Research Article

THE EFFECT OF MOBILE TECHNOLOGY-ASSISTED FLIPPED CLASSROOMS ON SELF-EFFICACY IN THE INFANTRY OFFICER SCHOOL

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Abstract

The main purpose of the study was to examine the effect of flipped classroom assisted by mobile technology on the self-efficacy of Infantry Officer School of Indonesian Marine Corps students. Experiments were used in this study. the subjects were all 133 Infantry Officer School of Indonesian Marine Corps Student Basic Stage Advanced Group, who were grouped into two groups: the experimental group, 67 people, and the control group, 66 people. The learning design of the flipped classroom assisted by mobile technology is applied to the experimental group. In contrast, the control group is subject to conventional learning models implemented in previous learning. Data collection techniques used by researchers are questionnaires and tests. The questionnaire is used to measure self-efficacy. Meanwhile, the test method collected data about students' conceptual comprehension abilities in the Map Reading material. The data collected about self-efficacy in conceptual comprehension skills will be analyzed using the t-test. The use of the flipped classroom assisted by the mobile technology model can have a positive influence on student self-efficacy. It is evidenced by the results of the t-test that there is a significant difference in the average self-efficacy results between experimental group students (M=51.46; SD=2.298) and control group students (M=41.15; SD=2.910), with $t(131)= 22.694$, $p=<0.001$.; Value Sig. (2-tailed) 0.00 <0.05 show a significant difference between self-efficacy in the flipped classroom assisted by mobile technology and conventional classroom.

Keywords: Flipped-classroom, Mobile technology, Self-efficacy, Infantry -officer schools.

INTRODUCTION

Infantry Officer School of Indonesian Marine Corps is one of the educational programs held at Kodiklatal to form Marine Corps Navy officers who are expected to be able to lead platoon-level troops both in daily service in units and operational assignments. The Curriculum infantry Officer School of Indonesian Marine Corps to emphasizes that the goal to be realized by the educational institution is to educate and equip prospective Marine Corps Navy officers to become soldiers who fight for the Sapta Marga and have the physical ability and professionalism of the marine dimension with technical and tactical knowledge and skills. In the infantry field, they can carry out their duties as Infantry Platoon commanders or other positions of the same rank. Mastery of techniques and tactics begins with understanding the professional material needed in the assignment. Mastering professional material makes it easier for an officer/Platoon Commander to educate and train his men. *Map Reading Material* is a priority that dominates every assignment in Military Operations for War and Military Operations Other Than War. Compulsory subjects included in the curriculum and included in the core classification must be mastered in theory and practice by every Marine Corps Navy officer. Map reading is one of the mandatory lessons and skills that every Platoon Commander must master to maneuver or find targets on the assignment field following the Operational Orders given by the Upper Unit. For students to have these skills, the curriculum is provided a Map Reading subject which outlines the theory and practice of determining places on a map or the terrain using topographic map coordinates.

Efforts to increase conceptual understanding and problem-solving skills for students, especially in the Map Reading subject, have been carried out by instructors in the learning process in the classroom by utilizing learning resources in the form of Instruction Packages provided by institutions or by field practice. The ability of students to apply map reading will significantly determine their success in assignments, especially when moving to an area of operation that is foreign to them. Even though in this modern technological era, it is possible to use sophisticated equipment to determine a location with high accuracy, the subject of map reading as a basic science is still given to each student so that graduates are more likely to survive in the worst situations that may occur in carrying out assignments. The learning process in the classroom generally uses the media in the form of PowerPoint containing a summary of the material presented using the lecture, question and answer, and practice methods to apply the theory that has been taught. Some of the obstacles that occur when students carry out field practice (practical exercises) to use the idea that has been accepted in class are that there are still many students who do not understand the theory of map reading, whereas, in the last three batches, an average of 35% of students have not understood the concept of map reading material, especially mathematical material (calculation), so errors occur in the process and result in the inability to find the correct coordinates. Some of the causes that can be identified based on the researchers' preliminary observations carried out at the Infantry Officer School of Indonesian Marine Corps are: (1) sourced from students who lack motivation in learning read map material; (2) sourced from the curriculum, namely the lack of relevance between determining the time allocation in the curriculum and the material load that students must master; (3) sourced from activities outside of academics, but must be carried out by students, namely protocol activities that can reduce student learning time in class. Points 2 and 3 result in

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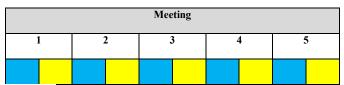Teknologi Pendidikan, Universitas Negeri Surabaya, Indonesia

limited study time for students in class when faced with learning objectives that expect students to understand theoretically and apply map reading activities correctly in practice. There are still students who lack the motivation to participate in Map Reading lessons can be caused because, personally, the student lacks the self-confidence to master the Map Reading material, which is primarily mathematical, so before taking the task, he already feels that he will not be able to master the material. Until recently, mathematics has always been seen as a difficult lesson and negatively impacted the mental part of students. The destructive consequences include anxiety, fear, and stress due to the absence of confidence in their capacity to carry out their responsibilities (Hasanah *et al.,* 2019). Meanwhile, related to the limited allocation of learning time in the classroom, it has been stipulated in the Curriculum that the subject of Reading Maps consists of 13 subjects with 10 hours of theoretical lessons and 25 hours of practical lessons available. With this comparison, faced with many subjects, there is still a need for additional study time so that students understand concepts and problem-solving skills in reading maps. The increase in learning time is not for the learning process in the classroom because the curriculum has set the allocation of time for map reading materials. However, the additional time is in the form of independent learning by students whose materials will be sent online by the teacher to be studied at home before the implementation of learning in class. So that when studying in class, students are more prepared and confident because they have studied before. Based on some of these fundamental problems and conditions, a learning model is needed to increase student learning time and optimize scheduled class time to make the learning process more substantial and achieve maximum learning outcomes. The learning model researchers use in this case is the Flipped Classroom method. The flipped classroom is the opposite of the conventional class and is also called the reverse class. Students attend lectures outside the classroom with video instructions and carry out interactive discussions while in class (Bishop and Verleger, 2013)

Previous studies have shown that flipped classrooms can improve conceptual understanding and problem-solving skills. Understanding students' mathematical concepts using the flipped classroom method is higher than that of students participating in conventional learning. In other words, the reverse class approach positively impacts students' understanding of mathematical concepts (Juniantari *et al.,* 2018). According to Schmidt and Ralph (2016), the flipped classroom allows students to improve their problem-solving skills (Schmidt and Ralph, 2016). Schmidt further emphasized that students will be ready to solve problems and investigate solutions in a flipped classroom because they have prepared themselves at home by watching online video lectures before class (Schmidt and Ralph, 2016). The flipped classroom model, in its implementation, combines learning in the classroom with learning outside the classroom to maximize learning activities without changing or adding to the time allocation that has been set in the curriculum but by conditioning learning activities in a more substantial class to increase understanding of concepts and improve problem-solving skills. The Flipped Classroom model's concept is that learning activities usually completed in class can now be completed at home, and learning activities usually done at home can now be completed in class (Bergmann and Sams, 2012). Before class learning activities, students read the material and watch learning videos before class. They start

discussing, exchanging knowledge, and solving problems, with the help of other students and educators who, in this case, act more as facilitators. The syntax or steps of the flipped classroom learning model, according to Atmadinata (2019), are as follows: Before the teaching and learning process in the classroom, students are directed to learn independently about the material that the teacher has shared online, either in the form of learning videos or other materials; In classroom learning, students are divided into groups at random to carry out discussions about the material already learned at home; During the discussion, the teacher acts as a facilitator and prepares questions related to the material to check students' understanding; Teachers share questions to do either individually or in groups, and teachers accompany students to help solve these problems (Atmadinata *et al.,* 2019).

They were referring to the syntax above, that the flipped classroom model is a learning model that divides two types of learning, pre-learning and classroom learning. During pre-learning or before learning in class, students have studied or obtained material exposure through learning videos or other learning resources uploaded by the teacher in Google classroom or Whatsapp groups by three days before learning in class. The following can be described as the implementation of flipped classrooms in Map Reading learning for the Infantry Officer School of Indonesian Marine Corps:

Table 1. Map Reading learning for the Infantry Officer School

Meeting				
1	2	3	4	5

Description:
Blue= Student learning activities at home
Yellow= Student learning activities in class and evaluation

The rapid development of technology has changed learning patterns, which inevitably have to utilize information and communication technology connected to the internet as part of the learning resources or media used. Two vital elements in flipped classrooms are using technology media as a learning medium when outside the classroom and building interactive and communicative learning while in the classroom (Halili and Zainuddin, 2015). The rapid development of technology in information and communication in this century has given rise to various devices that are physically small but have the same computing capabilities as computers and can be connected to the internet wirelessly. These devices include cell phones, tablets, and laptops, which in this study are categorized as mobile technology.

Mobile technology is a collective term used to describe various types of mobile communication technologies that are practical and highly mobile. According to Genc in his article entitled Analysis of Documents Published on Mobile Technology of Hearing Impaired in Web of Science Database, the concept of "mobile," which is loaded with communication technology, is used in wireless communication, mobility, and portability. Portable devices provide rapid access, use, and information processing through tablet computers, smartphones, and MP3 players (Genc *et al.,* 2020). In implementing this model, researchers use mobile technology in the form of cell phones (smartphones) owned by students as a device for accessing subject matter, both in the form of learning videos and other

learning materials uploaded by instructors online via Google Classroom or WhatsApp groups. The technical implementation is that the instructor first arranges the material for each meeting which is equipped with a learning video and uploads it via Google Classroom or the WhatsApp group that has been created. The material is delivered three days before face-to-face, so students have enough time to study. The choice of using a cell phone as a learning tool is based on the consideration that each student has a device capable of computing and can be connected to the internet. It is also supported by regulations in the Infantry Officer School of Indonesian Marine Corps stratum are allowed to carry and use cell phones to support learning activities.

In addition to the learning model, student self-efficacy has influenced another factor that influences conceptual understanding and problem-solving. Efforts to understand the concept of reading maps are increasingly challenging to materialize when students do not have confidence that students can master the material. In other words, student self-efficacy could be higher. Low self-efficacy can be seen in students' hesitance to raise their hands and answer questions when the instructor/lecturer gives questions to all students. Low self-efficacy can also be seen in students delaying assignments given by the instructor, so many students must be on time to submit assignments. Some experts argue that self-efficacy in learning is essential in improving students' understanding of concepts. Students with high self-efficacy have confidence in their ability to organize or complete the tasks needed to achieve specific results in different situations and difficulties so that students can more effectively manage their learning styles and achieve optimal learning results in various ways (Jarnawi and Untara, 2016). Students with high self-efficacy tend to have resilience, strength, and tenacity and never give up in dealing with every problem with all levels and variations. In contrast, students with low self-efficacy tend to avoid situations/problems that are considered difficult or act dishonestly to overcome these problems for example, cheating while doing exam questions. Self-efficacy is a person's belief in his ability to organize, compile and complete his work to achieve an expected result (Bandura, 2006). Students with high self-efficacy can feel confident in their skills so that when they do their assignments, they can be carried out in a systematic/organized manner based on solid motivation to achieve optimal results, even in various forms and levels of difficulty. In terms of education, if students have high self-efficacy, they will be encouraged to excel in achieving learning goals and have the choice to survive when facing difficulties (effort) because self-ability influences individual thinking. Process, feel, inspire them, and act. Self-efficacy for Infantry Officer School of Indonesian Marine Corps students is very positive, considering the dense and heavy burden of education. Students must have tenacity, resilience, and motivation to handle learning tasks.

In line with efforts to realize graduates of the Infantry Officer School of Indonesian Marine Corps which are mandated in the educational curriculum and the actual conditions of problems in the implementation of learning, the authors are interested in researching the effect of the flipped classroom assisted by mobile technology on the self-efficacy of Infantry Officer School of Indonesian Marine Corps students.

METHODS

Experiments were used in this study. The research was conducted when students were carrying out education at the Basic Advanced Group stage from July to November 2022. The time allocation for the research was to be carried out from September 4th week to October 4th week. While the implementation of flipped classroom assisted by mobile technology is the research treatment given to the experimental class for research subjects. In this study, the subjects were all 133 Infantry Officer School of Indonesian Marine Corps Student Basic Stage Advanced Group, who were grouped into two groups: the experimental group, 67 people, and the control group, 66 people. This study used two study groups; The learning design of the flipped classroom assisted by mobile technology is applied to the experimental group. In contrast, the control group is subject to conventional learning models implemented in previous learning. This learning process will be repeated according to the learning design developed. Data collection techniques used by researchers are questionnaires and tests. The questionnaire is used to measure self-efficacy. Meanwhile, the test method collected data about students' conceptual comprehension abilities in the Map Reading material. The pretest was given before the implementation of learning in both the experimental group and the control group, and at the end of the lesson, a posttest was carried out in both groups. According to the following table, data collection activities about students' self-efficacy towards learning to read maps using self-efficacy questionnaires, namely the closed questionnaire. The test instrument consists of indicators of understanding the concept. The collection of data on understanding the concept of the designation material and determining the place/coordinate on the map based on the data from the assessment results of the conceptual understanding test is carried out by matching the test results of each student with the developed scoring guidelines, where if the results of student work show indicators of understanding the expected concept, a score is given. One, and if not, then given a score of 0. The data collected about self-efficacy in conceptual comprehension skills will be analyzed using the t-test. This test aims to compare the averages of two groups unrelated to each other (two independent samples) to determine whether the two samples have significantly different means.

Table 2. Self-efficacy instruments

Aspect	Indicator	Declaration
Level	a. Student's belief in self-ability in learning	With my abilities, I can understand Map Reading material well.
		I can do the tasks/questions Reading Maps well. With my abilities
		With the skills I have, I can practice reading maps correctly.
		Map Reading material is essential for soldiers because it is very much needed in assignments.
	b. Student interest in learning	I am always active and try to understand more in learning to read maps.
		I do it as fast as possible if I get a Map Reading assignment.
		I always ask friends or teachers if there is material, I need help understanding.
Strengths	The fighting spirit of students in learning	I can do the things necessary to complete the task.
		I can work late into the night if the Map Reading task needs completion.

Table 3. Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Self-Efficacy	Experimental group	67	51.46	2.298	.281
	Control group	66	41.15	2.910	.358

Table 4.Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	*Sig. (2-tailed)*	Mean Difference	Std. Error Difference		Lower	Upper
Self-Efficacy	Equal variances assumed	2.428	.122	22.694	131	.000	10.311	.454		9.412	11.210
	Equal variances are not assumed.			22.654	123.499	.000	10.311	.455		9.410	11.212

RESULTS AND DISCUSSION

Based on the results of the t-test shows that Self-efficacy affects understanding the concept of reading maps for the Infantry Officer School of Indonesian Marine Corps Student Basic Stage Advanced Group. The results showed a significant difference between Self-Efficacy in flipped classroom assisted by mobile technology and conventional classrooms. Students with high self-efficacy better understand the concept of reading map material than those with low self-efficacy. Based on these data, it shows that there is a significant difference in the average self-efficacy results between students in the experimental group (*M*=51.46; *SD*=2.298) and students in the control group (*M*=41.15; *SD*=2.910), with t(131)= 22.694, *p*=<0.00.; Value *Sig. (2-tailed)* 0.00 <0.05 show a significant difference between Self-Efficacy in the flipped classroom assisted by mobile technology and conventional classroom. Self-efficacy refers to the beliefs, hopes, and beliefs that individual learners feel in their ability to perform tasks (Bala and Monika, 2022). The level of efficacy that students have can influence them in communicating something. The ability to understand is to communicate new information (Marzano and Kendall, 2006). One of the things that can reduce students' self-efficacy is feeling nervous. Flipped classrooms are designed to make students less nervous when carrying out learning activities(Chen Hsieh *et al.,* 2017). The use of flipped classroom assisted by mobile technology can have a positive influence on students (Mehring, 2017). The teacher's role can influence student understanding in flipped classroom assisted by mobile technology as a reinforcement of concepts mastered by students. Flipped classroom assisted by mobile technology can accommodate more interactions between teachers and students (Låg and Sæle, 2019). Assisted by technological devices can make it easier for students to understand learning material, supporting students' convenience. Devices in mobile technology will be beneficial if used in learning activities (Arianto *et al.,* 2016). Interactions that lead to closer relationships between teachers and students can improve student academic achievement (Robinson *et al.,* 2019). To understand a concept reading maps material, students must firmly believe they can understand it well. Self-efficacy is related to trust in each individual related to something that can be done (Hasanah *et al.,* 2019). The flipped classroom model allows students to be responsible and confident in their learning (O'Flaherty and Phillips, 2015). Self-efficacy is related to trust in each individual related to something that can be done (Hasanah *et al.,* 2019).

Students need strength and resilience when facing difficulties in understanding a concept. Self-efficacy supports the formation of students' resilience and strength when facing various difficulties at school, the attitude of not getting bored quickly, never giving up, and speed in completing a task/problem(Laurence and Florina, 2019).

Conclusion

The results showed a significant difference between the flipped classroom assisted by mobile technology (experimental group) and the conventional learning (control group). The use of the flipped classroom assisted by the mobile technology model can have a positive influence on student self-efficacy. It is evidenced by the results of the t-test that there is a significant difference in the average self-efficacy results between experimental group students (*M*=51.46; *SD*=2.298) and control group students (*M*=41.15; *SD*=2.910), with t(131 = 22.694, *p*=<0.001; Value *Sig. (2-tailed)* 0.00 <0.05 show a significant difference between Self-Efficacy in the flipped classroom assisted by mobile technology and conventional classroom. Furthermore, Students with high self-efficacy better understand concepts than those with low self-efficacy, Self-efficacy influences understanding the concept of reading maps for the Infantry Officer School of Indonesian Marine Corps Student Basic Stage Advanced Group.

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