Implementation of ARCS models to improve teachers' ability in flipped classroom learning

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Abstract. This research aims to improve the ability of the teacher's Junior High School in practicing flipped classroom learning in physics lessons. A quantitative approach with the type of descriptive was chosen to the research by modeling of one group pre-test and post-test design. The subject of the research was 34 physics teachers in Junior High School, which is 13 of male teachers and 21 female teachers. Data were collected by observed the activities, giving of questionnaires and holding of the test. In consequence, instrumentations used for the research were observation sheets, questionnaires, and multiple-choice questions. The result showed that activities were slightly increased from meeting I with a percentage of 78%, meeting II with a percentage of 83.05% and meeting III with a percentage of 87.28%. According to the questionnaire, teachers’ motivation was good with a percentage of 79.81% and teachers’ interest was very good with a percentage of 82.73%. Therefore, it can be concluded that using of ARCS can improve not only learning outcomes but also the motivation and interest of teachers. This study may have contributed to the literature since there are few studies available regarding the flipped classroom approach adapted to the ARCS motivation model on physics learning at school.

1. Introduction
Research regarding how to teaching physics at school always attract the attention of educators in college [1, 2, 3] because studying physics is very closely related to daily life, which can be related to the theory of physics. Recent research shows that traditional teaching methods and techniques in physics learning have a negative effect on students' learning outcomes [4, 5]. The process of physics learning is carried out by traditional methods, in which teachers are active and students are passive and not responsible for their own learning. Students only listen and take note lessons delivered by teachers [6, 7, 8]. Students who are taught that way will be students who fail instead of being students who actively ask questions, solve problems and provide solutions [9]. It also affects the low motivation and learning interests of students[10, 11]. However, student anxiety levels are lower for students who are independent in learning because they are more determined to solve difficult problems and, therefore more accomplished [12]. This is why it is important to consider the accuracy of the use of learning methods so that students engage more actively in physics learning [13, 14].

During this time, teachers teach physics lessons with traditional methods without connecting concepts with daily life [15, 16, 17]. If students learn the concept of physics with active learning by
associating it with daily life, learning will be more effective and consistent [18]. In active learning, teachers simply guide and prepare classroom conditions where an effective learning approach is used or in other words, teachers as facilitators in learning. In active learning, students actively participate in learning in an active way in terms of cognitive, emotional, social and physical, and classify knowledge, examine by forming hypotheses and making connections with previous learning [19, 20, 21]. In recent years, the most popular teaching method based on active learning is flipped classroom method [22, 23] because by flipped classroom can increase the activeness of learning while in the classroom, as well as in accordance with the advancement of technology and information.

Teachers understand the importance of active learning, new methods need to be developed so that students can be actively involved in the learning process [24, 25]. The Flipped Classroom is one of the special blended learning [26]. In this flipped classroom method, students watch a video of lessons related to the material discussed and then prepare questions for issues that have not been understood [27, 28, 29]. In the Classroom, Learning by flipped classroom method students take part in creative activities such as problem-solving, group discussions and discussions with teachers [30, 31]. According to Tucker [32], the most important benefit of the flipped classroom approach is its support for team working and discussions within the Classroom. The Flipped Classroom method is able to increase the interaction between teachers and students and reduce the dominance of teachers in classroom learning [33]. Therefore, teachers can spend more time discussing with students [34].

Therefore, teachers must implement Flipped Classroom in physics learning. So before applying it, teachers must understand how to practice flipped classrooms in the Classroom. The result of observations and surveys to teachers in some schools, the majority of teachers are close to 85%, do not yet understand how to implement Flipped Classroom in learning. Based on these facts, training activities are needed to improve the teaching ability of teachers in using flipped classrooms in learning. The ARCS motivation model [35], developed by Keller [36] is quite important in increasing the effectiveness of teaching conditions and is the only motivation model. The ARCS motivation model consists of four basic dimensions, namely Attention, Relevance, Confidence and Satisfaction [37]. Then in this study will implement ARCS model to improve the quality of teaching teachers in applying flipped classroom learning.

2. Method

This study is a mixed study in which quantitative and qualitative methods were used. The quantitative data of this research were obtained from physics teacher training motivation questionnaires with ARCS model. On the other hand, qualitative data were obtained from semi-structured interviews with some teachers. The sample using total of 34 physics teachers from different school in Central Java area. The sample consisted of 21 female and 13 male teachers.

| Table 1. Research design |
|--------------------------|
| Groups                  | Pre-Test     | Application | Post-Test                |
| Physics Teacher at Junior High School | Motivation questionnaire | Flipped Classroom | Motivation questionnaire |
| Perception questionnaire |                          |              |                          |

In this study, pre-test and post-test designs with one group design that consisted of qualitative data were used. The research design is given in Table 1. Before the teacher training activities begin, all participants will be given an initial perception questionnaire about the Flipped Classroom and motivational questionnaire of this training activity. This training activity adopts the ARCS model. At the end of the activity, the trainee teacher will be given a questionnaire to see the changes after this training. Moreover, at the end of the training process, interviews were conducted with 20 teachers.

The main activities carried out in this training: (1) building knowledge through training activities on introducing Flipped Classroom and the role of teachers and students in Flipped Classroom learning; (2) socialize media that can be used in Flipped Classroom learning; (3) arrange Flipped Classroom learning steps; (4) practice Flipped Classroom learning. Data is collected using documentation, focus
group discussions, and interviews. Photos and videos are also used as data sources. Then, to describe the results of the development process, the collected data is descriptively analyzed.

3. Result and Discussion
Observations of teacher activities during the training process are measured using an activity sheet that aims to see participants' interactions flipped classroom learning training activities with arcs models applied. Based on results observation of the activeness of the trainees during three meetings by implementing arcs models, participants' activities are said to be good because they have improved from the first meeting until the last meeting to 87.28%. This corresponds to Keller [2010], in his research, also explained that the activities of students who study by applying ARCS models are well underway. The overall percentage increase in participants' activities in the implementation of the ARCS model can be seen in Figure 1.

![Figure 1. Graph of participant activity](image)

Motivation plays an important role in this training activity [38], because of its function of encouraging, moving, and directing training activities. Therefore, the principles of motivation drive are closely related to the learning process that occurs, so it also affects the results of this training. Teacher participants will usually be motivated to know something when what is learned in relation to what is in the daily life. So that what is learned contains meanings that are beneficial to the person and cause complacency after studying it. Motivation will affect the results of the training because motivation can give rise to confidence to achieve a desire for success [39]. Efforts to find out the motivation of the trainees towards the application of Flipped Classroom learning in this study are by providing a questionnaire that covers all four aspects of motivation. Information about the results of the shared questionnaire is presented in Figure 2.

![Figure 2. Motivational questionnaire results graph](image)
The Attention aspect of motivation and interest shows curiosity in participants making participants will be concerned about what is being learned [40]. This can arise with the encouragement of the self and the help through motivational activities and perceptions so that the participant's attention can be focused on the training activities. The Relevance aspect of motivation and interest shows the connection between the material studied and what is in life can give rise to motivation and interest to learn [41], because feeling what he learns has benefits for him. The Confidence aspect of motivation and interest shows that awarding can increase confidence during the training process, thus increasing the motivation and interest of participants [42]. The Satisfaction aspect of motivation and interest shows feelings of joy and feelings of satisfaction towards learning.

Teacher motivation in training activities can arise due to outside factors and factors from within [43]. Outside factors can be in the form of accepted appreciation, learning environment and learning activities that are able to attract the attention of teachers. While factors from within can be the desire of the teacher to succeed in learning, and there is an expectation of achieving the goals of this training activity [44]. The results of the motivation questionnaire given, the average motivational score was reviewed from 4 aspects (Attention, Relevance, Confidence & Satisfaction) in accordance with ARCS model, which is 79.81%. When viewed based on each aspect, in the attention aspect is obtained 80.37%, relevance aspect 78.17%, confidence aspect 79.47% and satisfaction aspect 81.25%.

Interest is a sense of preference and a sense of attraction at some point or activity [45]. Learning activities are based on a high interest in encouraging better learning so as to improve the results of Learn. Interests may arise if they feel that what they learn is beneficial and with regard to his life, either at the present or in the future Come. Learning interests is a person's interest in learning as a decisive factor in a degree of activeness of one's learning [46]. The interest of the Teacher Participants in this study is known by ARCS questionnaire that emphasizes four aspects, namely Attention, Relevance, Confidence and Satisfaction. Information on interest in Flipped Classroom learning implementation training can be found in Figure 3.

Interest affects the activities of teachers in training activities, if the teacher participant has a high interest, then his attention to the training process will be centered on the materials described by the instructor, and the activities of the participants it will also be good. Overall the result of the percentage of students' attention in the interest poll this training activity is 82.73% and is classified as good. The results of the motivation questionnaire given, the average motivational score was reviewed from 4 aspects (Attention, Relevance, Confidence & Satisfaction) in the attention aspect is obtained 79.51%, relevance aspect 85.32%, confidence aspect 82.47% and satisfaction aspect 83.64%. Interest can be raised by arousing the needs, connecting existing materials with everyday experiences, opportunities for participants to participate actively in training with the aim of getting good training results, and using a wide range of techniques in providing training. This corresponds to the aspects that exist in the ARCS model.
Another important result of this study was a significant increase in motivation and interest scores for questionnaires given to trainees, namely teachers. Results show that the Flipped Classroom method affects the role of teachers as facilitators and allows them to engage in classroom discussions. In addition, providing examples of materials related to daily life and using simulations is considered to increase motivation. The results of this study support the idea that motivation and interest levels increase if learning occurs actively and provide a real example according to daily life [47]. As a result of interviews conducted with trainees, most expressed positive opinions about flipped classroom method training tailored to arcs models. The participants also stated that the learning methods provided were more effective and entertaining because they gained knowledge of the lessons through video. This highlights the case that flipped classroom method training tailored to arcs models has a positive effect on participants. However, there are participants who also have a negative opinion about this training. The results of this study are consistent with other studies on Flipped Classroom learning. This study will contribute to the literature since there are few studies available regarding the flipped classroom method adapted to the ARCS model for physics teachers training at Junior High School.

4. Conclusion
The results of this study show that the training of physics teachers in applying Flipped Classroom learning that adopts the ARCS model offers excellent results, participants’ motivation and interest in this training is also good.

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