

# The Effect of Prior Knowledge and ASSURE Model on Simulation and Digital Communication Learning Outcomes in Vocational High School

Yudha Aditya Fiandra\*, Nizwardi Jalinus, Ridwan, Rijal Abdullah

Doctoral Program, Faculty of Engineering, Universitas Negeri Padang, Indonesia

\*Corresponding author's email: [yudhaaditya1994@gmail.com](mailto:yudhaaditya1994@gmail.com)

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## ABSTRACT

*This research is in the form of experimental research. This study aimed to examine and see the effect of applying the ASSURE model and prior knowledge on the results of Simulation and Digital Communication subjects at the SMK. The population involved in this study were students majoring in Computer and Network Engineering class X SMKN 3 Pariaman, where class A was the experimental class, and class B was the control class. These two classes were also divided into two groups, high and low prior knowledge. This study uses a 2x2 factorial design. Hypothesis testing using a two-way ANOVA test. The results obtained are that (1) the learning model has a significant effect on learning outcomes, the ASSURE model gets a higher score than the conventional learning model, (2) prior knowledge has a significant effect on learning outcomes, higher prior knowledge gets a higher score than the conventional learning model. which is low, and (3) there is no interaction between the learning model and prior knowledge on learning outcomes. The N-Gain test showed that high prior knowledge in the ASSURE learning model got the highest improvement results, and low prior knowledge from conventional classes got the lowest results.*

**Keywords:** *Instructional Model, Prior Knowledge, ASSURE, Vocational*

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## INTRODUCTION

The development of digital technology is currently affecting student learning styles in today's generation Z (Widiawati et al., 2018). Their daily activities cannot be separated from the use of internet-based media (Astini, 2020; Yudha Aditya Fiandra et al., 2022; Prihatmoko, 2016). They start from looking for information about hobbies, news, and chatting to looking for learning references. Dependence on cyberspace can occur outside or inside the school environment, so students must be competent in filtering the information they get (Nasution, 2020). Seeing the habits of students in using internet technology, it is time to create innovations through adjusting learning models tailored to the characteristics and needs of students.

The learning model is an essential component that affects learning outcomes (Anggrawan, 2019; Muizaddin & Santoso, 2016). Research findings in implementing simulation learning and digital communication at the vocational high school level still experience several obstacles related to students' time, space, models, media, learning resources, and psychological barriers (Dalu & Rohman, 2019; Y A Fiandra et al., 2021). Ideally, in the subjects of simulation and digital communication, 40% of theory must be conveyed and 60% of practice. However, it has not been fully implemented according to the lesson plan.

Teachers still use conventional models in the form of lectures so that students become passive and the learning atmosphere becomes boring. Many students can present a good level of memorization of the teaching material received, but they do not understand it. An alternative that can be used is a learning model that can make students active and liven up the class atmosphere so that the class is no longer boring (Octavia, 2020).

This can be done by utilizing technology to support the learning model (Salsabila et al., 2020). Technology facilitates learning and can increase curiosity and make students more interested in participating in learning (Yulianti et al., 2019). One of the models that can be used is the ASSURE learning model. The ASSURE model is a learning model that is more oriented toward using media and technology to create the desired learning processes and activities (Iskandar & Farida, 2020; Munandar, 2020).

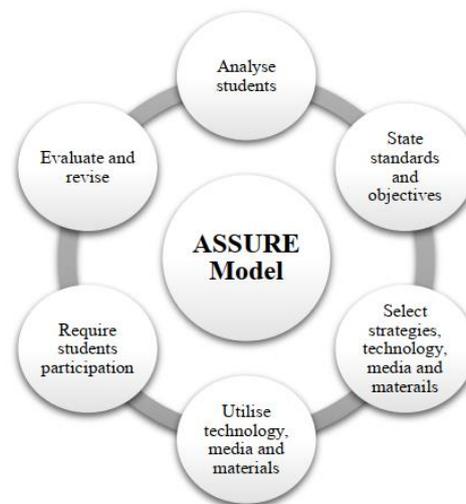
One of the characteristics analyzed in the ASSURE model is prior knowledge. Prior knowledge is students' level of knowledge before starting learning (Zaenudin, 2021). Teachers often consider prior knowledge the same when in reality, this is not necessarily the case. Prior knowledge has a high impact on learning. Those with good prior knowledge can follow the learning process very well (Rahman et al., 2019).

The ASSURE learning model is a model that uses technology systematically in learning (Kosilah & Septian, 2020). This model focuses on technology planning, making it easier for teachers to design and make changes to the educational environment to support students (Kim & Downey, 2016). The advantage of this model is that it can thoroughly analyze the components in learning in the form of student characteristics, formulation of learning objectives, strategies and learning activities, and assessment of the learning process. (Clymer, 2007).

In addition, the ASSURE model can also increase students' active participation by utilizing the role of technology so that learning can be more optimal (Al-Khattat et al., 2019). ASSURE is an acronym. The ASSURE model syntax is as follows (Bajracharya, 2019) (See Figure 1).

1. Analyze (analyze the characteristics of students)
2. State (determining learning objectives)
3. Select (choose the model, method, and media)
4. Utilize (using models, methods, and media)
5. Require (inviting active students)
6. Evaluation (evaluation and revision)

In contrast to the ASSURE model, conventional learning still discusses a subject in the usual way where the teacher is the primary source of information in learning. Students listen more to the teacher's explanation in front of the class and carry out assignments if the teacher gives practice questions (Irawan et al., 2015). This learning is still carried out assuming knowledge can be transferred entirely from the teacher's mind to students. The teacher is to give instructions or lectures during the learning process, while the students only receive passive learning.



**Figure 1.** ASSURE model (Heinich et al., 2002)

Prior knowledge is one of the characteristics of students (Hasanuddin, 2020). The diversity of backgrounds and experiences causes the prior knowledge of each to be not the same. Those with high prior knowledge can learn better than their average and low-ability peers (Astuti, 2015). The prior knowledge that students get before learning affects the learning process significantly. If the prior knowledge is good, it is easier for teachers and students to interact positively, thus facilitating learning (Dochy, 1994). Moreover, there are levels of knowledge that are interrelated and increasingly complex in the future. Those with high prior abilities can easily remember the information they have obtained and understand the material that has been learned faster.

Teachers need to know the extent of their students' prior knowledge so that if the prior knowledge is good enough, then there is no need to discuss it in learning (Hailikari et al., 2008). Researchers suspect that prior knowledge affects student learning outcomes.

## METHOD

This research was conducted in Computer and Network Engineering at SMK in Pariaman. This type of research is quasi-experimental. The research design used a 2x2 factorial design. The sampling technique used is purposive sampling. The samples in this study were students of class X TKJ A as the experimental class and students of class X TKJ B as the control class. The two classes are further divided into high and low prior knowledge.

Four variables become the focus of research: the independent variable, moderator variable, dependent variable, and control variable. The independent variable is the learning model or instructional model; the moderator variable is prior knowledge, the dependent variable is learning outcomes, and the control variable is the teacher, material, learning objectives, and test instruments. Data collection techniques in this study were learning outcomes tests and learning style questionnaires. The test was given to both classes, while the questionnaire was only given to the control class as information on students' learning styles.

A multiple-choice test with 30 questions was given to both classes. This test has been tested on students in the previous school year by measuring the validity, reliability, level of difficulty, and differentiating questions. Analysis of the instrument's validity used the product moment formula to test the validity of the questions and the Spearman-Brown formula to test the reliability of the questions. Analysis of the final test data using two-way ANOVA. The normalized N-Gain test formula determines the increase in learning outcomes.

## RESULTS & DISCUSSION

### Result

The class was divided into experimental and control classes, with both classes divided into high and low prior knowledge. Thus, the experimental class of high prior knowledge, low prior knowledge experimental class, high prior knowledge control class, and low prior knowledge control class were obtained. Based on the data analysis results, the whole class data are homogeneous and normally distributed. Improved learning outcomes are normalized in N-Gain. Here are the final test results (see Table 1 and 2).

**Table 1.** Final Test Data

Type	Prior Knowledge	Average	N-Gain
Experimental	High	88.50	0.50
	Low	75.50	0.50
Control	High	76.00	0.50
	Low	53.50	0.30

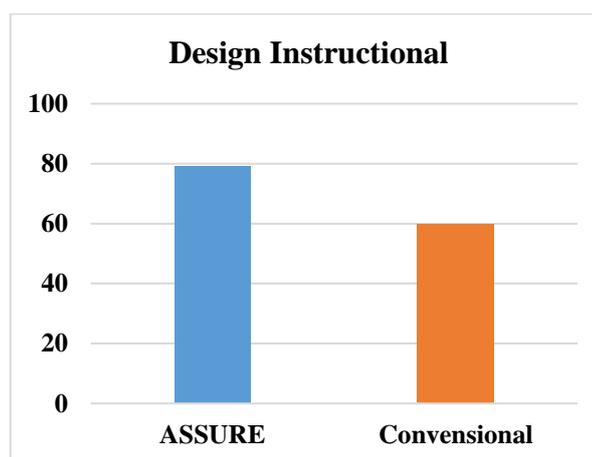
Table 1 and Table 2 show that the high prior knowledge experimental class has the highest average score of 88.50 and the best increase in learning outcomes with a gain of 0.50. The low prior knowledge control class has the lowest average score of 53.50 and the lowest increase in learning outcomes with a gain of 0.30. The following shows the results of the two-way ANOVA test using the SPSS 21 program.

**Table 2.** ANOVA Test Results

Category	Sig.	Status
Model	0.00	H0 rejected
Prior Knowledge	0.00	H0 rejected
Model * Prior Knowledge	0.07	H0 accepted

### Discussion

Figure 2 shows the influence of the ASSURE and conventional learning models on learning outcomes for Simulation and Digital Communication subjects.



**Figure 2.** The Effect of Learning Models on Learning Outcomes

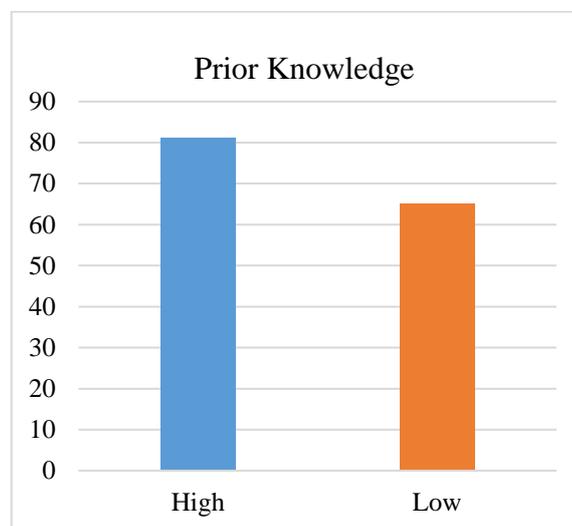
The learning model has a significant effect on learning outcomes. Based on statistical tests, a sig value of 0.00 (sig <0.05) was obtained. In the ASSURE model, students are given a learning style questionnaire (VAK) before the start of learning. In the following syntax in

selecting the learning model, the researcher chose the VAK model as a follow-up to the VAK learning style. In this VAK model, researchers provide PowerPoint media to improve visuals, build group discussions to improve audio, and provide experiments to improve kinesthetics.

When learning takes place, students are pretty enthusiastic. Those dominant in visuals ask more questions when given pictures and animations. Those who are dominant in audio ask and answer more questions when conducting discussions, and those who are dominant in kinesthetic ask more questions when conducting experiments. The ASSURE model can indeed help students to be more active. Experimental class students had a better average score than students in the control class. Researchers used conventional learning models in the control class through lectures and experimental activities.

When learning, students in the experimental class were more active in asking or discussing than in the control class. When assisted with graphics, pictures, and animations, students enthusiastically pay attention to explanations. They are more enthusiastic about conducting discussions and do not hesitate to ask what they do not understand. However, the control class did not show this. They prefer to chat alone and look bored in following the lesson.

This follows the theory that the ASSURE learning model is better than the conventional model (Al-Haydary & Majeed, 2021). Similar research also shows that the ASSURE model can significantly affect students' Digital Communication and Simulation learning outcomes (Irna, 2018). Another study explained the low learning outcomes in conventional learning models because students in the learning process only heard the explanation of the material from the teacher and recorded material from the textbook, or the teacher only lectured in providing material (Royani, 2015). Figure 3 shows the influence of prior knowledge on learning outcomes in Simulation and Digital Communications.



**Figure 3.** The Effect of Prior Knowledge on Learning Outcomes

Prior knowledge has a significant effect on learning outcomes. Based on statistical tests, a sig value of 0.00 (sig <0.05) was obtained. Table 1 shows high prior knowledge in the experimental and control classes having higher N-Gain than low prior knowledge. Those who have high prior knowledge are easier to adapt to learning. Moreover, they are more active and enthusiastic when given practice questions when they come forward to write answers. Most students with low prior knowledge are not active and do not master the lesson well.

Prior knowledge in learning will determine students' fluency in understanding the material being studied so that students with high prior knowledge have better learning outcomes than those with low prior knowledge.

Other studies also show that the learning outcomes of groups with high prior knowledge are higher than groups with low prior knowledge, so prior knowledge has a very important role in the learning process and significantly influences learning outcomes. (Shing & Brod, 2016; Zambrano et al., 2019).

There is no interaction between learning models and knowledge in this research. Table 2 shows the sig value of 0.06 ( $\text{sig} > 0.05$ ). The learning model and prior knowledge each significantly affect learning outcomes, but there is no interaction between them. This can happen because those who have high prior knowledge will be able to produce high learning outcomes even though they are given a different learning model. Thus, prior knowledge and learning models are independent. The influence given by the learning model on learning outcomes is independent and not related to prior knowledge, and vice versa.

The influence given by prior knowledge on learning outcomes is independent and unrelated to the learning model. In learning using any learning model, the higher the prior knowledge of students, the higher the learning outcomes. The following shows a graph of the interaction of the learning model and prior knowledge (see Figure 4).

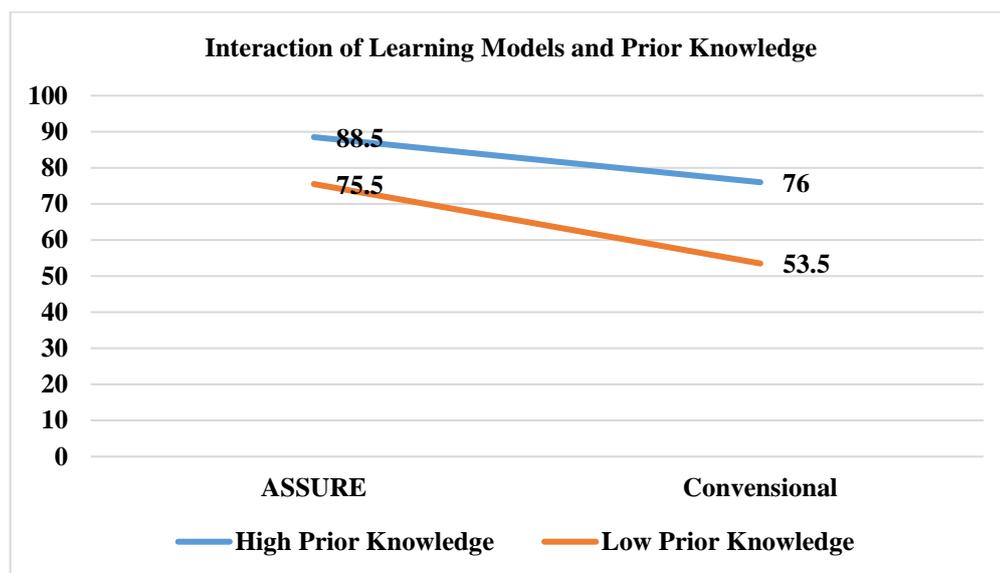


Figure 4. Interaction of Learning Models and Prior Knowledge

Statistically, a variable is said to interact with other variables if both have a meeting point (Hasnunidah, 2017). In Figure 3, it can be seen that there is no meeting point between the two lines connecting the two variables. In this study, a meeting point will emerge if one class with low prior knowledge can achieve higher learning outcomes than those with high prior knowledge in the same class. In theory, however, this cannot happen.

This is also supported by the gain value obtained by each group. This shows that theoretically or values in the field do not allow the interaction of learning models and prior knowledge. Each class has an increase in different sub-materials associated with improving learning outcomes.

The material taught in this research is vibration and waves. The material is divided into four sub-materials: communication in the network, virtual classroom learning, video

presentations, and visual simulation applications. The following shows the analysis of answers for each class with "a" as communication in the network, "b" virtual classroom learning, "c" visual simulation application.

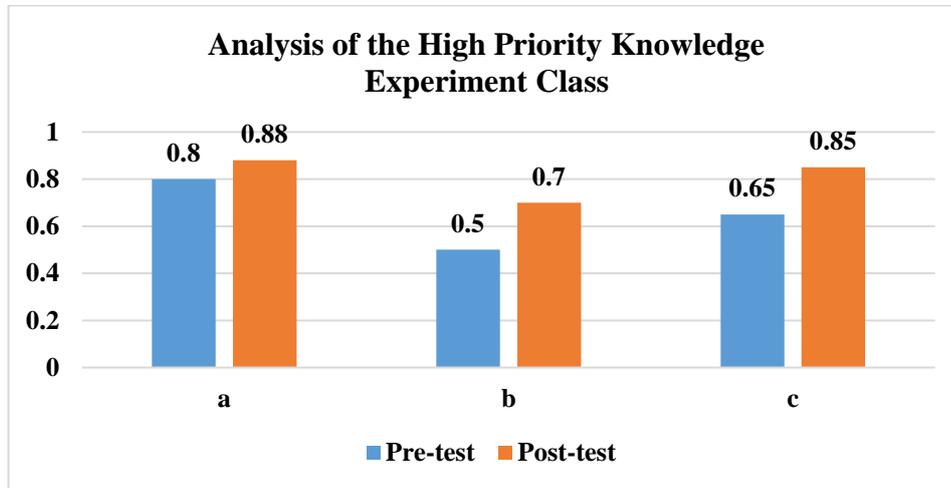


Figure 5. Analysis of the High Priority Knowledge Experiment Class

Figure 5 shows that the experimental class with prior knowledge understood communication in the network well before being given treatment, while they still do not understand the virtual classroom learning materials and visual simulation application materials. After being given treatment, there was a significant increase, especially in virtual classroom learning materials and visual simulation application materials. This shows that the models and methods used are pretty helpful for students in understanding the learning material.

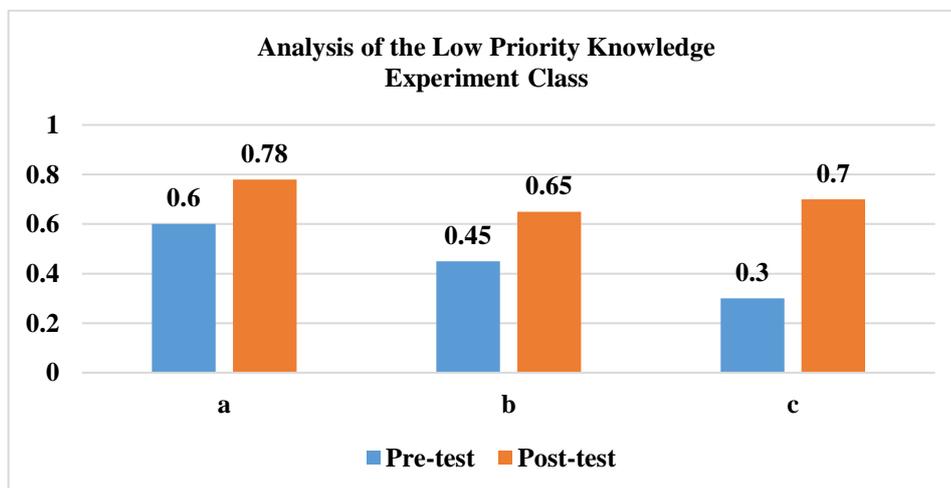


Figure 6. Analysis of the Low Priority Knowledge Experiment Class

The picture above shows the experimental class with low prior knowledge showing different things. Before being given treatment, this class has a good understanding of communication in the network only but not for other materials. After being treated, this class experienced an increase in all materials but was not as good as the experimental class with high prior knowledge.

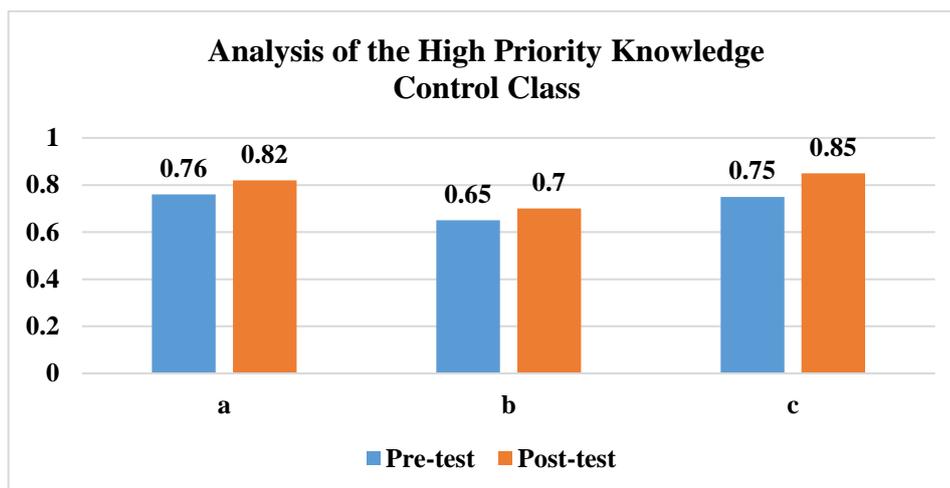


Figure 7. High Initial Knowledge Control Class Answer Analysis

Figure 7 shows that the control class with high prior knowledge understands the network's communication material and the visual simulation application material before being given treatment. After being given treatment, the three materials experienced an increase; the biggest was in virtual classroom learning.

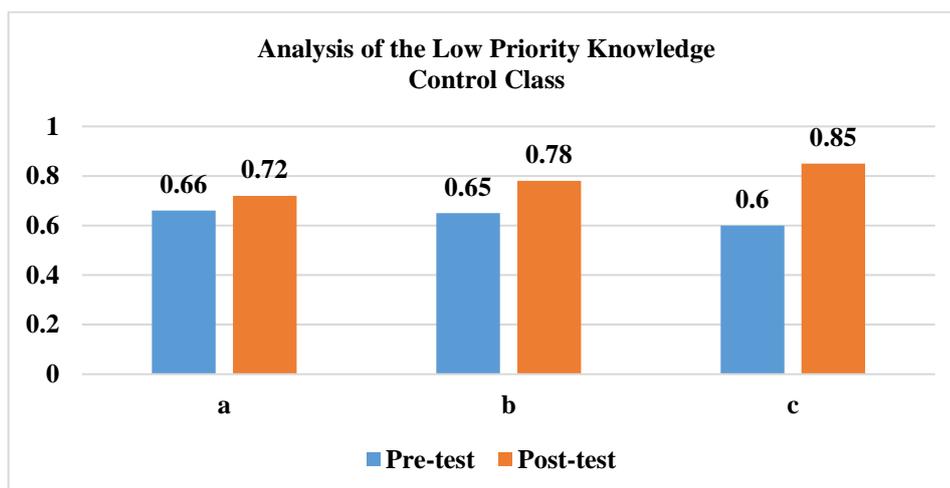


Figure 8. Analysis of the Low Priority Knowledge Control Class

The picture above shows that the control class with low prior knowledge did not understand the three materials before treatment. After being treated, each material improved well, especially in the visual simulation application material.

## CONCLUSION

Based on the results of the research and discussion, it is concluded that there is an influence of the learning model on learning outcomes, an effect of prior knowledge on learning outcomes, and no interaction between learning models and prior knowledge. The ASSURE model is better than the conventional model regarding the learning model.

It can be seen that the average value of the ASSURE model is higher than the conventional model. Regarding prior knowledge, students with high prior knowledge have better learning

outcomes than low prior knowledge. This can be seen from the value of high prior knowledge, which is higher than low prior knowledge.

From the normalized N-Gain calculation as a whole and per sub-material in each class, it can be concluded that students in the experimental class with high prior knowledge experienced a significant increase for all sub-materials. Students in the experimental class with low prior knowledge and control class with high prior knowledge experienced the best improvement in the virtual class learning sub-materials. The low prior knowledge control class experienced the best improvement in the visual simulation application sub-material. In further research, it is hoped that another analysis can be carried out on the characteristics of students.

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