2019). Self-efficacy is a belief in one's own ability to perform certain tasks so as to achieve the expected goals. In relation to prospective teachers, self-efficacy is the confidence of prospective teachers to plan and carry out teaching practice (Almutairi, 2020). Self-efficacy has an important role in supporting prospective teachers' teaching abilities and is also able

to develop professional attitudes as a teacher (Banas & York, 2014; Simsek & Yazar, 2019). Research conducted in Indonesia found that the overall self-efficacy of prospective teachers is still relatively lacking, as well as biology teacher candidates (Marlina, 2015; Riawan et al., 2021).

Self-efficacy is theoretically constructed from Bandura's socio-cognitive theory, defined as a mastery of the self (Bandura, 1977), self-assessment of one's ability to do something (Bandura, 1982), and confidence in performing behaviors to obtain desired outcomes (Bandura, 1978). Self-efficacy is a person's belief in his or her ability to cope with tasks, obligations, and challenges related to his or her professional role in the educational environment (Caprara et al., 2006; Djigić et al., 2014). Self-efficacy is also defined as an assessment of an educator's ability to obtain desired outcomes from learner engagement (Tschannen-Moran et al., 1998). Self-efficacy is a prospective teacher's personal belief in carrying out teaching practices, producing learning tools, organizing, achieving learning goals, and also realizing the best basic teaching skills and can determine how a person feels, thinks, motivates himself and behaves

Previous research has measured prospective teachers' self-efficacy during teaching practice (Postareff et al., 2007). The results of this measurement reported that the length of teaching practice affects the confidence of prospective teachers in performing or doing teaching practice. The more often they perform, the more confident they will be in doing teaching practice. The weakness of the self-efficacy instrument used is self-assessment so that it cannot obtain in-depth data. The latest self-efficacy measurement uses an instrument in the form of a questionnaire. The selection of self-efficacy instruments in the form of questionnaires is based on the results of previous studies which have reported that self-efficacy questionnaires with a 5-point Likert scale are appropriate and can explore the right information about a person's self-efficacy (Eachus & Cassidy, 2006). Self-efficacy questionnaires with a 4-point Likert scale ranging from 1 (not confident), 2 (less confident), 3 (moderately confident), and 4 (very confident) are also able to explore prospective teachers' *self-efficacy* in mastering content/materials clearly.

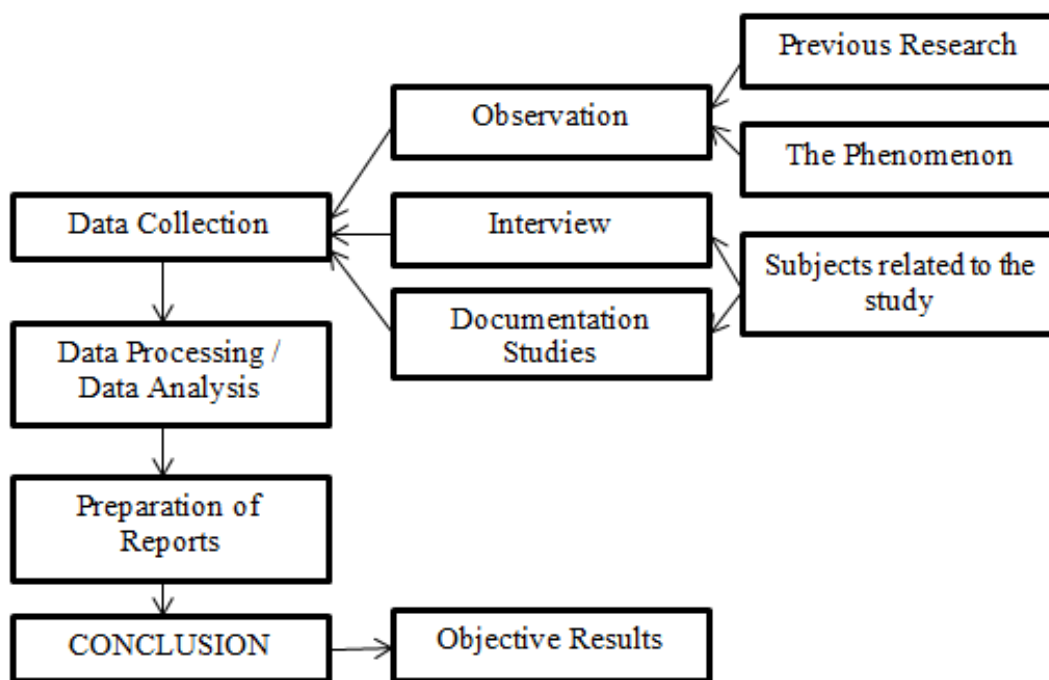
Several studies have reported that self-efficacy in prospective teachers in micro teaching courses has shown good results. After carrying out micro teaching, prospective teachers become more creative, critical, and show increased motivation in teaching. This assumes that micro teaching is an important course for prospective teachers to have confidence in teaching at school in the future. Self-efficacy is a skill that of course needs to be practised as often as possible (Erkol & Ugulu, 2014). If you do not often do teaching or do not often practice teaching, then self-efficacy will decrease. With micro teaching, prospective teachers have the space to continue to practice and build confidence and this greatly affects the way they teach in real classrooms.

So far, research on self-efficacy is still limited especially for novice teachers (Chen et al., 2024; Kalinowski et al., 2024; Mensing et al., 2024; Özbilen et al., 2024; Yao & Wang, 2024). There has been no research that reports on teacher self-efficacy in the first year of teaching and no research that describes the self-efficacy of prospective teachers during micro teaching which is correlated with self-efficacy during real teaching in schools (Beckmann & Ehmke, 2023; Caprara et al., 2006). Aspects or factors of self-efficacy that can build self-efficacy in micro teaching and in real teaching at school are also important to analyse. This is what strengthens the need for this research. It is known that to obtain complete, detailed and in-depth data, more than 1 type of instrument is needed. In

measuring self-efficacy, it is better to conduct an interview after distributing the questionnaires. Interviews are very important to explore the reasons and responses of participants to the answers given on the questionnaire. Currently, there is no research on self-efficacy measured by questionnaire instruments accompanied by interviews with prospective teachers who have real teaching experience in schools (Beckmann & Ehmke, 2023; Kutluca, 2021; Marlina et al., 2024; Tasgin & Dilek, 2023; Yulianti et al., 2021). This research answers this shortcoming. The purpose of this study is to describe biology teachers about their self-efficacy whether it develops during micro teaching or when they have experienced real teaching at school.

## Methods

This research uses a qualitative descriptive method as shown in Figure 1.



**Figure 1.** Research Stages

The first stage of the research is data collection which is carried out when students do micro teaching. Prospective teachers were observed during teaching practice. During the observation, the observer observes the phenomenon that occurs in the classroom by focusing on how students learn, not only on how prospective teachers teach. Observers also analyzed the self-efficacy competencies that prospective teachers must have from previous research. Observers observed how the development of self-efficacy of prospective teachers when opening the class to closing the lesson. After the third display, prospective teachers were interviewed to identify their self-efficacy development. Every process of the prospective teachers' teaching practice was well documented in order to help the discussion

in measuring the development of the prospective teachers' self-efficacy after three teaching displays.

After micro teaching ends, right after 6 months, teacher candidates serve as teachers in schools. Each pre-service teacher conducted real classroom teaching. Within 6 months of teaching, each participant was interviewed and observed to identify whether they had high self-efficacy in teaching. Observations were conducted during each stage of micro teaching and real teaching as shown in Table 1.

**Table 1.** Micro teaching and real teaching stages

Stages	Activities
Preparation	<ul style="list-style-type: none"> <li>a. Develop a learning activity plan in accordance with the time given. The implementation time of <i>micro teaching</i> can be adjusted as needed. Usually, the duration of <i>micro teaching</i> is 10-40 minutes.</li> <li>b. Organize the number of students in the class, where <i>micro teaching</i> is between 1-10 students only.</li> <li>c. Search and prepare tools or media for teaching activities.</li> <li>d. Prepare <i>micro teaching</i> materials, for example with textbook references.</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>a. Deliver <i>micro teaching</i> learning materials communicatively. Teachers and prospective teachers can use a language style that is easy for students to understand in class.</li> <li>b. Manage the class well so that the <i>micro teaching</i> class runs smoothly.</li> <li>c. Provide practice problems.</li> <li>d. Assess and evaluate learning outcomes at the end of the meeting.</li> </ul>
Providing Feedback	Debriefing or discussion with <i>observers</i> or peers. This debriefing will help teachers and prospective teachers know what to do to make improvements.

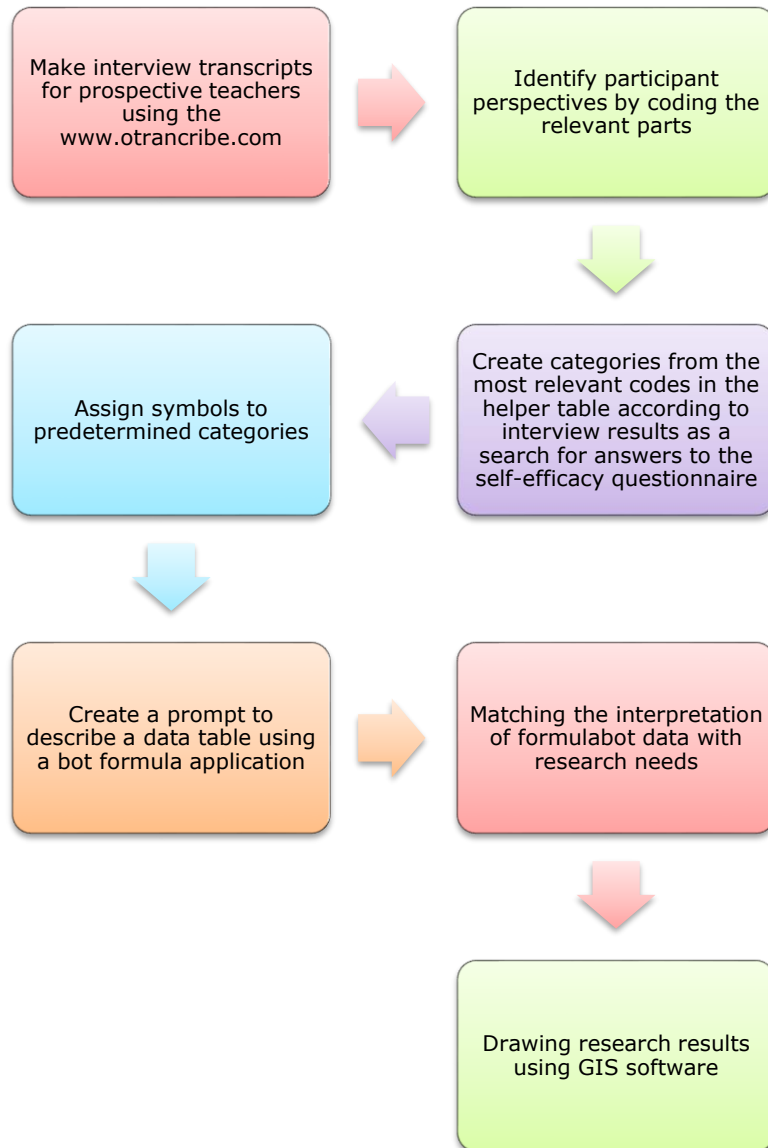
Data on prospective teachers' self-efficacy were obtained using a modified *self-efficacy* measurement instrument. The sampling technique uses random sampling and collection procedures data using a questionnaire developed from Tschannen-Moran & Hoy (Tschannen-Moran & Hoy, 2001). The instrument is spread over six indicators: confidence in developing learning strategies, confidence in involving students in learning, confidence in classroom organization, confidence in accepting changes in education policy/curriculum, confidence in participating in self-development activities, and confidence in developing innovative work/scientific publications. The instrument was distributed with the help of the Biology Subject Teacher Consultative Group in each district/city.

This study was conducted over a year or two semesters in the 2022/2023 academic year. The first semester all participants were observed in teaching practice in the micro teaching course. In the next semester, interviews and questionnaires were conducted to explore participants' responses after participating in real teaching at school. The interview points were organized with the adaptation of Bandura (1995) shown in Table 2.

**Table 2.** Interview instruments

Source of <i>Self-efficacy</i>	Strategies that can be used	
Performance Experience	<i>Participant modeling</i>	Imitating others
	<i>Performance desensitization</i>	Eliminate the bad influence of past achievements
	<i>Performance exposure</i>	Highlighting past successes
	<i>Self instructed performance</i>	Train yourself to do your best
Other People's Experience	<i>Live modeling</i>	Observing others
	<i>Symbolic modeling</i>	Observe symbolic models, movies, comic stories
Social Support	<i>Suggestion</i>	Influence with words based on trust
	<i>Exhortation</i>	An exhortation, an urgent warning.
	<i>Self-instruction</i>	Self-command
	<i>Interpretative treatment</i>	The new interpretation corrects the old wrong interpretation
Physiological and Emotional State	<i>Attribution</i>	Changing attribution, taking responsibility for an emotional event
	<i>Relaxation feedback</i>	Relaxation
	<i>Symbolic desensitization</i>	Eliminating emotional attitudes with symbolic modeling
	<i>Symbolic exposure</i>	Symbolically eliciting emotions

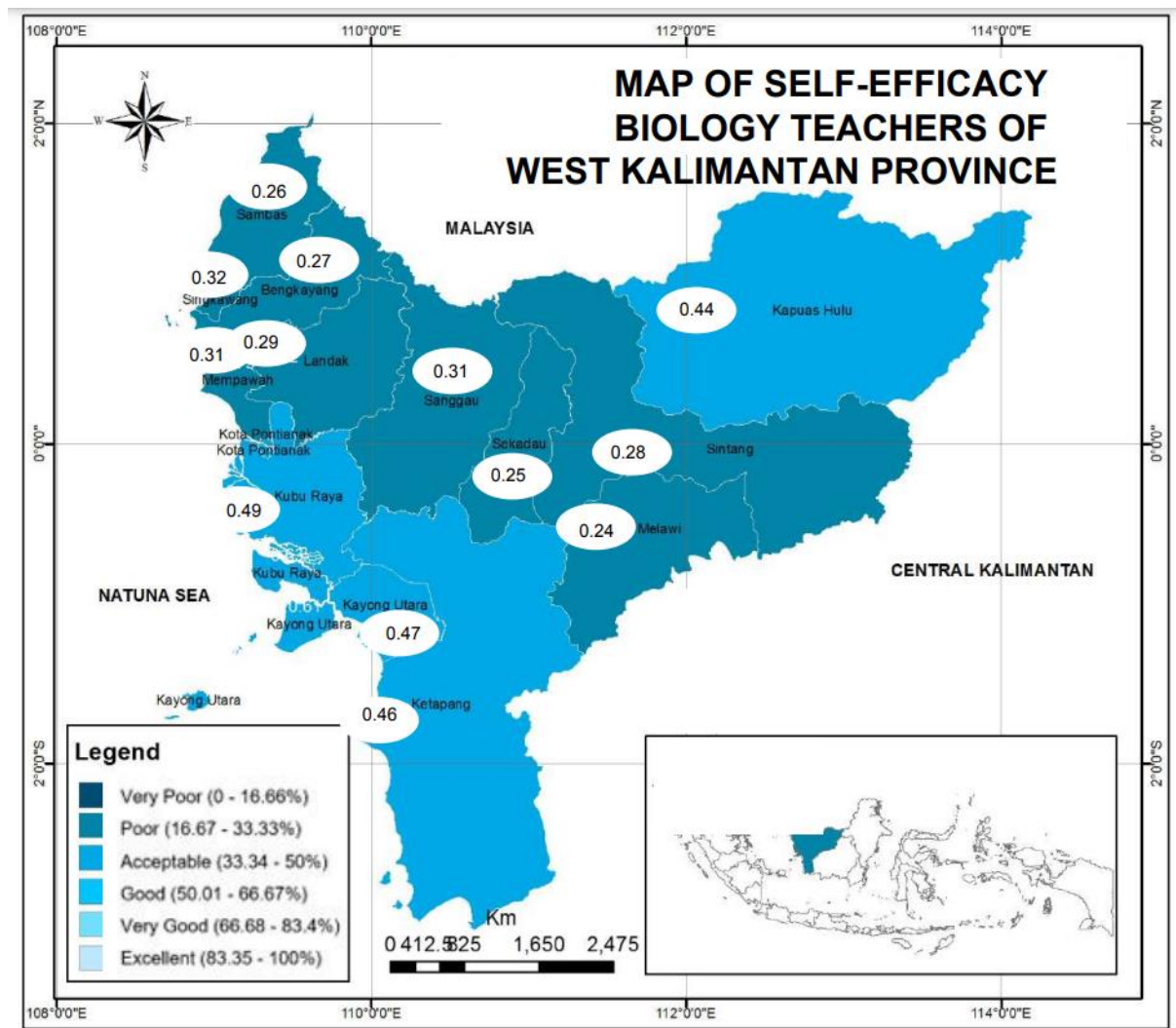
Qualitative data analysis was conducted to describe the self-efficacy picture based on the perspective of prospective biology teachers shown in Figure 2. The data from the self-efficacy questionnaire obtained from the field is quite a lot, so it needs to be recorded carefully and in detail and continued with data reduction. Reducing data means summarizing, choosing the main things, focusing on the important things, and looking for themes and patterns. Thus, the reduced data will provide a clearer picture of the self-efficacy of first-year teachers. Data reduction also makes it easier for researchers to collect further data, and search for it if needed. After the data is reduced, the next step is to present the data. Data presentation is done in the form of brief descriptions, charts, and relationships between categories.



**Figure 2.** Stages of Data Analysis

## Results and Discussion

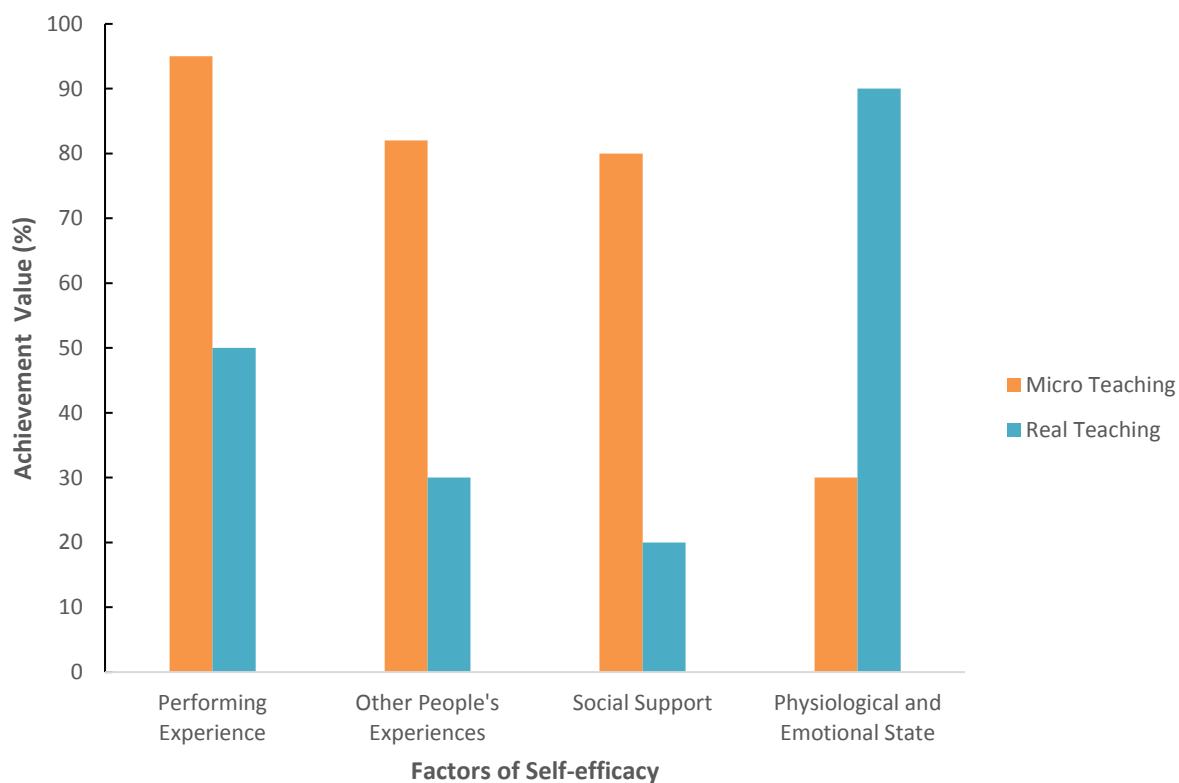
Based on the questionnaire results that have been analyzed using Arc GIS software, it was found that the *self-efficacy* of new biology teachers teaching in schools in the first year is overall low as illustrated in Figure 3.



**Figure 3.** Map of Self-efficacy of Biology Teacher

The low *self-efficacy* of first-year biology teachers could be one of the significant challenges in improving the quality of teaching in the area. Several studies mentioned that the length of time and teaching experience is not in line with the increase of self-efficacy (Chen et al., 2024; Kalinowski et al., 2024; Mensing et al., 2024; Özbilen et al., 2024; Yao & Wang, 2024). Many data show that some biology teachers still do not dare to change the way or strategy of student-centred learning. The aspect of confidence in the learning process includes the skill of managing the class with the chosen learning strategy, knowing that the learning process has occurred in students and there has been a learning environment in the classroom (Caprara et al., 2006; Bandura, 1978; Djigić et al., 2014; Bandura, 1982). Trust in knowledge includes aspects of confidence in determining essential and non-essential material, decisions to go to the next material and play the position of teachers and students as co-constructors of knowledge. Based on the results of interviews with several biology teachers, it was found that there are several factors that contribute to the low *self-efficacy* of biology teachers including 1) lack of training and support which means that teachers do not get adequate training in teaching methods, use of technology,

or development of pedagogical skills, they may feel insecure in carrying out their duties (Tasgin & Dilek, 2023; Kutluca, 2021; Marlina et al., 2024), 2) limited infrastructure conditions such as inadequate classrooms, incomplete facilities, and inadequate equipment, can make teachers feel insecure in providing quality teaching (Schmid et al., 2021), 3) unsupportive learning environment: the learning environment at school and at home can also affect teacher *self-efficacy*. Factors such as lack of support from the principal, student discipline problems, or lack of support from parents can make teachers feel insecure in managing the classroom and achieving learning goals (Marlina et al., 2023), and 4) lack of support from the education community can also affect *self-efficacy* (Kalinowski et al., 2024; Mensing et al., 2024; Yao & Wang, 2024). Teachers may feel isolated or not have access to the resources and support they need (Banas & York, 2014; Chang, 2024). Based on the results of the interviews, it was found that during the 6 months of micro teaching courses, prospective teachers had high self-efficacy in three factors, namely the factors of performance experience, experience of others, and social support. Meanwhile, after teaching at school, the factors that support the development of self-efficacy are physiological and emotional conditions. This is depicted in graphical form in Figure 4.



**Figure 4.** Achievement Value (%) of Each Factor Influencing Self-efficacy Development

Figure 4 provides information that micro teaching is able to increase the self-efficacy of prospective teachers. Self-efficacy at the beginning of learning is not yet visible, especially in designing lessons. Some activities to hone teaching skills are observing



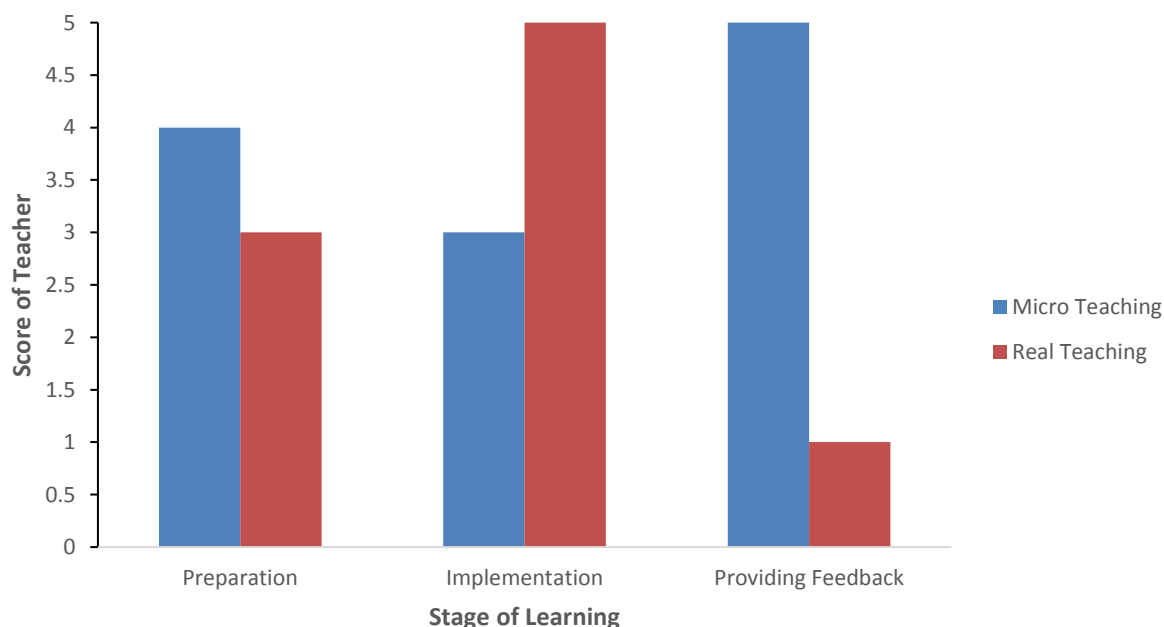
learning from various references (Banas & York, 2014; ulianti et al., 2021; Almutairi, 2020; Simsek & Yazar, 2019). The results of learning observations are then discussed and analysed in groups. However, this activity has not succeeded in improving teaching skills, especially student-centred learning. When designing lessons, prospective teachers still use many references available on the internet and previous plans as a reference so that learning activities will be in accordance with student characteristics. Micro teaching is able to foster collaboration and cooperation between prospective teachers so that they can provide input and suggestions to each other. The more input and suggestions given, the more confident prospective teachers will be in carrying out teaching practices (Gezer, 2015; Chang, 2024; Yüce, 2023; Pfitzner-Eden, 2016). The experience of appearing during micro teaching turns out to be the most dominant factor in shaping the self-efficacy of prospective teachers compared to real teaching (Batkın Ertürk et al., 2024; Bortes & Giota, 2024; Chen, 2024; Pierce et al., 2024). In the experience of appearing in micro teaching, each prospective teacher is observed by colleagues and also the supervising lecturer who plays an important role in preparing the learning design (Bozkurt & Yiğit, 2022; Dzormeku et al., 2024; Jean DeFeo et al., 2024; Segura et al., 2023). Prospective teachers become more confident when appearing because the learning design is clear. This is different from real teaching, which of course designs learning independently. When designing learning independently, teachers do not have friends to discuss with so they are still less confident when teaching. Input and suggestions in designing learning greatly determine teacher confidence when performing teaching (Dzormeku et al., 2024; Lai et al., 2023; Mikeska et al., 2023).

Other people's experiences and social support also affect the increase in self-efficacy of prospective teachers during micro teaching (Kirbulut & Bektas, 2011; Sarigöl & Akdeniz, 2014; Serbin, 2023; Yu et al., 2023). In micro teaching, each prospective teacher is required to be an observer and observe the teaching and learning process that occurs. In this observation process, prospective teachers can find good practices that can contribute to the development of their self-confidence. They become more aware of how to activate students and can identify patterns of interaction that are established in learning. In micro teaching, prospective teachers also have social support from their surroundings because they have the same learning goals so they can collaborate to find appropriate learning strategies (Serbin, 2023; Batkın Ertürk et al., 2024; Bortes & Giota, 2024; Chen, 2024; Pierce et al., 2024). While in real teaching, observation activities are rare and can be said to be not carried out. This is related to the many tasks of each teacher so that it is not possible to conduct observations in other classes and each teacher is less involved in the learning designs of other teachers. The most dominant factor in real teaching is the physiology and emotions of the teacher (Pierce et al., 2024; Batkın Ertürk et al., 2024; Bortes & Giota, 2024; Chen, 2024). During micro teaching, learning activities tend to be conditioned so that there is less sense of belonging and closeness to students. Different from real teaching, because the class being taught is a real class, every activity is a discovery and not engineered.

The *self-efficacy* instrument developed in this study consists of 6 indicators. The *self-efficacy* indicators measured in this study are confidence in designing learning strategies, confidence in designing learning that involves students, confidence in classroom management, confidence in accepting changes in the education curriculum, confidence in participating in self-development activities, and confidence in developing innovative work/

scientific publications. Micro teaching classes have a greater impact on increasing *self-efficacy* than real teaching. The highest increase was in the performance experience factor. Based on two previous research findings, it was found that prospective teachers tend to fully involve themselves and concentrate fully in teaching practice especially when performing and this can foster a culture of responsiveness (Chang, 2024; Yüce, 2023). Based on the results of interviews with prospective biology teachers obtained information that the *micro teaching* framework supports prospective biology teacher students to dare to design strategies that involve students in learning. Students collaborate in *micro teaching* groups to find the right way to condition students to be ready and actively involved in learning. This is in accordance with the findings of several studies that *micro teaching* helps prospective teachers to pay more attention to learning strategies, identify structures that support learning, and develop material-based planning (Koberstein-Schwarz & Meisert, 2022; Parks, 2008; Pierce et al., 2024; Sims & Walsh, 2009).

Micro teaching seems to be able to prioritize the role of the model teacher as a teacher by leading to three types of *self-efficacy*. These three types of *self-efficacy* are (a) *behavioral self-efficacy*, which is a belief about the possibility of good teaching behavior, (b) *normative self-efficacy*, which is a belief about normative expectations and motivation to create a pleasant atmosphere for students, (c) *control self-efficacy*, which is a belief about the existence of factors that will facilitate or hinder the performance of teaching behavior (Khan & Idris, 2019; Parks, 2008). Based on the results of the interviews, information was also obtained that the most supportive stages in increasing the *self-efficacy* of prospective teachers were at the *preparation* and *feedback* stages as illustrated in Figure 5.



**Figure 5.** Self-efficacy in micro teaching and real teaching

Self efficacy is not only related to belief in skills and abilities, but also involves self-acceptance, self-esteem, and a sense of self-worth (Erkol & Ugulu, 2014; Eachus & Cassidy, 2006; Postareff et al., 2007). It allows teachers to feel comfortable, recognise and understand strengths and weaknesses, and have the resilience to face criticism or failure without feeling crushed (Banas & York, 2014; Marlina, 2015; Yulianti et al., 2021; Simsek & Yazar, 2019). At the *preparation* stage, students are given the opportunity to convey their experience in designing lessons and each student is free to express their opinions (Chang, 2024; Sukawati, 2021). Based on the opinions of prospective biology teachers from the results of interviews, information was obtained that in the *preparation* process prospective teachers are required to be good at communicating, thinking ahead, providing ideas on how to organize a class, or providing examples of how to be a nurturing figure. In the *preparation* process, prospective teachers also ensure that the lesson plan must be able to bridge everything that is a matter of students running smoothly. During the collaboration process, the *self-efficacy of prospective* teachers will further increase (Yüce, 2023; Chang, 2024; Poellhuber et al., 2008). Teacher candidates who have high *self-efficacy* will be enthusiastic or strive to demonstrate their ability to achieve success. Conversely, if prospective teachers have low *self-efficacy*, they tend to avoid assignments or carry them out half-heartedly so that they will quickly give up if they encounter obstacles. In this case, educators in higher education certainly need to have high *self-efficacy* as well to prepare challenging learning for prospective teachers (Ahola et al., 2023; Hsu et al., 2021).

Self-efficacy is an important factor that contributes to the quality of effective learning (Koberstein-Schwarz & Meisert, 2022; Hsu et al., 2021; Parks, 2008; Sims & Walsh, 2009). Confident teachers tend to be better able to deal with challenges and difficulties in the teaching and learning process, and can have more influence on students' academic development and achievement (Serbin, 2023; Batkın Ertürk et al., 2024; Bortes & Giota, 2024; Chen, 2024; Chang, 2024; Yüce, 2023; Pierce et al., 2024). Based on the results of the interview, it was also obtained information that there were many very valuable experiences when participating in the feedback stage. One of them is the different characters of prospective teachers, some are smart in solving problems but shy or lack confidence in conveying ideas. There are teacher candidates who are hyperactive in designing lessons but when given the opportunity to express their opinions they do not like it, and there are also those whose wishes or ideas must always be obeyed. So many differences in the nature and habits of prospective biology teachers in the preparation stage, of course it is one of the challenges for prospective teachers as educators to build discussions effectively and design learning collaboratively (Pierce et al., 2024; Marlina et al., 2023; Hsu et al., 2021). With members who have different opinions, of course, each group is required to be able to determine the best learning design that is in accordance with the agreement of group members based on the suitability of the characteristics of the material to be taught (Ahola et al., 2023; Pierce et al., 2024; Batkın Ertürk et al., 2024; Yüce, 2023).

Self-efficacy in teaching is also built in the teaching display stage (Bortes & Giota, 2024; Chen, 2024; Chang, 2024; Yüce, 2023; Pierce et al., 2024). In the teaching display stage, each member of the micro teaching group is given the opportunity to be able to explain the learning process in accordance with the lesson plan designed in the preparation stage. This ability to explain is tested in the teaching display stage (Marlina & Hamdani,

2023; Hsu et al., 2021). There are some prospective teachers who feel nervous and feel insecure when explaining the learning process ( Hsu et al., 2021; Marlina et al, 2023). This was experienced by all prospective biology teachers when they first conducted a learning simulation. It cannot be denied by all prospective biology teachers that when speaking and explaining the learning process that will be carried out, the atmosphere faced is very different compared to the atmosphere when collaborating in the preparation stage (Almutairi, 2020; Hsu et al., 2021; Yulianti et al., 2021).

The feedback stage provides an opportunity for prospective biology teachers to dare to speak in front of the class. To be able to dare to speak in front of the class, prospective biology teachers must have a strong mentality and self-efficacy. To build strong mental and self-efficacy, it must first begin with getting rid of negative thoughts and fears that exist in themselves. Based on the experience of prospective teachers from the results of interviews obtained information that there are four ways that prospective biology teachers can build self-efficacy when teaching, namely always practicing, being calm, focusing, and interacting with students (Abidin et al., 2020; Chang, 2024; Marlina et al., 2024). The preparation and feedback stages in micro teaching provide opportunities for prospective biology teacher students to practice explaining, being calm, and focusing (Abidin et al., 2020). These two activities are not owned or paid less attention in real teaching so that they do not feel confident in teaching. The existence of input and response from peers is a factor that can develop teacher self-efficacy in schools. Teachers who have practiced self-efficacy can help other teachers to overcome difficult situations more optimally, so that classroom management becomes more effective.

## **Conclusion**

Research on teacher candidates' self-efficacy has been widely reported but no one has reported on the factors that influence self-efficacy during micro teaching and real teaching. The analysis of previous research has also not described the development of self-efficacy during micro teaching which is correlated with real teaching. The results of this study report interesting things that the factors that support the development of self-efficacy during micro teaching are more dominant than during real teaching in schools. It can be concluded that micro teaching is an efficient technique in increasing the self-efficacy of prospective biology teachers. At the time of micro teaching, prospective teachers have high self-efficacy in three factors, namely the experience of performing, the experience of others, and social support. Meanwhile, after teaching in schools (real teaching), factors that support the development of self-efficacy are physiological and emotional conditions. Real teaching lacks facilities and infrastructure for teachers to discuss with each other in developing learning in the classroom. Each teacher has full responsibility for the teaching strategies implemented in his/her class without any suggestions for improvement and input from other teachers. Having responsibility for the classroom does not contribute to self-efficacy in teaching. What teachers need is a learning community at school that can provide space for all teachers to collaborate and reflect so that all teachers can provide input and suggestions for improving classroom management, pedagogy, and the use of technology in the classroom.

## Acknowledgement

We want to thank the students at the University of Tanjungpura, the students in the biology education study program, biology teacher in West Kalimantan Province, and all of the experts who validate the research instruments.

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