

EFFECTIVENESS OF INTERVENTION ARRANGING ASSIGNMENTS IN HIGH SCHOOL PHYSICS

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Abstract

Motivation is considered as a crucial element in acquiring physics concepts (Redish, 2003). Also, educational psychology has developed various intervention models to promote student motivation. Particularly, The Time Continuum Model (Wlodkowski, 1985) shows that strengthening the connection between consecutive classes enhances learner motivation. This study focused on assignments that emphasize links between classes and examined their effectiveness. In addition, I investigated whether the intervention would enhance student motivation such as autonomy and significance of assignments.

Six eleventh graders joined in the intervention from April to November 2019, which consisted of (1) arranging assignments that included many thinking tasks once every two physics classes, and (2) linking classes by offering answers to the assignments of previous classes at the beginning of the following classes. The surveys were conducted after the intervention on November 26th and measured student motivation through an interview asking each person why they study physics etc.

The results suggest that participants became autonomous physics learners through this intervention because they said “To learn physics is useful” and “Physics changed from a weak subject to interesting it”. They also showed that participants found the assignment significant because they said “Doing assignments made me more aware in class” and “I was able to study little by little for the test”.

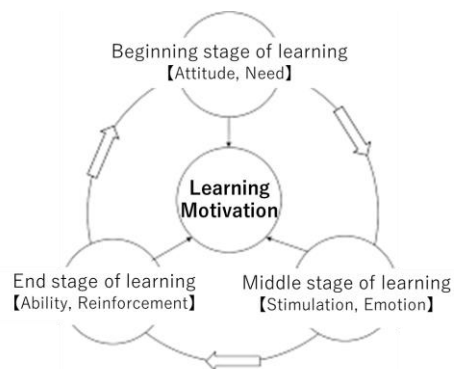
Keywords: *Assignments, physics, motivation.*

1. Introduction

In physics education research, the acquisition of physics concepts is one of the major goals, and research is being conducted from various perspectives. Among them, motivation is considered as a crucial element in acquiring physics concepts (Redish, 2003).

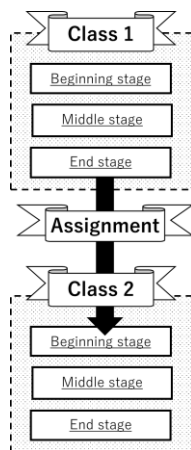
Also, educational psychology has developed various intervention models to promote student motivation. Particularly, The Time Continuum Model (Wlodkowski, 1985) shows that strengthening the connection between consecutive classes enhances learner motivation (Figure 1). Based on this model, the weak connection between classes and lessons becomes apparent as an issue in high school physics. This study focused on “assignments” that emphasize links between classes. In other words, assignments that strengthen the connection between classes can be considered to increase learner motivation (Figure 2).

Figure 1. The Time Continuum Model.



Source: Wlodkowski(1985)

Figure 2. Assignments that emphasize links between class1 and class2.



2. Objectives

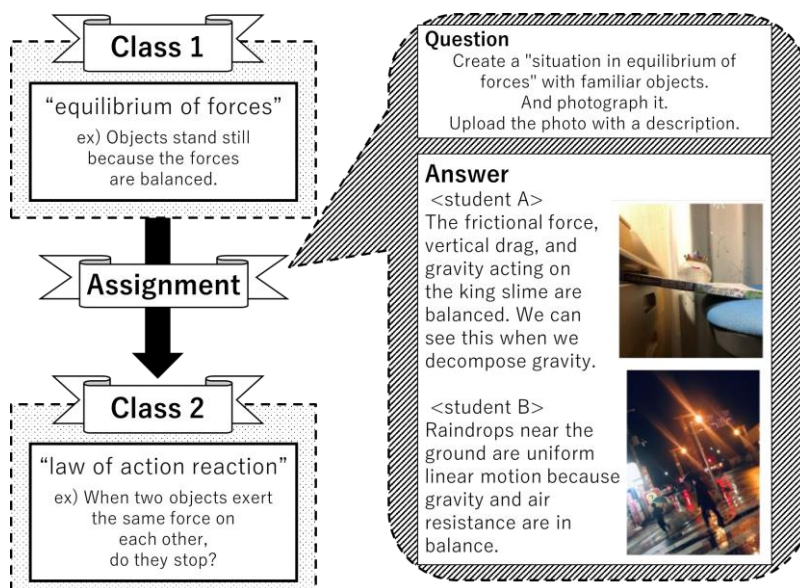
The purpose of the study is (1) examining effectiveness of the intervention , and (2) investigating whether the intervention would enhance student motivation such as autonomy and significance of assignments.

3. Methods

Six eleventh graders joined in the intervention from April to November 2019, which consisted of (1) arranging assignments that included many thinking tasks once every two physics classes , and (2) linking classes by offering answers to the assignments of previous classes at the beginning of the following classes. An example of an assignment and solutions of students is shown in Figure 3.

The surveys were conducted after the intervention on November 26th and measured student motivation through an interview asking each person “Why do they study physics?” and “What have you ever tried to understand physics?” etc. Interviews were conducted one-on-one between teacher and student.

Figure 3. Assignments for the class "equilibrium of forces" and examples of answers.



4. Result & discussion

The results of the interviews are shown in Tables 1. This table shows that people study physics because they enjoy learning physics. In particular, Student C and D feel that sharing opinions with others is the attraction of physics class. Based on Self-Determination Theory (Ryan & Deci, 2000), participants became autonomous physics learners through these classes. In addition, Student D improved attitudes toward listening to others in class in order to work on assignments. In other words, assignment may contribute to stimulating class discussions. Therefore, it is possible that participants find enjoyment in physics through the class, and that assignment is one of the factors contributing to this.

Table 1. The interview surveys.

Speaking	Statement	Speaking	Statement
T	Why do you study physics?	T	What do you tried to do anything to understand the content of physics?
S(A)	Um,,,What's it for,,, for a career? Well, I guess it's interesting.	S(D)	Compared to April, I started to listen to other people's opinions.
T	I see. What makes you think that?	T	Why?
S(A)	When I was in junior high school, I hated science, especially physics. So I thought "I can't do physics! " But that thinking changed in April.	S(D)	I heard other people's opinions and realize "I see! ", "Assignment is not such a bad thing." Also, I was asked to do assignment. So I think I have changed the way I look at assignments.
T	How has it changed?	T	How has it changed?
S(A)	Interesting! I think that I may have gone from what I didn't like to what I felt interesting.	S(D)	Well, I think that doing assignments made me more aware in class.
Speaking	Statement	Speaking	Statement
T	Why do you study physics?	T	Why do you study physics?
S(C)	I do it partly because I have to take physics as a class, but also because physics classes are funny to listen to.	S(E)	Usually they make me do it. But if I have a choice to take physics or not, I'll take it. The job I want to get doesn't use calculations or physics, but I think it would be useful to know physics and it seems like a good way to have a basis for everything.
T	Why do you think it's funny?		
S(C)	In other classes, the teacher would warn me if I talked, but in physics, it's fun because we all share our opinions.		

5. Conclusions

To increase high school students' motivation to learn physics, I used assignments as an intervention to promote connections between classes. After interventions were implemented, an interview survey revealed that participants became more autonomous in physics as a result of the classes, suggesting that assignments may have been involved in the activation of the classes.

References

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