Terakreditasi S4 sinta

pISSN 2685-0761
eISSN 2685-0850

JURNAL INOVASI PEMBELAJARAN KIMIA
(Journal Of Innovation in Chemistry Education)
https://jurnal.unimed.ac.id/2012/index.php/jipk
email: Jinovpkim@unimed.ac.id

Recieved : 11 January 2023
Revised : 5 April 2023
Accepted : 27 April 2023
Publish : 30 April 2023
Page : 11 - 16

Analysis Student Motivation and Learning Outcomes by Apllying Problem Based Learning and Discovery Learning Models

Freddy Tua Musa Panggabean[1]*, Pasar Maulim Silitonga[2], Jamalum Purba[3], Jasmidi[4], and Rica Ariani Purba[5]

[1,2,3,4,5]*Chemistry Education Study Program, Universitas Negeri Medan, Medan*

**Email: freddypanggabean@unimed.ac.id*

Abstract: *Models like problem-based learning and discovery learning can improve learning outcomes and motivation using Macromedia Flash-based students on chemical equilibrium materials. In this study, non-test instruments like questionnaires about learning motivation and test instruments with a cognitive level of C3 to C5 were both used. This research attempts to: 1) to compare the learning outcomes produced by the PBL and DL models; and 2) to determine if motivation and student learning results have a linear and substantial relationship. 64 students from classes XI MIPA 1 and MIPA 2 who were chosen at random made up the sample. Two-party t-test and correlation test data analysis. The results: 1) The learning outcomes for students who used the PBL and DL models in chemistry were different. Where student learning outcomes obtained PBL model (18.219 ± 2.268) and student learning outcomes using the DL model (16.438 ± 2.327) with* t_{value} *(3.101) >* t_{table} *(2.00) and a sig value (0.003) < sig(0.05). 2) Student learning outcomes and motivation are linearly correlated and substantial where in the PBL model obtained r count (0.773) > r table (0.349) and dl model obtained rcount (0.770) > r table (0.349) with sig(0.000) value < sig (0.05).*

Keywords: *Problem Based Learning; Discovery Learning; Learning Outcomes; Learning Motivation; Chemical Equilibrium.*

INTRODUCTION

The principles of 21st century learning, professors and lecturers serve as facilitators in a student-centered learning environment. In order to establish an environment that encourages students to actively engage in learning activities, teachers and lecturers must be able to construct appropriate learning strategies, models, and media. Facts demonstrate that students, particularly in science classes, have a tendency to memorize topics, theories, and principles more than they understand (Panggabean & Purba, 2021).

Students at SMA Negeri 1 Tanjung Morawa tend to be less engaged and motivated during the learning process, according to observations made there. 47.87% of students received a score in the chemical equilibrium material where the average KKM achievement was reached, falling short of the KKM score of 75. Obviously, there are a variety of reasons why students do not participate as much in their education. Low learning motivation is one of the causes, which has an impact on the results of learning.

Learning is enhanced by motivation, which includes having high levels of reasoning, optimism about one's actions, perseverance, and patience. Difficulties are seen as challenges to be overcome. Teachers will feel at ease, delighted to give material, optimal and passionate in carrying out the process of teaching and learning activities in the classroom if the indicators are fully owned by the students (Wardiana & Asroyani, 2022). Numerous earlier research have demonstrated how increasing student motivation can enhance their academic performance (Zulvadri & Safitri, 2019).

In addition to motivation, another factor contributing to it is the employment of less diverse learning models (Miasari et al., 2020) and the use of instructional resources that undermine learning so that students rapidly get bored (Lestari, 2022). The PBL (Problem Based Learning) model is one of the instructional strategies that can engage students and suit their needs in terms of learning. Whereas when employing the PBL approach, students' learning results can be improved by t_{count} > t_{table} (2.92>2.02) (Ramlawati et al., 2017). In addition to the PBL model, (Miasari et al., 2020) mentioned that one of the methods that may call for teachers to be more inventive in assisting pupils to be able to actively learn to find their own information is the Discovery Learning model. This is also supported by the improvement in academic performance indicated by the acquisition of t_{count} (3.63) > t_{table} (1.679).

Learning models and learning media both contribute significantly to bettering the learning outcomes of students. Implementing an interactive learning paradigm based on Macromedia Flash is one of the best ways to encourage students to be active and critical consumers of information (Mufidah & Sa'adah, 2022). When compared to before and after using macromedia flash, the average learning outcome for students increased from 57.1 to 77.3 (Mardianto et al., 2022).

The application of problem-based models, specifically Problem Based Learning (PBL), differs from the Discovery Learning (DL) model in that students can improve their knowledge to become more autonomous people by using the PBL model to help them activate their problem-solving skills (Dewi et al., 2020) and the discovery learning (DL) model, which accounts for people's active pursuit of knowledge, by itself produces the best outcomes (Patandianan et al., 2022).

LITERATURE REVIEW

Problem Based Learning (PBL)

The problem-based learning (PBL) learning paradigm consists of a number of educational exercises that place an emphasis on the process of approaching problems from a scientific perspective. Through PBL, students actively think about or interpret problems, search for and process data, propose answers, and finally draw a conclusion rather than passively listening, taking notes, and memorizing the content (Nuryanto et al., 2015). The PBL structure has five steps: orienting students to the issue or the problem, organizing learners to learn, and directing both individual and group investigations, create and present the work and examine and assess the approach taken to solving the problem (Sukrawan & Komaro, 2011).

The PBL model is capable of: a) challenging students' abilities; b) increasing student learning activities; c) assisting students in applying their new knowledge to real-world problems; d) assisting students in developing their new knowledge; e) making students accountable for their learning; and f) making students feel content and like PBL learning is being applied to their lives. The PBL paradigm still has flaws, such as the following: a) It is less appropriate to be used in courses with a high degree of variety due to issues with task allocation; b) Student learning outcomes with a problem-based learning model depend on problem-solving answers. To put it another way, students must be ready to take on a new role in the learning process; c) problem-based learning implementation takes a lot of time; d) teachers who use this learning model must be able to inspire good students; and e) the formulation of problems in the learning process must be precise with the learning objectives (Ramlawati et al., 2017).

Discovery Learning (DL)

Through an orderly accumulation of facts or information learned through exploration or observation, students learn concepts using the discovery learning approach. When using the discovery learning paradigm, teachers don't just sit about; instead, they help students find their knowledge and work through issues (Putri et al., 2017). The approaches to learning are as follows: 1) simulation (students read the problem); 2) problem statement (students recognize the issue and then develop a hypothesis); 3) data gathering (students gather the necessary facts and figures from a variety of sources); 4) data processing (the act of processing data); In order for the outcomes to be satisfactory, the following steps must be taken: 5) verification (based on the outcomes of processing the information data obtained), 6) generalization (drawing inferences) (Purwanti & Suryani, 2018).

Students will understand fundamental concepts and ideas better thanks to the growth of a sense of investigation and success, which is one benefit of the Discovery Learning model. Other benefits include encouraging students to think critically and act independently, and having them use a variety of learning resources (Saleha & Nadar, 2021). However, there are a few things to take into account, including the organization (especially if the completion of tasks is done outside of school), the monitoring, which makes it risky to waste time, money, and energy, and the teacher's ability to assess whether each student works with a high and uniform level of sincerity (Saleha & Nadar, 2021).

Macromedia Flash

For learners to comprehend the lesson's concept and to keep up with the times, learning in the digital age demands innovations with a digital slant. Use of computer-based media via the macromedia flash software is one example of how technology is being used in the field of education (Mardianto et al., 2022). A program called Macromedia Flash can be used to make visual presentations that can understand several types of media, including films, animations, photos, and audio. Actionscript, a programming language used to animate objects, manage navigation, and interact with movies, is also included in this software (Wardani et al., 2022).

Learning Motivation

Students who learn to change their behavior are motivated by learning on an internal and external level, usually with some encouraging indicators or features (Uni, 2016). The traits of learning motivation are: (a) diligence in completing tasks; (b) tenacity in the face of difficulty; (c) interest in a variety of adult issues; (d) preference for working alone; (e) ability to defend one's position; (f) difficulty in letting go of one's beliefs; and (g) enjoyment of problem solving (Sadirman, 2014).

Learning Outcomes

Learning objectives for students generally include behavioral modifications in the cognitive, emotional, and psychomotor domains (Sudjana, 2014). 1) Internal factors, such as physical and psychological factors, and 2) External factors, such as family and school factors, are the factors that have an impact on learning outcomes.

METHODS

This study uses a one-group pre-test-post-test design and a true experiment methodology. 64 students from classes XI science 1 and XI science 2 made up the research sample. Students, teachers, and chemical equilibrium materials serve as the study's control factors. Student learning motivation serves as the study's moderator, while the free variables include Discovery learning and problem-based learning models.

The motivational questionnaire tools utilizing the Likert scale and test instruments in the form of multiple choices that have met valid and reliable standards were used to collect the study data. Using Excel and the SPSS application, the research data were examined using a two-party t-test and a correlation test.

RESULT AND DISCUSSION

Normality Test

To determine if the obtained continuous data is regularly distributed or not, data normality testing is done.

Table 1.Normality Test Experimental Class I

Analysis	Mean	L_{count}	L_{count}	L_{tabel}
Pretest	8.19	2.235	0.1178	0.1566
Postest	18.22	2.268	0.1178	0.1566
Initial Motivation	82.38	23.442	0.1293	0.1566
Final Motivation	121.84	24.321	0.1455	0.1566

It is determined from Table 1, which displays the results of the normality test, that the data from the experimental class students' Pretest, Posttest, Initial Motivation, and Final Motivation have a normal distribution of distributed data with $L_{count} < L_{table}$.

Table 2. Experimental Class Normality Test II

Analysis	Mean	L_{count}	L_{count}	L_{table}
Pretest	7.14	2.34	0.1298	0.1566
Postest	16.44	2.327	0.1387	0.1566
Initial Motivation	79.81	21.133	0.1280	0.1566
Final Motivation	104.59	21.133	0.1150	0.1566

Table 2, which displays the results of the normality test, leads to the conclusion that the experimental grade II students' Pretest, Posttest, Initial Motivation, and Final Motivation data have a normal distributed data distribution with $L_{count} < L_{table}$.

Homogeneity Test

By examining the extent of deviations that occur, the homogeneity test is used to estimate the degree of scattering of quantitative data or the degree of homogeneity of data within one data group.

1. Pretest

Table 3. Data variance of pretest

Experimental Class	Data variance (s^2)
Class I	5.475
Class II	4.996

Therefore:

$$F = \frac{biggest\ variance}{smallest\ variance} = \frac{5.475}{4.996} = 1.096$$

It is inferred that the experimental class I and class II data have homogeneous variance since $F_{counts} < F_{table}$ is 1.096 < 1.83 ($\sigma_1^2 = \sigma_2^2$).

2. Postest

Table 4. Data variance of postest

Experimental Class	Data variance (s^2)
Class I	5.415
Class II	5.144

Therefore:

$$F = \frac{biggest\ variance}{smallest\ variance} = \frac{5.415}{5.144} = 1.053$$

It is inferred that the experimental class I and class II data have homogeneous variance since $F_{counts} < F_{table}$ is 1.053 < 1.83 ($\sigma_1^2 = \sigma_2^2$).

3. Initial Motivation

Table 5. Data variance of initial motivation

Experimental Class	Data variance (s^2)
Class I	549.532
Class II	446.609

Therefore:

$$F = \frac{biggest\ variance}{smallest\ variance} = \frac{549.532}{446.609} = 1.230$$

It is determined that the experimental class I and class II data have homogeneous variance since $F_{counts} < F_{table}$ is 1.230 < 1.83 ($\sigma_1^2 = \sigma_2^2$).

4. Final Motivation

Table 6. Data variance of final motivation

Experimental Class	Data variance (s^2)
Class I	665.668
Class II	591.491

Therefore:

$$F = \frac{biggest\ variance}{smallest\ variance} = \frac{665.668}{591.491} = 1.125$$

It is determined that the experimental class I and experimental class II data have homogeneous variance since $F_{counts} < F_{table}$ is 1.125 < 1.83 ($\sigma_1^2 = \sigma_2^2$).

Hypothesis Test

The SPSS version 22 program was used to conduct the hypothesis test using an

Independent-samples T-test. Testing was done to look for differences between experimental classe I and clases II learning outcomes.

Table 7. T-two test

Class	**SPSS**			**Sig**	**Conc**
	Mean	$\mathbf{T_{table}}$	$\mathbf{T_{test}}$		
Exp I	18.22	2.00	3.101	0.003	Ha accepted
Exp II	16.44				

A T-test of 3.101 and a sig value were found 0.003. It can be concluded that there are differences in student learning outcomes taught using the Problem Based Learning and Discovery Learning models because of the value of the sig.< 0.05, which means that the first hypothesis is accepted and tested for accuracy at the level of $\alpha = 0.05$.

Correlation Test

The test was carried out using the product moment correlation test (Correlate Bivariate) using the SPSS Version 22 program, namely:

Table 8. Correlation test

Class	**Manual**		**SPSS**		**Conc**
	$\mathbf{r_{count}}$	$\mathbf{r_{table}}$	$\mathbf{r_{count}}$	**Sig**	
Exp I	0.733	0.349	0.733	0.000	Ha accepted
Exp II	0.770	0.349	0.770	0.000	Ha accepted

r_{count} 0.773 and sig values were found in the Experimental Class I column is 0.000. The value of the sig. < 0.05 indicates that there is a significant relationship between student learning results and learning motivation when the Problem Based Learning paradigm based on Macromedia Flash is used to teach.

There were r_{count} of 0.770 and sig values in the Experimental Class II column is 0.000. The value of the sig. < 0.05 indicates that there is a significant relationship between student learning outcomes and learning motivation when the Discovery Learning paradigm based on Macromedia Flash is used to teach them.

CONCLUSION

The learning outcomes for students who received instruction utilizing the Problem Based Learning and Discovery Learning models built on Macromedia Flash were found to differ based on the findings of the research and hypothesis testing. With a hit t_{value} (3,101) > t_{table} (2.00) and a sig(0.003) < sig(0.05) model, student learning outcomes were obtained utilizing the Problem Based Learning model (18.219 ± 2.268) and the Discovery Learning model (16.438 ± 2.327). Furthermore, there is a linear and significant relationship between student learning outcomes and motivation, with the Problem Based Learning model obtaining r_{count} (0.773) > r_{table} (0.349) and the Discovery Learning model obtaining r_{count} (0.770) > r_{table} (0.349) with a sig_{value} (0.000) < sig (0.05).

REFERENCE

Dewi, S., Wiyasa, N., & Suniasih. (2020). Pembelajaran Melalui Model Problem Based Learning Berbantuan Media Kartu Gambar Meningkatkan Kompetensi Pengetahuan Ipa Siswa. *Journal for Lesson and Learning Studies*, *3*(2), 246–254. https://ejournal.undiksha.ac.id/index.php/JLLS/article/view/27276

Lestari, F. A. P. (2022). Pengaruh Pembelajaran Berbasis E-Learning Dan Motivasi Belajar Terhadap Prestasi Belajar Mahasiswa. *Seminar Nasional Riset Dan Inovasi Teknologi*, 838–844.

Mardianto, M., Maysarah, S., & Iqbal-Nst, M. (2022). Efektivitas Penggunaan Media Pembelajaran Berbasis Macromedia Flash Dalam Meningkatkan Hasil Belajar Matematika Siswa . *MES: Journal of Mathematics Education and Science*, *7*(2), 78–82. https://doi.org/10.30743/mes.v7i2.5009

Miasari, N. P., Sumantri, M., & Renda, N. T. (2020). Pengaruh Model Pembelajaran Discovery Learning Berbantuan Lingkungan Sekitar terhadap Hasil Belajar IPA. *Jurnal Pendidikan Dan Kewirausahaan*, *3*(2), 319.

Mufidah, E., & Sa'adah. (2022). Pengaruh model pembelajaran interaktif berbasis macromedia flash terhadap hasil belajar siswa kelas v. *CENDEKIA*, *14*(01), 147–158.

Nuryanto, N., Utami, B., & Saputro, A. N. C. (2015). Penerapan model pembelajaran problem based learning (pbl) dilengkapi macromedia flash untuk meningkatkan kemampuan berpikir kritis dan prestasi belajar siswa …. *Jurnal Pendidikan Kimia*, *4*(4), 87–94. https://jurnal.fkip.uns.ac.id/index.php/kimia/article/view/6610

Panggabean, F. T. M., & Purba, J. (2021). Pengembangan E-Modul Terintegrasi Media Berbasis Adobe Flash CS6 Untuk Meningkatkan Kemampuan Pemecahan Masalah Kimia Mahasiswa. *Jurnal Inovasi Pembelajaran Kimia*, *3*(2), 116. https://doi.org/10.24114/jipk.v3i2.28108

Patandianan, S., Ramlawati, & Maryono. (2022). Pengaruh Media Berbasis Macromedia Flash pada Model Pembelajaran Discovery Learning terhadap Hasil Belajar Siswa Kelas X SMA Negeri Cendana Kabupaten Enrekang (Studi Pada Materi Pokok Hidrokarbon). *Jurnal Ilmiah Pendidikan Kimia*, *3*, 8–17.

Purwanti, K. Y., & Suryani, E. (2018). Pengaruh Discovery Learning Dengan Pendekatan Scientific Berbantuan Powtoon Terhadap Motivasi Dan Kemampuan Berpikir Kritis. *Janacitta*, *1*(1). https://doi.org/10.35473/jnctt.v1i1.17

Putri, N. M. C. D., Ardana, I. K., & Agustika, G. N. S. (2017). Pengaruh Model Discovery Learning Berbantuan Lingkungan Terhadap Kompetensi Pengetahuan IPA Siswa Kelas V. *Jurnal Inovasi Pendidikan IPA*, *4*(1), 78. http://oldpasca.undiksha.ac.id/e-journal/index.php/jurnal_pendas/article/view/3076/1643%0Ahttp://ejournal.undiksha.ac.id/index.php/JJPGSD/article/view/716

Ramlawati, Yunus, S. R., & Insani, A. (2017). Pengaruh Model PBL (Problem Based Learning) terhadap Motivasi dan Hasil Belajar IPA Peserta Didik. *Jurnal Sainsmat*, *6*(1), 1–14. http://ojs.unm.ac.id/sainsmat/article/download/6451/3684

Saleha, & Nadar. (2021). Pengaruh Penerapan Model Discovery Learning Terhadap Hasil Belajar Pada Mata Pelajaran IPA di SDN 165 Pudete Kabupaten Enrekang. *Jurnal Pendidikan Guru Sekolah Dasar*, 153–176.

Sukrawan, Y., & Komaro, M. (2011). Problem Based Learning pada Mata Pelajaran Dasar Kompetensi Kejuruan Teknik Mesin. *Invotec*, *VII*(1), 93–113.

Wardani, Rahwan, & Zukin, A. (2022). Pengembangan Media Pembelajaran Berbasis Macromedia Flash Pada Mata Pelajaran PAI Kelas 5 SD Tema Mari Mengenal Rasul - Rasul Allah SWT. *Edupedia*, *6*(2), 186–193. https://doi.org/10.24014/jnsi.v2i1.7111.9

Wardiana, W., & Asroyani, A. (2022). Pengaruh Motivasi Guru terhadap Prestasi Belajar Siswa di MI Yadinu Pancor Kopong Lombok Timur. *Jurnal Ilmiah Mandala Education*, *8*(1), 1140–1147. https://doi.org/10.36312/jime.v8i1.2950

Zulvadri, I., & Safitri, E. (2019). Pengaruh Motivasi Belajar Terhadap Prestasi Belajar Siswa Kelas Xi Ips Sma Negeri 6 Merangin. *Jurnal Tunas Pendidikan*, *2*(1), 31–40. https://doi.org/10.52060/pgsd.v2i1.190