The Use of Science Film Media "Gravity and Interstellar" in English Learning to Improve the Understanding of the Physics Concepts

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Abstract: Physics and English are two disciplines that play an important role in the advancement of science and technology in the globalization era. Physics is a basic capability that must be possessed to advance science and technology. That is why physics has also become the main pillar for technological advances today. Some of the research results from physicists have contributed greatly to current technology. English courses in the Physics Education Study Program are included in the English for Specific Purpose (ESP) or English Language category for specific purposes, in which the teaching material must be related to physics that the students' needs. However, the lack of understanding of the physics concepts is still the main problem faced by students of the Physics Education Study Program. This research is an experimental study used experimental design, namely the one group pre-test – post-test design. Subject of research is students of fifth semester in Physics Education Study Program. Technique of collecting data used instruments in the form of essay questions. Techniques of analyzing data are descriptive quantitative and inferential analysis approaches using t test to determine whether there is an increase between the average data. The results indicates that learning English in physics education study programs by using the media of science film can improve the students' understanding of physics concepts. This can be seen based on the results of the t-test, it is known that the average before getting pre-test is 55.69 after getting post-test to be 67.09 so that the increase was 11.62%, then t-test was obtained, the t-count was 10.208. The value of t-table with df 34 at the significance level of 5% is 1.69.

1 INTRODUCTION

English courses in the department of physics education are included in English for Specific Purpose (ESP) category, where in learning, teaching materials must be related to physical sciences that are related to students' needs. According to Hutchinson and Waters (1994), ESP is the English teaching approach that the methods used are based on the reasons why the learner wants to learn English.

In other words, Specific Purpose (ESP) is different from General English (GE). According to Yaumi (2012) in his research entitled "*Learning Materials Development of English for Specific Purpose*" ESP has approaches and assumptions that are different from General English (GE). The aim of ESP is for students to be able to master English in their fields of study. For example chemistry students, they must understand English for Chemistry, or if they are engineering students, they must know English for engineering, or if they work in hospitality, then they must know English Hospitality, if they are maritime students, then they must master Maritime English, and so on.

However, learning materials development of English for specific purpose (ESP) will be more affective if it supported by good learning media. Understanding the concept can also be improved through audio-visual media (film). Because film is an audio-visual media that involves the senses of sight and hearing in one process (Munadi 2013). Edgar Dale (Arsyad, 2003) estimates that the acquisition of learning outcomes through the sense of sight ranges from 75%, through hearing senses around 13% and through other senses around 12%.

Otte (1966) states the creativity in learning can be realized by presenting learning experiences for students. Therefore, film is one of the media that can provide learning experiences that can be used as a

stimulus to increase learning motivation that can achieve learning goals. In a study entitled "*The Effectiveness of Using Film Media to Increase the Interest and Economic Learning Outcomes of Class X Students*", Yasri and Mulyani (2016) wrote in a Film (Masterpiece) in the Classroom (2011) mentioning that students tend to understand things more interpreted in films rather than in textbooks. It was also stated that the film was able to provide learning experiences that students did not get in the classroom because of the limited space and time they had.

2 LITERATURE REVIEW

Musfiqon (2012) presents the benefits and characteristics of film media in increasing the effectiveness and efficiency of the learning process, namely:

    a. Overcoming the limitations of distance and time.
    b. Able to portray past events realistically in a short time.
    c. Film can bring children from one country to another and from one period to another.
    d. Films can be repeated if necessary to add clarity.
    e. The message delivered is fast and easy to remember.
    f. Developing students' thoughts and opinions.
    g. Developing the students' imagination.
    h. Clarify things that are abstract and provide a more realistic picture.
    i. Very strong influence on someone's emotions.
    j. Film is very good at explaining a process and can explain a skill.
    k. All students can learn from the film, both smart and less intelligent,
    l. Growing interest and motivation to learn.

This research was motivated by the lack of understanding of the physics' concept which is still a major problem faced by students of the Physics Education Study Program. Therefore, the learning materials development of English for specific purpose (ESP) at the department of physics education that is related to the learning materials of physics by using film media can help them to increase their understanding of the concept of physics.

The films "Gravity and interstellar" are both science fiction genre. The content of the films are about some of physics' concepts, Newton's Law of Universal Gravitation, Special Theory of Relativity, Newton's 3 Law of Motion.

    a. Gravity

    b. Interstellar

The stages of English learning using Gravity and Interstellar film media can be seen in the following chart:
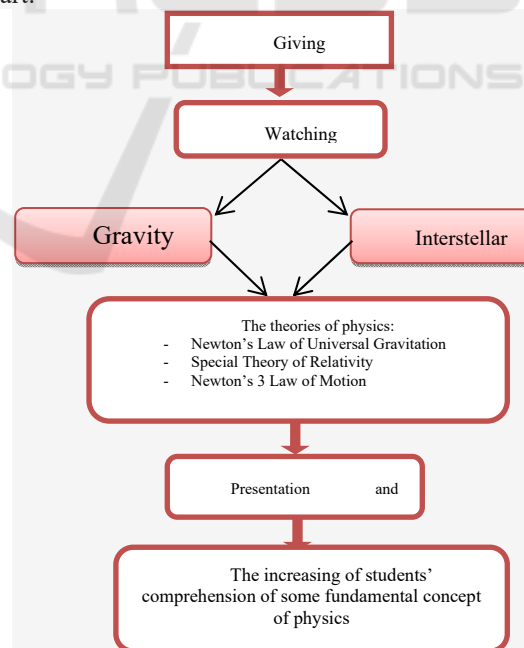

Figure 1: The stages of English learning using Gravity and Interstellar film.

3 METHOD

This research was an experimental research. According to Alsa (2004), the essence of experimental research is to examine the effect of treatment on behavior that arises as a result of treatment. By using pre-experimental design, namely the one group pretest-posttest design, that there is a pretest before being given treatment, the treatment results can be known more accurately, because it can compare with the situation before being treated. This design involves one group given the pre-test (O), given treatment (X) and given a post-test. Treatment success is determined by comparing the pre-test and post-test values.

In the pre-experimental design one group pretest-posttest design study, the first step was to determine the sample to be used as the research sample and group it into one research class. The second stage was to provide a pre-test to measure the understanding of physics concepts before being given treatment using gravity and Interstellar film media and the last stage was to give a sample post-test to measure the level of understanding of physics concepts after treatment.

Table 1: Design the one group pre-test-post-test.

O$_1$	X	O^2
Pre-test	Treatment	Post-test

The subjects in this study consisted of population and sample. The population was all students at the department of physics education. The sample is a portion of the population taken randomly, namely 35 students. The techniques of data collection used instruments in the form of essay questions. The technique of data analysis was descriptive quantitative analysis approach and inferential approach using *t-test* to find out whether there are differences between the average results of the data before and after the treatment, so that it can be stated that there is an effect of the treatment or vice versa.

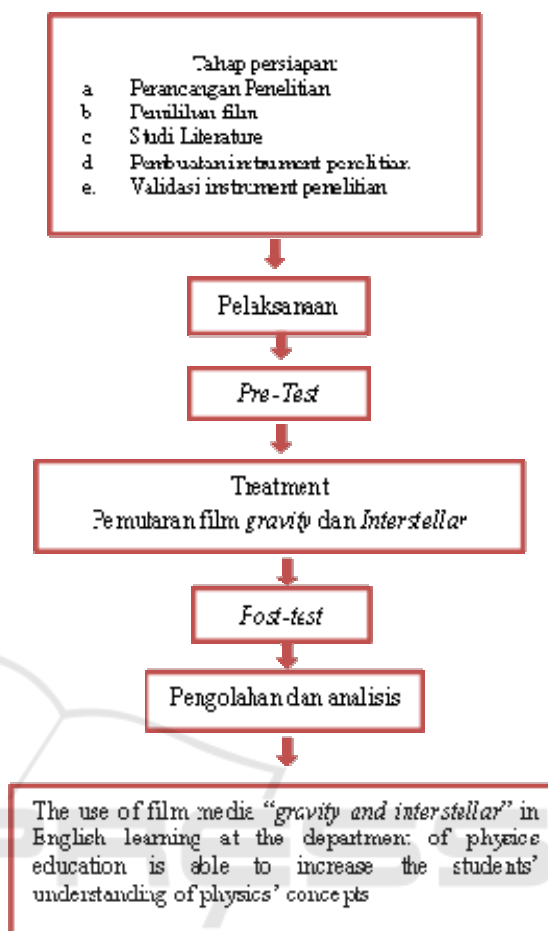The Stage of Research's Implementation could be seen on the chart below:

Figure 2: The Stage of Research's Implementation.

4 RESULT AND DISCUSSION

Hutchinson and Waters (Mahripah et al., 2016) state that ESP is an approach in language learning where all decisions taken involve teaching material and the overall learning method is based on the reason of learners in learning English. Therefore, teachers or lecturers are required to be able to develop interesting teaching materials and according to the learners' needs. In developing teaching material, of course, it requires learning media that can facilitate understanding a material. According to Aqip (2010) the instructional media of art as everything that can be used to channel messages (messages), stimulates the mind, feelings, attention, and abilities of students so that it can encourage the learning process.

Film is an audio-visual media that involves the senses of sight and hearing in one process (Munadi

2013). Edgar Dale (Arsyad, 2003) estimates that the acquisition of learning outcomes through the sense of sight ranges from 75%, through hearing senses around 13% and through other senses around 12%. Therefore, Yasri and Mulyani (2016) that students tend to understand more things that are interpreted in films than in textbooks. It was also stated that the film was able to provide learning experiences that students did not get in the classroom because of the limited space and time they had.

The selection of gravity and interstellar films is because the two films are included in the category of science fiction film, which cover some physics concepts, such as Newton's Law of Universal Gravitation, Special Theory of Relativity, Newton's 3 Law of Motion. Before learning begins, students are given a pre-test in the form of 11 essay questions related to the three theoretical physics in the film to determine the level of their understanding of the theory. In the post-test phase, it is conducted after students take part in learning using gravity and interstellar film media.

This research only involved one class to find out the learning outcomes before and after watching *Gravity* and *Interstellar* films. This research is a pre group design one group pre-test-post-test design, the first step was to determine the sample that will be used as the research sample and group it into one research class. The second stage was to provide a pre-test to measure understanding of physics concepts before being given a test treatment to measure the level of understanding of physics concepts after being given treatment.

Thus, before taking data, the researcher tested the question instrument to be used as a matter of pretest and posttest. Of the 15 questions tested there were 4 questions that were dropped while 11 questions were valid as many as 11 questions. The questions were dropped because of the count <r table, at the 5% significance level with n = 35, df n-2 = 33, 2-tailed that is 0.361 and Alpha Cronbach's reliability test results were 0.851. The conclusion is alpha = 0.851> r table = 0.3338, so that the instrument was reliable or reliable. After testing the validity and reliability of the questions, it is known that the items that are invalid cannot be used and the valid items continue to the research. Test results that have been known to be the results, then proceed with taking the initial data using the next pre-test to be treated and followed by post-test with the aim to determine differences in learning outcomes before and after being given action through film media.

4.1 Prior Learning Outcomes (pre-test)

Table 2: Learning Result before Treatment.

	N	Mini-mum	Maxi-mum	Mean	Std. Deviation
Pretest Valid N (listwise)	35 35	41.00	70.00	55.4571	8.05621

The results of calculations using SPSS 20.0 on the data before treatment (pre-test) obtained a valid number of samples of 35, average score of 55,4571, minimum value of 41 and maximum of 70. The table of learning outcomes before being given treatment in the form of watching films as a media in learning English for understand the concept of physics obtained frequency as seen in the following table:

Table 3: Frequency distribution of pre-test.

No	Class Interval	Frequency	Relative Frequency
1	41-47	6	17.14
2	48-54	9	25.71
3	55-61	12	34.29
4	62-68	6	17.14
5	69-75	2	5.71
6	76-82	0	0
7	83-89	0	0
	Total	35	100

Based on the table taken by frequency pre-test, a histogram can be drawn below:
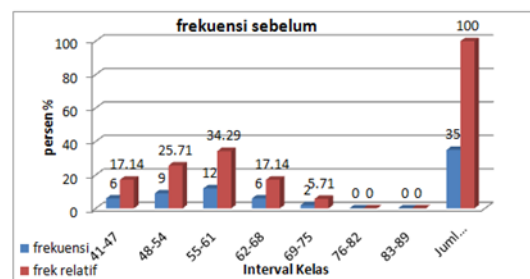

Figure 3: The distribution of study result pre-test.

Based on the table and histogram above, the frequency of the pre-test shows that the dominant interval is between 55-61 (34.29%) or as many as 12 students.

4.2 Learning outcomes (Post-test)

Table 4: Learning Outcomes after Treatment (Post-test).

	N	Mini-mum	Maxi-mum	Mean	Std. Deviation
Post-test	35	46.00	87.00	67.0857	10.49193
Valid N (list-wise)	35				

The results of calculations using SPSS 20.0 on the data after treatment (post-test) obtained a valid number of samples of 35, average score of 67.0857, minimum score of 46 and maximum score of 87. Learning outcomes after watching Gravity and Interstellar films were given frequency variations and increased frequency distribution through media films in learning English.

Table 5: Frequency After (post-test)

No	Class interval	Frequency	Relative frequency %
1	41-47	1	2.86
2	48-54	5	14.29
3	55-61	4	11.43
4	62-68	8	22.86
5	69-75	6	17.14
6	76-82	10	28.57
7	83-89	1	2.86
	Total	35	100

Based on the frequency distribution table, the post test can be illustrated in the histogram below:
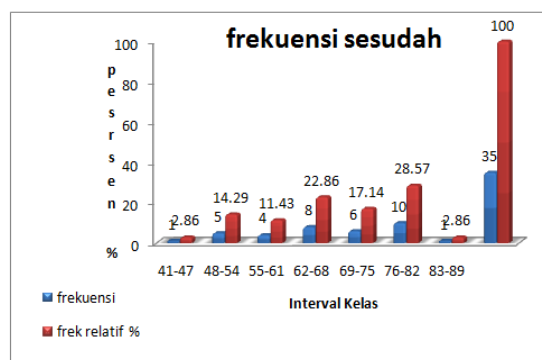

Figure 4: Frequency After (post-test).

4.3 Testing Requirements Analysis

Test requirements analysis was carried out before conducting data analysis. The prerequisites used in this study were the normality test and homogeneity test. The following is the data presentation:

4.3.1 Test for Normality

Normality test was done to test whether all variables are normally distributed or not. The normality test used the Kolmogorov-Smirnov formula in the calculation using the SPSS 20.0 program. To Know whether the variables are normal or not is if sig> 0.05 then normal and if sig <0.05 can be said to be abnormal. The results of the calculation are as follows:

Table 6: Summary of Normality Test.

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	f	Sig.	Statistic	df	Sig.
Pre-test	.083	35	.200*	.968	35	.393
Post-test	.118	35	.200*	.961	35	.242

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the table above, it is seen that the pre-test and post-test data on learning outcomes have increased. This is indicated by the value of the pre-test and post-test data greater than 0.05 (sig> 0.05) which is 0.200> 0.05. Thus, it can be concluded that

the research data before and after normal distribution.

4.3.2 Hypothesis Testing

This study aims to determine differences in learning outcomes before (pre-test) and after (post-test) through *Gravity* and *Interstellar* film media to improve understanding of physics concepts in learning English. The pre-test and post-test t-test is to determine whether there is an increase in learning outcomes. The study was said to be significant if *t-count> t table* at the significance level of 5% and p value <0.05.

Table 7: The results of t-test paired with pre-test and post-test.

		Paired Samples Test							
		Paired Differences					t	d f	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	posttest - pretest	11.62857	6.73920	1.13913	9.31358	13.94357	10.208	34	.000

Based on the table, the average post-test and pre-test scores were 1,139. it obtained *t-count > t-table* at a significant level of 5% (10.208> 1.69) and has a probability value or p <0.05 (0.00 <0.05) which means that there is a significant increase in scores before and after watching the film.

Therefore, based on the results of the *t-test* it is known that the average before (pre-test) is 55.69 and after the post-test is 67.09, so that the increase is 11.62%, then the *t-test* is obtained by the *t-count* of 10.208. The value of *t-table* with df 34 at the significance level of 5% is 1.69. Therefore, *t-count > t-table* (10.208> 1.69) and the significant value is smaller than 0.05 (0.00 <0.05). Thus, it indicates that there is a significant increase in the score of the learning outcomes of the sample class, namely the fifth semester students of department of physics education through film media with the aim of increasing understanding of physics concepts in learning English.

The following is a diagram before and after students are treated by applying science film media:
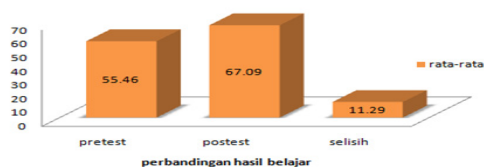

Figure 5: Diagram of the Difference between Pre-test and Post-test Student Learning Outcomes through Science Film Media.

Based on the diagram above, it can be clearly illustrated that learning English at the departments of physics education by using *Gravity* and *Interstellar* film as media can help students to improve their understanding of physics concept.

5 CONCLUSIONS

Based on the results of data analysis and discussion of research results, it can be concluded that:

a. Media science fiction films can be used in learning English in the Department of physics Education.

b. The use of Gravity and Interstellar film media in learning English in physics education study programs can be used to improve the understanding of the concept of fifth semester students of Physics Education Study Program.

c. The science fiction film media can also be used in physics learning in general.

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