Jurnal Penelitian Pembelajaran Fisika
Vol. 15 Issue 3 – July 2024, p288-293
p-ISSN 2086-2407, e-ISSN 2549-886X
Available Online at http://journal.upgris.ac.id/index.php/JP2F
DOI: 10.26877/jp2f.v15i3.16546

Transformation of Physics Learning: The Use of Powtoon Animation and VAK Model to Enhance Learning Motivation Viewed from Students' Inductive Reasoning Ability

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Received: 09 March 2024. Accepted: 09 July 2024. Published: 31 July 2024.

Abstract. Development of Powtoon Animation Media with the VAK Model to Increase Students' Physics Learning Motivation in terms of Inductive Reasoning Ability. This study aims to examine the results of the development of Powtoon animation media with the VAK model on the variables of students' physics learning motivation in terms of inductive reasoning. To obtain the results of student learning motivation, it was carried out using the Posttest only control group research design. The design of this study uses two test classes, namely experimental and control. Data collection was carried out at the end of the lesson. From the results of both it was found that the motivation of the experimental class students was higher than that of the control class. In addition, to measure the effect of covariates on the test variables, covariate analysis (anacova) was carried out. The result is that students' inductive reasoning contributes 22% of their effective contribution. This shows that there is an addition of every 1% of the predictor variable to the increase in the dependent variable in the form of student learning motivation of 0.516.

Keywords: Powtoon, VAK, Inductive Reasoning

1. Introduction

The application of knowledge will always be in line with technological advancements [1]. Technology is used to facilitate human activities, one of which is learning. According to [2], the use of technological devices can simplify the understanding of abstract science concepts, making them more concrete. One of the science concepts that requires a concrete form of the theory being studied is physics.

Physics, as one of the branches of science, plays an important role in human development, particularly in the advancement of Science and Technology [3]. The presence of physics concepts in scientific modeling is essential for students to understand world changes and scientific concepts deeply [4]. Physics is a mandatory subject to be taught to students, especially at the senior high school level [5].

The role of physics in the development of Science and Technology (IPTEK) inherently provides motivation for students to learn. However, in reality, this is contradicted by the current conditions of teaching and learning activities (KBM) in schools. According to research conducted by [6], physics is considered a challenging subject to follow. This difficulty is experienced by almost the majority of students, resulting in a decrease in students' motivation to learn physics [7].

Motivation forms the basis for students to achieve optimal learning outcomes. Learning motivation involves both internal and external drives for students engaged in learning [8]. Internal factors stem from within the student, driven by desires and aspirations for success, and the motivation to learn in pursuit of hopes and dreams. External factors include rewards, conducive environments, enjoyable and engaging activities [9]. Students' learning motivation is closely tied to their intelligence in receiving and processing information, including subject matter.

The processing level of information varies among students from birth, reflecting their unique identities and potentials [10]. These differences mean that each individual possesses distinct desires, feelings, aspirations, tendencies, enthusiasm, and resilience, making each person unique. This uniqueness necessitates that students have specific ways to process information according to their abilities [11]. According to Gilakjani [12], in his research, every student employs different learning abilities—some utilize visual, auditory, or kinesthetic methods to achieve deeper understanding.

Students' ability to process information is also influenced by their reasoning skills. Good reasoning skills enable students to interpret received information accurately. Reasoning itself consists of two types: deductive reasoning and inductive reasoning. Inductive reasoning involves drawing general conclusions based on specific cases, literacy, intuition, or specific experiences [13]. Reasoning abilities are crucial for learning physics because students are required to think logically and systematically. Supporting tools such as learning media are essential for developing students' reasoning skills. The learning media used should have advanced capabilities, not only to convey information clearly but also to form more concrete concepts from abstract physics explanations, such as animations.

Animation-making tools have evolved significantly, and one example is Powtoon. Powtoon is an application designed to simplify the creation of presentations or informational media with a focus on animation [14]. The ease of use provided by Powtoon significantly influences the prospects of using physics learning media, especially for static fluids topics. Many explanations of static fluids topics provided by teachers leave students struggling to analyze how fluid pressure affects objects in real-world scenarios, compounded by aspects like the application of Archimedes' principle on floating ships or Pascal's Law.

Based on the stated problem, there is a strong rationale for developing learning media for static fluids topics. The main objective of this research is to enhance student learning motivation, assessed through students' inductive reasoning abilities. This material explanation is supported by technological advancements through the use of Powtoon animation media with the VAK model. The development of Powtoon animation media results in a product in the form of an instructional animated video on static fluids, presented in mp4 format specifically for second-semester senior high school students.

2. Method

This research was conducted at Madrasah Aliyah (MA) Muhammadiyah Nangahure, East Nusa Tenggara Province. The sample consisted of Class XI MIA 1 as the experimental group and Class XI MIA 2 as the control group, each with 20 students. This study is categorized as developmental research. The Research and Development (R&D) method was employed to develop a specific product and evaluate its effectiveness [15].

The focus of this research was to determine the influence of using Powtoon animation media on student motivation, with inductive reasoning as the predictor or covariate. To measure these changes, instruments for student learning motivation and inductive reasoning were utilized. Indicators of student learning motivation primarily encompassed internal motivation factors such as self-directed learning, active learning engagement, and the ability to maximize learning outcomes, as detailed in table 1.

Table 1. Grid of student learning motivation instrument.

No.	Indicators	Item Number	Total
1.	Self-directed learning	1,2*,3,4,5,6*,7*,8,9*,10	10
2.	Active learning engagement	11,12*,13,14*,15, 16,17*,18,19,20*	10
3.	Desire to maximize learning outcomes	21,22*,23*,24,25,26*,27,28*,29,30*	10
		Total	30

Note: *) Negative assessment items

The type of data analysis used in this study is analysis of covariance (ANCOVA). To examine the relationship between the covariate effect on the test variable, which is learning motivation, regression analysis, correlation analysis, and effectiveness analysis are conducted. Additionally, prerequisite tests such as normality and homogeneity of data are performed. Statistical tests are carried out using the SPSS program with a confidence level of 95%.

This research involved two test classes, with the first class (experimental) exposed to treatment using Powtoon animation media with the VAK learning model, while the subsequent class (control) received no treatment or followed conventional methods. Class selection was done through random sampling. This study falls under quasi-experimental research, employing a Posttest Only Control Design [16] as shown in table 2.

Table 2. Posttest only control design research layout.

Class	Treatment	Posttest Outcome (O1)
Experimental (X1)	X1	O1
Control (X2)	X2	O1

In Table 2, the research design is presented with the notation that X1 and X2 sequentially represent the experimental and control classes, while O1 denotes the treatment received. The Quasi-experimental Posttest Only Control Design emphasizes comparing the treatments received by both study groups and drawing conclusions based on the final outcomes achieved.

3. Results and Discussion

3.1. *Assumptions Testing*

Before proceeding to the MANCOVA analysis, it is essential to conduct assumptions testing. Several data assumptions need to be checked, including normality and homogeneity.

3.1.1. *Normality test*

In this study, normality testing of the data was conducted using the Shapiro-Wilk test. The analysis was performed using SPSS 16.0 data analysis software. The results of the normality test are presented in table 3.

Tabel 3. Result of normality test.

Variable	**Sig**	**Conclusion**
Motivation	0,349	The data is normally distributed.
Inductive Reasoning	0,660	The data is normally distributed.

Based on the data presented in table 3 regarding the results of the Shapiro-Wilk normality test, all data used in the study are normally distributed, with significance values above the minimum threshold of 0.05.

3.1.2. *Homogeneity test*

The results of the homogeneity test conducted are presented in table 4 below. Based on Table 3, the significance values for each data set are greater than 0.05, indicating that the variances of the data used in this study are homogeneous.

Table 4. Results of homogeneity test.

Variable	Sig	Conclusion
Motivation	0,825	Homogeneous variance
Inductive Reasoning	0,323	Homogeneous variance

Based on table 4 presented, the significance values for each dataset are greater than 0.05. Therefore, it can be concluded that the variances of the data used in this study are homogeneous.

3.2. *Results*

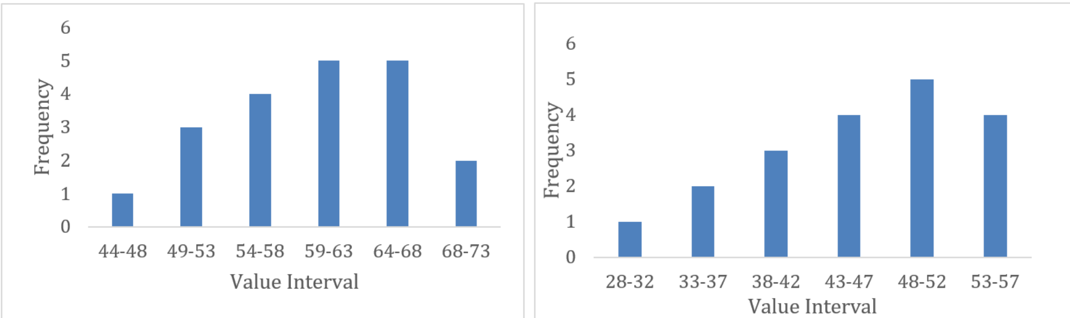
3.2.1. *Student learning motivation*

The analysis of student learning motivation is summarized in a table including the mode, mean, minimum, maximum, and median values. Descriptive data for student learning motivation in the experimental and control classes can be observed in table 5. The table presents the final assessment scores of student learning motivation in the experimental and control classes.

Tabel 5. Student learning motivation scores.

Class	N	Average	Median	Modus	Min	Max
Experiment	20	60,1	61,5	58	45	70
Control	20	46,8	47,5	57	30	58

From these results, it was found that the average motivation scores in the experimental class were higher compared to the control class. This aligns with previous research on the use of animation media in physics education, indicating a significantly higher increase in student learning motivation in the experimental class compared to the control class [17], [18]. According to [19], similar conclusions were drawn in their research, highlighting the significant positive impact of animation media on student learning motivation. Specifically, it can be observed that the most frequent scores for student learning motivation in the experimental class fall within the range of 59 to 63 and 64 to 68. Conversely, the most frequent scores for student learning motivation in the control class are within the range of 48 to 52. Figure 1 illustrates the distribution diagram of student motivation from both test classes.



(a) (b)

Figure 1. Frequency Distribution of Student Learning Motivation (a) Experimental Class (b) Control Class.

3.2.2. *Students' inductive reasoning*

The descriptive analysis results of students' inductive reasoning for the control and experimental classes, which have been analyzed, are presented with information including the average score for each class, median, mode, and minimum and maximum scores. Table 6 below shows the inductive reasoning scores for students in the experimental and control classes.

Table 6. Students' inductive reasoning scores.

Class	N	Average	Median	Modus	Min	Max
Experiment	20	71,25	72,5	60	52	88
Control	20	68,3	68,5	64	55	85

3.2.3. Contribution of covariate analysis

Covariate contribution analysis is used to determine the predictor's contribution as a covariate to the tested dependent variable. In this study, the contribution involved calculating the effective contribution of the predictor variable, in this case, inductive reasoning, to the dependent variable, student learning motivation. Before conducting the contribution analysis, regression analysis and covariate analysis are necessary. Below are the results of the regression and covariate analyses.

Tabel 7. Results of regression and correlation analysis.

Covariate	Dependent Variable	Regression Coefficient	Correlation Coefficient	R	Regression
Students' inductive reasoning	Motivation	0,516	1746,5	0,223	901,7

Based on the table presented above, the results of regression and correlation analysis between the covariate and its relationship with the dependent variable are shown. R-square (R^2) is the coefficient of determination indicating the extent of the predictor variable's influence on the dependent variable. From the table, it is observed that inductive reasoning has a 22% influence on motivation. The regression coefficient (Beta) represents the relationship where every 1% increase in the predictor variable (inductive reasoning) leads to a 0.516 increase in the dependent variable (motivation).

The correlation coefficient measures the level of association between the two test variables, and from the table, a correlation value of 1746.5 is obtained as the cross-product correlation value. Lastly, the regression value for each dependent variable with the predictor variable is sequentially 901.7. After meeting the requirements for analysis, effective contribution calculations can be performed, and the results can be observed in the following table.

Table 8. Effective contribution analysis results.

Covariate	Dependent Variable	Effective contribution
Students' inductive reasoning	Motivation	22,3%
Total		22,3%

Based on the table above, it can be concluded that the effective contribution analysis of the covariate variable, inductive reasoning, towards student learning motivation as the dependent variable, shows a 22.3% influence of inductive reasoning on student motivation.

4. Conclusion

Based on the results of the data analysis and discussion, it can be concluded that the Powtoon animation media with the VAK model has a better impact on student learning motivation compared to conventional classroom learning. This is clearly reflected in the average motivation scores of 60.1 for the experimental class compared to 46.8 for the control class. Additionally, it is found that inductive reasoning contributes 22% effectively to this outcome. This indicates that for every 1% increase in the predictor variable, there is a corresponding 0.516 increase in the dependent variable, which is student learning motivation.

Acknowledgments

We express our heartfelt thanks to the Muhammadiyah institution for consistently providing us with opportunities to conduct research on the development of this instructional media.

References

[1] Jamun Y M, Jan. 2018 Dampak Teknologi Terhadap Pendidikan *Jurnal Pendidikan dan Kebudayaan Missio* **10** 48–52

[2] Alias N and Siraj S, Nov. 2012 Effectiveness of Isman Instructional Design Model in Developing Physics Module based on Learning Style and Appropriate Technology *Procedia Soc Behav Sci* **64** 12–17

[3] Farizi Z Al Sulisworo D Hasan M H and Rusdin M E, Oct. 2019 Pengembangan Media Animasi untuk Mendukung Pembelajaran Berbasis TPACK dengan POWTOON pada Materi Torsi SMA Kelas XI *Jurnal Penelitian Pembelajaran Fisika* **10** 108–113

[4] Liu C-Y Wu C-J Wong W-K Lien Y-W and Chao T-K 2017 Scientific modeling with mobile devices in high school physics labs *Comput Educ* **105** 44–56

[5] Ridwan Y H Zuhdi M Kosim K and Sahidu H, May 2021 Pengembangan Media Pembelajaran Interaktif Berbasis Model Problem Based Learning untuk Meningkatkan Kemampuan Berfikir Kreatif Fisika Peserta Dididk *ORBITA: Jurnal Kajian, Inovasi dan Aplikasi Pendidikan Fisika* **7** 103

[6] Ekici E, 2016 "Why Do I Slog Through the Physics?" Understanding High School Students' Difficulties in Learning Physics *Journal of Education and Practice* **7** 95–107

[7] Sari H K, 2016 Peningkatan Keterampilan Proses Sains dan Hasil Belajar Fisika Siswa pada Model Pembelajaran Kooperatif Tipe Student Team Achievement Division *Tadris: Jurnal Keguruan dan Ilmu Tarbiyah* **1** 15–22

[8] Nguyen P B T Degrave P Van Steendam E and Sercu L, Dec. 2023 Self-determination in EMI education. A study of university students' motivation in Vietnam *International Journal of Educational Research Open* **5**

[9] Hidayah N and Hermansyah F, 2016 Hubungan antara Motivasi Belajar dan Kemampuan Membaca Pemahaman Siswa Kelas V Madrasah Ibtidaiyah Negeri 2 Bandar Lampung Tahun 2016/2017 *Jurnal Pendidikan dan Pembelajaran Dasar* **3** 1–21

[10] DeLago C Dickens B Phipps E Paoletti A Kazmierczak M and Irigoyen M, Jul. 2018 Qualitative Evaluation of Individual and Group Well-Child Care *Acad Pediatr* **18** 516–524

[11] Suryana D, *Pendidikan Anak Usia Dini* Padang: UNP Pres Padang.

[12] Pourhosein Gilakjani A, Dec. 2011 Visual, Auditory, Kinaesthetic Learning Styles and Their Impacts on English Language Teaching *Journal of Studies in Education* **2** 104

[13] Drupadi S W and Mumu J, 2018 Analisis Kemampuan Penalaran Induktif Matematis Mahasisa Pendidikan Matematika Universitas Papua. *Journal of Honai Math* **1** 113–126

[14] Powtoon T, About Us. *Https://Www.Powtoon.Com/Aboutus/.*

[15] Sugiyono, 2018 *Metode Penelitian Kuantitatif, kualitatif, R & D* (Bandung: CV Alfabeta)

[16] Wiersman W and Jurs S G, *Research Methods in Education: An introduction, 9th ed* (USA: Pearson Education)

[17] Bahtiar B Kafrawi M and Yeni S, Nov. 2020 Pengaruh Model Pembelajaran Kooperatif Tipe Stad Menggunakan Media Film Animasi Terhadap Motivasi dan Hasil Belajar Siswa Di MTs Al-Intishor Sekarbela *ORBITA: Jurnal Kajian, Inovasi dan Aplikasi Pendidikan Fisika* **6** 207

[18] Amelia C and Manurung A S, May 2022 Pengaruh Media Pembelajaran Audiovisual Powtoon terhadap Motivasi Belajar Siswa pada Pelajaran Matematika di Sekolah Dasar *EDUKATIF : JURNAL ILMU PENDIDIKAN* **4** 4346–55

[19] Yuliati D Santoso S and Setiadi G, 2022 Pengaruh penggunaan Media Pembelajaran Powtoon Terhadap Motivasi dan Hasil Belajar materi IPS pada Siswa kelas VI Sekolah Dasar Kecamatan Cluwak Kabupaten Pati *Jurnal Ilmiah Wahan Pendidikan* **8** 132–144