Conference Paper

Preparation and Self-Efficacy of Science Student Teachers to Teach in English

Monika Sidabutar

Educational Technology, Universitas Negeri Yogyakarta

ORCID:
Monika Sidabutar: https://orcid.org/0000-0001-6846-175X

Abstract

The aim of this study was to examine the preparation of science student teachers before teaching in English, and to determine their self-efficacy in teaching in English. Data were collected using the triangulation method, through questionnaires, interviews, and documentation studies on student teacher practicum portfolios. This was a descriptive qualitative study and data were analyzed using the interactive analysis method of Miles and Huberman (1984) which has three components of analysis, namely data reduction, data presentation, and drawing conclusions or verification. The results showed that there were 6 preparations made by science student teachers before teaching in English: 1) determine the topic of the material being taught and look for the material; 2) study the subject matter in depth; 3) compile lesson plans in English; 4) prepare tools and materials for teaching including handouts, props, demonstrations, and science practicum; 5) search for common terminology in science related to the topic being taught; 6) practice teaching science in English, namely doing teaching exercises in English. The results also showed that the science student teachers' level of self-efficacy in teaching science in English varied from low to high: 45.8% had high self-efficacy levels; 39.5% had moderate levels; and 9.0% had low self-efficacy.

Keywords: self-efficacy, science student teacher, teaching preparation, readiness

Corresponding Author:
Monika Sidabutar
monika.sidabutar@uny.ac.id

1. Introduction

Currently, many schools provide learning by using English as the language of instruction, although it cannot be called an international standard school because it is no longer valid. It does not make the number of schools with a similar pattern decrease in number, it is actually increasing. Parents send their children to study at schools that use English as a medium of instruction, hoping that their children will not only master the subject matter such as mathematics and science but also improve their English language skills. The reality that happened on the ground was not in line with what was expected. Many parents complain that sometimes their children who have taken English tutoring courses are better in speaking English than their chemistry or biology teachers. It means that the teacher quality did not meet the parents' expectation, especially for those who teach in

the English Schools. They are expected not only able to teach science or other material well but also speak English fluently [1, 2].

Based on Government Regulation Number 19 of 2017 concerning amendments to government regulation number 74 of 2008 about Teachers, Article 10, states that a teacher is required to have four competency standards, namely pedagogic competence, personality competence, social competence, and professional competence. According to Djiwandono [6], there are two aspects that must be prepared by the teacher, namely: (1) studying the subject itself and (2) choosing wisely the materials that can be passed on to students. Yamin and Ansari (2008) add that as a teacher, teachers must be able to help their students' development and to master the science. The maximum performance of a science teacher is strongly influenced by careful preparation before teaching [9] and the teacher's self-efficacy and motivation to teach science in English [7]. Self-efficacy is born from a belief in one's ability to act in facing life's problems. If a science teacher has high self-efficacy and motivation plus solid competence in the field of science, it is hoped that the teacher will produce maximum performance in class, for that it needs careful preparation for the best results. Self-efficacy grows in the framework of a theory called social cognitive theory coined by Bandura in 1986. This theory states that the level of self-efficacy depends on the judgment of others and their interactions with certain situations [17]. Self-efficacy is so important because self-efficacy also supports someone to commit to doing their job [11]. Although self-efficacy has a very important role in one's performance, having high self-efficacy in one area does not mean having high efficacy in other fields. So, if a science teacher has solid competence in the field of science, it does not necessarily mean that he has the same performance when it comes to teaching science in English. After seeing the important role of science teachers in education, the author was interested in researching science student teachers who are required to be able to teach science in English. A preliminary research has been conducted to find out the opinion of student teachers of English class at a private university about their willingness to teach at an international standard school. It was found that around 55% of student teachers reacted negatively when asked if they were ready to teach the subject in English, and around 60% of them reacted negatively when asked about their willingness to be placed in an international standard school even though their English Proficiency Test score are satisfactory around 400 - 500. This research was conducted to know the student teachers' preparation before teaching in English, and to determine how the self-efficacy of students teaching science in English were.

2. Related Works/Literature Review

Bandura (1994), a psychologist in his theory of "social cognitive theory" says that self-efficacy is a person's belief in their own ability to produce a level of performance that affects all events that interfere with his life (in [15]). The level of self-efficacy of a person depends on the judgment of others and their interactions with certain situations [17]. Self-efficacy is one of the strongest motivational predictors to find out how well someone shows their performance in all situations. When working on a task, a person with high self-efficacy struggles to complete the task rather than avoiding it for various reasons, although the high self-efficacy of a person in certain fields does not guarantee that the person also has high self-efficacy in other fields [8]. Luthans [10] says that the concept of self-efficacy is very different from the concepts of self-esteem, hope motivation and locus of control.

The difference between self-efficacy and self-esteem lies in the purpose of the beliefs they generate. Self-efficacy is oriented to one's belief in one's ability to perform tasks and is limited to certain contexts, whereas self-esteem is oriented to one's belief in something valuable and is a global construction of life evaluation. Self-Efficacy and motivation seem to have the same meaning; namely maximum effort produces maximum performance. The difference is seen in the basic concept, self-efficacy has a wider range and involves several other perceptions such as ability, expertise, knowledge, experience with certain tasks, and task complexity. And it involves psychomotor reactions such as emotions, stress, and physical exhaustion. Robbins [14] states that a person with high self-efficacy responds positively to negative feedback by increasing their effort and being more motivated, while people with low self-efficacy prefer to reduce their effort when negative feedback is given. If a person experiences success in doing a task given by his superior, it increases the self-efficacy of that person and considers that success is repeated if he does different tasks and vice versa. If someone has failed in carrying out his duties, automatically he forms the thought that he is also failing if he does the task that different [18].

Self-efficacy has a very strong effect on motivation to learn. As an illustration, when compared to students who have low self-efficacy, students with high self-efficacy are more challenged to do their job, show more effort, last longer, have more strategies and generally show better performance [7]. Woolfolk and Hoy [19] conducted research on teachers regarding their personal evaluation of their performance. This study found that they evaluated their own performance using two self-efficacy tests. First, teachers evaluate their teaching efficacy, which is related to a sense of trust in the educational

process that affects students at important times. Second, teachers evaluate their personal efficacy in teaching (personal teaching efficacy), which is related to the belief that teachers can contribute to significant changes in their students [5].

Personal teaching efficacy is the teacher's belief in his ability to bring students to succeed and learn about all matters related to general knowledge [5]. Teachers who have high personal teaching efficacy are fully responsible for success, and failure of the instructional it implements [7]. Teaching self-efficacy or contextual efficacy is related to the teacher's ability to deal with limited factors outside of himself when he teaches. That is, the teacher's belief in his ability as a professional teacher is not only in presenting subject matter in class, but also in terms of manipulating (exploiting) the limitations of space, time and equipment related to the teaching-learning process. strategy, have a sense of responsibility high responsiveness and giving time to be more focused on learning, and feel more confident when working with parents of students [5]. Eggen and Kauchack [7] stressed that teachers with low self-efficacy are clearly more likely to blame low scores on students with low abilities, less concern for the school environment, less cooperation with school administrators and other external causes.

According to Helsin and Klehen [8] high self-efficacy improves a person's work quality, relates quickly, and makes good decisions even when under pressure. However, low self-efficacy leads a person to inconsistent and varied analytical thinking which reduces the quality of that person's problem solving. Even though problem solving is a key competency in improving one's social skills. Self-efficacy is very influential on a person's attitude in carrying out their responsibilities, so it is important for someone to have high self-efficacy to maintain their performance in the world of work, especially for a teacher because they have an important task, namely a role model for their students. It is very possible that something very fatal happens when a teacher has low efficacy, because if someone who is in doubt about his or her ability to behave can be called a person who has low self-efficacy [3]. Teacher's self-efficacy in instructional is related to teacher beliefs in their ability to help students to learn [16]. Schunk, Pintrich, and Meece [16] added that teachers with high self-efficacy are more likely to choose activities that are challenging, help students to progress and survive with students with problems, and have a series of strategies to help students learn and motivate them to endure difficult tasks. Thus, according to the literature has been studied above the characteristics of teachers who have high self-efficacy are: i) Studying various teaching strategies to support learning and allocating learning time better; ii) Able to work together with parents to improve student learning; iii) Able to increase the motivation of students who have low abilities in their class; iv) Paying attention to the school environment, able to

work together with school administrators; v) Professional at work, able to relate quickly and able to make decisions even under pressure; vi) Able to help students to progress and be able to survive with students who have problems vii) Able to motivate students to endure difficult tasks.

According to Maddux [11], a person's self-efficacy can be measured in three dimensions, namely magnitude, strength, and generality. Magnitude is a dimension related to a person's ability to do a given task. For example, the teacher's belief that he is capable of doing the tasks assigned to him as an educator. Strength is a dimension related to how much confidence a person has in acting. For example, a measure of a teacher's confidence in his ability to solve problems related to students who hate their lessons. Generality is a dimension related to a person's belief in acting in accordance with expectations. For example, a teacher's belief in himself to try to be an effective teacher. In this study, only discussing the dimensions of strength possessed by student teachers in teaching science in English.

3. Material & Methodology

3.1. Data

Data were collected using instruments with the triangulation method, namely questionnaires, interviews, and documentation studies on student teacher practicum portfolios. The questionnaire was prepared based on self-efficacy indicators, namely the respondent's belief that he was able to (i) influence decision making; (ii) influencing school resources; (iii) instructional; (iv) disciplinary; (v) involving parents; (vi) involve the community; (vii) creating a positive climate in schools. In this study, the questionnaire was distributed to all science student teachers who had taught in English either at the practicum location or in the Microteaching Course. Interviews were conducted with 10 respondents, as well as 6 colleagues and 6 lecturers that randomly selected. This interview aimed to find out the direct opinion of student teachers about their preparation in preparing subject matter and to find out their self-efficacy in teaching science in English. A documentation study was carried out on the respondent's portfolio which aims to find their preparation process such as lesson plans, feedback from mentors and teaching aids used when teaching science in English during the teaching practicum.

3.2. Method

The method used in this research is descriptive qualitative to explain the observed situation in a more specific way by focusing on the observed variables [12]. The credibility test is carried out by checking data from several related sources through interviews, namely to the relevant lecturers and colleagues, which aimed to ensure the data from the questionnaire filled out by student teachers is correct in accordance with the actual reality. Meanwhile, the dependability test is carried out with experts' judgment who audited all research activities. The analysis technique used in this study is the interactive analysis of Miles and Huberman [21] which has three components of analysis, namely data reduction, data presentation, and drawing conclusions or verification. Data is analyzed through rigorous selection, summarizes, and classifies them in broader patterns and so on. Meanwhile, the presentation of data is the second important flow of interactive analysis activities. The third important analytical activity is to draw conclusions or verification. This activity is carried out in an interactive form with the data collection process as a continuous, repetitive, and continuous process forming a cycle.

4. Results and Discussion

4.1. Results

4.1.1. Student teacher's preparation before teaching science in english

Out of the 20 questionnaires that had been distributed, 4 of them did not return, 16 questionnaires were obtained which contained information about their preparation and self-efficacy of teaching in English. Teaching preparation data is presented in Table 1 and the respondent's self-efficacy is presented in Table 2.

TABLE 1: The percentage of the level of preparation for teaching science student teachers in English.

Variable	Level (%)		
	Very Good	Fair	Poor
Respondent percentage	71.3	19.7	9

Table 1 shown that about 71.3% of science student teachers did very well in preparation for teaching, 19.7% did adequate teaching preparation and 9% did not make meaningful preparations. The interviews result with 10 respondents who were randomly selected showed that most of student teachers had prepared subject matter well even though there were some who still needed to deepen their knowledge of science

material. It also found that 80% respondents had attended non degree English Courses. The preparations made by the respondents were looking for materials / materials on a topic to be taught; read textbooks and study subject matter in depth; prepare tools and materials for practicum and teaching including lesson plans, handouts, presentation materials, and teaching aids; search for terms in English (terminology) which was common in science related to the topic; and practice teaching science in English.

There were 6 preparations made by student teachers before teaching in English, namely, the first preparation is determining the topic of the material being taught and looking for the material. It was found that 20% of student teachers searched for good material from the internet after determining the desired topic, while other student teachers searched for material from textbooks. The second preparation is to study the subject matter in depth. Based on the research, this preparation was carried out by approximately 87.5% of student teachers. The third preparation is compiling lesson plans in English. It was found that 70% of student teachers admitted to making English lesson plans in the series of preparations they did. The fourth preparation is preparing tools and materials for teaching including handouts, props, demonstrations, and science practicum. About 30% of student teachers prepare activities for science learning, one of them prepares a demonstration as an activity to deepen students' understanding of the concepts of science subject matter being taught, while two other student teachers prepare laboratory labs as activities. The sixth preparation is to practice teaching science in English, it was found that more than 60% of student teachers did teaching exercises in English.

Based on the interview results with respondents' colleagues, it was found that more than 50% of student teachers showed good performance in the Microteaching Course. Although some students need practice in English and deepen their knowledge of the science subject matter. The lecturer said that the preparation that must be done by students before teaching science is to determine and look for the material / topic presented; choosing a learning method; preparing a presentation; meet the rubric that has been given; draw up lesson plans; practice the delivery language; understand scientific terminology related to the topic presented. When viewed from the perspective of mastery of subject matter, the student teacher's ability was already good even though they must not be satisfied because science continued to develop rapidly so they are expected to continue learning. When viewed from their ability to speak English, the lecturer supports the opinion of colleagues that there are some who are already able to speak English very well, although there are still many of them who use bilingualism when making presentations in front of the class. The results of the documentation study, it

was found that the portfolio provided evidence that the student teachers have actually carried out science learning in English, made lesson plans in English and provided teaching aids to support learning. In addition, it was found that the mentor provided good to excellent feedback for the presentation of student teachers in teaching science in English.

4.1.2. Science Teacher Students Self-Efficacy in Teaching with English

This study only measures the dimensions of the efficacy of the strength to measure the self-efficacy of student teachers in teaching science in English, which discusses how strong a student teacher's belief in his own ability to act to carry out his duties as a teacher. The dimension of strength efficacy is measured by several criteria, namely, self-efficacy in decision making and influencing school resources, instructional, disciplinary, involving parents, involving the community, and creating a positive climate. The results of data analysis on the student teacher self-efficacy questionnaire in teaching science in English by 16 student teachers are presented in Table 2.

TABLE 2: The level of self-efficacy of science student teachers in teaching science in English.

Variable	Strength Level (%)		
	High	Middle	Low
Respondent percentage	45.8	39.5	14.7

From Table 2, it is known that around 45.8% of student teachers have high self-efficacy in teaching science in English, 39.5% feel they do not have high self-efficacy in this field and 14.7% feel they have low efficacy in teaching science in English. Based on interviews with respondent colleagues, student teacher self-efficacy varies widely from needing support to high levels. In addition, the science subject lecturer said that the student teacher self-efficacy in teaching science was quite high even in English. Although in fact there are still many who needed practice and deepened the content, some respondents were able to teach science in English.

Furthermore, this study found that the student teacher efficacy in school instruction varied widely. About 75% believe that they have high efficacy to ensure students are still willing to do difficult science assignments. However, only 31.3% of students believed they have high efficacy to help students who do not receive support from home. More than 50% of students stated that their self-efficacy was high if the question was related to the way students' attitudes were handled in the classroom. For example, dealing with students who are less motivated to do science homework. About 68.8% of students feel

confident that they are able to make students able to work together. Based on the data obtained, 50-75% of student teachers have high instructional efficacy. The high strength of student teacher instructional efficacy means that they are able to motivate students with low abilities in science in the English class [7]. From a disciplinary point of view, it was found that about 50% of students thought that they were capable of being good discipline in controlling student attitudes in the classroom but only 31.3% were sure that they were able to solve problems in the school environment, outside the classroom. In other words, student teachers who choose to be hesitant may consider themselves to be at a moderate level of efficacy. The high strength of student teacher disciplinary efficacy means that they are able to control student attitudes and have good classroom management [7].

In terms of involving parents and the community, more than 50% of students claim to have moderate levels of self-efficacy when dealing with students' parents, around 20% have high self-efficacy and the rest claim to have low self-efficacy. The high power of efficacy in involving parents and the student teacher community means that they are able to face and cooperate well with parents [7]. Student teachers who have high self-efficacy are more confident when working with parents [5]. The same thing also happened to self-efficacy in involving the community into schools, more than 50% of students claimed to have self-efficacy which was at a moderate level in involving the community in schools, especially business people, churches and universities. In terms of creating a positive climate, it was found that around 68.8% of students claimed to have high efficacy to make students believe in their teachers and 56.3% of students claimed to have high efficacy to help other teachers to improve their teaching abilities. About 75% of students feel they have high efficacy to make students confident that they can do good school work.

4.2. Discussion

Based on the research, there were 6 preparations made by science student teachers before teaching science in English. The first preparation is determining the topic of the material being taught and finding the material, which is sourced from the internet and textbooks. At this stage, student teachers consult with mentor teachers regarding their expectations or learning outcomes to be achieved from learning. The second preparation is in the form of studying the subject matter in depth. Based on the results of the questionnaire, this preparation was carried out by approximately 87.5% of student teachers by reading more than one English textbook. This data was found in a

documentation study with evidence of several photocopies of parts of science textbooks that were used by student teachers as a reading source. The third preparation, compiling lesson plans in English. There is evidence of English lesson plans in the practicum portfolio documentation. The fourth preparation is preparing tools and materials for teaching including handouts, props, demonstrations, and science practicum. Student teachers prepare activities for science learning, including preparing demonstrations as activities to deepen students' understanding of the concept of science subject matter being taught, and preparing laboratory labs as activities. The fifth preparation is a search for common terminology in science related to the topic being taught. The sixth preparation is to practice teaching science in English, namely doing teaching exercises in English. About 45% of student teachers have high self-efficacy in making decisions and influencing school resources. The high self-efficacy of student teachers in this field encourages the improvement of the quality of their science teaching in class. In addition, it also increases the student teacher's ability to relate so that problems in the classroom can be resolved properly [8]. The results of the interviews showed that on average student teachers with high levels of self-efficacy were willing to be placed in international schools or schools that demanded teachers to teach bilingual.

Based on the study, it was found that student teachers who had high efficacy believed themselves to be able to ensure that students were still willing to do difficult science assignments, help students who did not receive support from home and were able to handle student attitudes in the classroom. About 50-75% of student teachers have high instructional efficacy. The high strength of student teacher instructional efficacy means that they are able to motivate students with low abilities in science in the English class [7]. Teachers with high self-efficacy in instructional are more likely to choose activities that are challenging, help students to progress and survive with students with problems, and have a series of strategies to help students learn and motivate them to endure difficult tasks [16].

About 50% of students believe that they are capable of being good discipline in controlling students' attitudes in the classroom and are sure that they are able to solve problems in the school environment, or outside the classroom. The high strength of student teacher disciplinary efficacy means that they are able to control student attitudes and have good classroom management [7]. In terms of involving parents and the community, around 20% of students believe themselves to have a high level of self-efficacy when dealing with students' parents. The high power of efficacy in involving parents and the student teacher community means that they are able to face and cooperate well with parents [7]. Student teachers who have high self-efficacy are more

confident when working with parents [5]. Meanwhile, the high self-efficacy of students in community involvement in schools has enabled them to involve the community in schools, especially business people, religious organizations, and universities. In terms of creating a positive climate, around 68.8% of students have high efficacy to make students trust their teachers and help other teachers improve their teaching abilities. Also, about 75% of students feel they have high efficacy to make students confident that they can do good school assignments. The high self-efficacy of students in creating a positive climate in schools can improve the quality of learning both between teachers and students or teachers and teachers.

5. Conclusion

Based on the research, there were 6 preparations made by science student teachers before teaching science in English. The first preparation is to determine the topic of the material being taught and look for the material. The second preparation is in the form of studying the subject matter in depth. The third preparation, compiling lesson plans in English. The fourth preparation is preparing tools and materials for teaching including handouts, props, demonstrations and science practicum. The fifth preparation is a search for common terminology in science related to the topic being taught. The sixth preparation is to practice teaching science in English, namely doing teaching exercises in English. The level of self-efficacy strength of science student teachers in teaching science in English varies from low to high where around 45.8% of science student teachers have high self-efficacy levels, 39.5% on moderate levels and 9% on low self-efficacy. Student teachers who have high efficacy believe themselves to be able to ensure students are willing to do difficult science assignments, help students who do not receive support from home and are able to handle student attitudes in the classroom.

Acknowledgement

References

[1] Anam S, Susanti H. Menggenjot mutu kepala sekolah rintisan SBI [Internet]. Majalah Pena. [Published on 31 Maret 2008, cited 2018 March 31]. Available from: https:

//www.slideshare.net/sekolahmaya/pena-pendidikan-13.

[2] Anam S. Wawancara Surya Dharma, MPA, Phd, Direktur Tenaga Kependidikan memberi nilai tambah rintisan SBI [Internet]. Majalah Pena Pendidikan; 2008. Available from: https://www.slideshare.net/sekolahmaya/pena-pendidikan-12.

[3] Bandura A. Self-efficacy. Stanford University Press. 1994.

[4] Bandura A. Cognitive psychology and instruction. Bruning RH, Schraw GJ, Norby MM, Ronning RR, editors. Upper Saddle River, NJ: Prentice Hall; 2004. Social foundations of thought and action: A social cognitive theory.

[5] Bruning R H, Schraw G J, Norby M M, Ronning R R. Cognitive psychology and instruction, 4th edition. Pearson Merrill Prentice Hall; 2004.

[6] Djiwandono SEW. Psikologi pendidikan. Penerbit Grasindo; 2002.

[7] Eggen P, Kauchak D. Education psychology. Windows on classrooms. Pearson Prentice Hall, Inc; 2007.

[8] Helsin PA, Klehen U. Encyclopedia of industrial/organizational psychology. Rogelberg SG, editor. Thousand Oaks. Self efficacy; p. 705-708. 2006.

[9] Johnson L. Pengajaran yang kreatif dan menarik. Membangkitkan minat siswa melalui pemikiran. Penerbit PT Indeks; 2009.

[10] Luthans F. Analisis hubungan antara faktor pengalaman, pemodelan, persuasi social, keadaan fisik-psikologis dan self efficacy. Erlangga, UPH-Press; 2008. Perilaku organisasi.

[11] Maddux JE. Handbook of social and clinical psychology: The health perspective. Forsyth CR, editor. Self efficacy; p. 55-57. 1991.

[12] Nasution S. Penelitian ilmiah. Metode research. Ghalia Indonesia; 2006.

[13] Pajares E. Motivation in education. Theory, research, and application. New Jersey: Pearson Prentice Hall, Inc; 2008. Self efficacy beliefs in achievement settings. Review of educational research.

[14] Robbins SP. Organizational behavior. Pearson Education, Inc; 2003.

[15] Santrock JW. Educational psychology. 3rd edition. McGraw Hill; 2008.

[16] Schunk DH, Pintrich PR, Meece JL. Motivation in education, theory, research and application. Pearson Prentice Hall, Inc; 2008.

[17] Schunk DH, Pajares F. The development of achievement motivation. Wiegfield A, Eccles J, editors. Academic Press. The development of academic self-efficacy. 2002.

[18] Siska S. Hubungan antara self-efficacy, pola asuhan dan prestasi belajar bahasa inggris siswa SDN Bekasi Jaya XIV. Universitas Pelita Harapan; 2009.

[19] Woolfolk AE, Hoy WK. Cognitive psychology and instruction. Pearson Merrill Prentice Hall; 2004. Prospective teacher's sence of efficacy and beliefs about control.

[20] Yamin HM, Asari BI. Taktik mengembangkan kemampuan individual siswa. Gaung Persada Press; 2008.

[21] Miles MB, Huberman AM. Qualitative data analysis: A sourcebook of new methods. Sage Publications; 1984.