Enhancing learning motivation of university students in Indonesia with the RADEC model and Google Earth

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ABSTRACT: In this article, the authors outline the effect of the read-answer-discuss-explain-create (RADEC) model and Google Earth on the learning motivation of university students in Jakarta. There were two groups of students formed, an experimental and a control one. A comparison of the pre-test with post-test results of the experimental and control groups are presented and discussed. The practical contribution of this study is to create more awareness among lecturers about the importance of various models and media in teaching. One of them is the use of the RADEC model and the assistance of Google Earth in the teaching process to increase student learning motivation at Muhammadiyah University Prof. Dr. Hamka Jakarta, Indonesia. The results of the study indicate that the approach with the RADEC model and Google Earth has increased university students learning motivation more than without using this model and Google Earth technology. The achieved results and benefits can also be applicable to other universities interested in using this approach.

INTRODUCTION

Education is a vessel used to prepare quality human resources for the labour market where they are able to compete in the era of globalisation. Lecturers form part of those human resources, and play a crucial role in school teaching and learning activities. Also, it is necessary to continuously improve the quality of teaching and learning, especially in universities in Jakarta, Indonesia, which are the focus of this article, in terms of the methods and learning media used. Currently, teaching and learning are very closely related to technology that is used as an educational medium. University students are generally interested and willing to use technology as an interactive learning medium. Therefore, lecturers as professional teaching staff must be more aware and agile in relation to developments and technological changes in the current Industry 4.0 era, and not only use the traditional lecture method, but be more flexible in developing their teaching approach by incorporating various technological developments [1-3].

Some universities in Indonesia still experience several problems that need to be overcome, so that they can fulfil their educational role. One of those problems relates to the low learning motivation of university students, which is due to the tedious learning process. That tediousness can impact on the level of engagement of university students when participating in the learning process. In traditional learning, university students usually sit, listen and record what the lecturer has said [4]. There is sufficient evidence to indicate that many lecturers still teach using only the lecture method, for example in Tisza's study [5], that pointed to the lecturers' comfort with the lecture method. This study invited lecturers to incorporate technology into the teaching/learning process. The goal is to make the learning environment interesting.

Stimulating and fun-based education increases university students' motivation and enthusiasm for the learning process. In addition, university students can become more active in asking questions, because they are less afraid in a more relaxed atmosphere [6]. However, developing an exciting learning and teaching process for university students requires planning and development, such as using technological media [7]. Technology is currently considered to help minimise a dull atmosphere in the class and increase university students' curiosity in the learning process. Curious, engaged students are more confident to ask their lecturers for information, as needed [8][9].

Most formal educational institutions have incorporated technology into their learning and teaching process. However, many lecturers still cannot use instructional media to support their teaching, because they need more skills to utilise the available technology. Therefore, developing strategies to help the teacher to be more active and technology-oriented is crucial as it can increase university student motivation [10]. Lecturers must be able to increase their competence through appropriate digital literacy training, so that they can efficiently and effectively support students in learning activities. There are many technological media to support the teacher and student in class, one of which is Google Earth technology, which is helpful in providing updates in class. By using this technology, it is expected that the learning motivation of university students will increase.

Google Earth is a computer program/an application that can provide accurate image visualisation, so that, for example, university students can see for free real locations or new places they have never visited. In addition, on Google Earth, teachers can present material, prepare interactive quizzes and even provide detailed explanations of the material presented [11]. Considering the capability of Google Earth and the educational benefits that may result from its use, the researchers chose this application in their attempts to increase university students' learning motivation. Google Earth can be used in interactive on-line and off-line learning processes. It is useful and fast, thus it can be considered a valuable teaching and learning tool.

Generally, Google Earth is used only as a guide or a location finder. However, now it has extended its functions to become a learning medium for university students. Among the many advantages of Google Earth particularly useful is the provision of up-to-date information, provision of changes in the terrain, the depth of the ocean and mountains, distance measurements from one place to another [12]. Considering that, students can describe a place in detail and write descriptive essays based on this application [13].

There needs to be a learning model for implementing Google Earth as a learning medium to motivate university students to learn, as their motivation can influence several things, one of which is the learning outcomes. So, an appropriate learning model is crucial and should be student-centred. Such learning should be interactive, and create an encouraging and enjoyable atmosphere. It is envisaged that by the 2023 curriculum, teachers can combine learning models with technological media. This can make learning more exciting and time efficient.

In this current study, the researchers chose the read-answer-discuss-explain-create (RADEC) model, because students get direct experience in the learning process [14]. The benefits of the RADEC model, which is based on solving problems, include enhancement in students' critical thinking skills. The RADEC model is based on the principle that university students can have the same abilities in terms of knowledge and skills, and as such the model stimulates all students [14][15].

Considering this background information, a university in Jakarta, Indonesia, was chosen for this study to make it easier for the researchers to collect the required data. Jakarta is the capital city of Indonesia, and has the largest population in the country. Also, the development of technology is relatively high and the Internet in Jakarta is speedy. The selected university in Jakarta has adequate and comprehensive facilities and infrastructure when compared to other cities. So, it can provide appropriate environment for this study involving the use of Google Earth and its impact on the learning motivation of university students.

Specifically, this study aims to determine the use of Google Earth in teaching and learning activities within the RADEC model at Muhammadiyah University of Prof. Dr. Hamka (Universitas Muhammadiyah Prof. Dr. Hamka) in Jakarta, Indonesia, and to examine its impact on student learning motivation.

This study also aims to create more awareness among lecturers about the importance of engaging various models and media in teaching. The achieved results and benefits can also be applicable to other universities interested in using this approach.

METHOD

In this study experimental quantitative research was applied [16]. As mentioned above, Google Earth and the RADEC model were used in the teaching/learning process [17]. A pre-test and post-test were carried out in the experimental/control group design. The subjects of this study were 61 students from Muhammadiyah University of Prof. Dr. Hamka, Jakarta, Indonesia. Random sampling was chosen to select students from the University. Questionnaires were given to students to collect the relevant data before and after the learning process.

RESULTS AND DISCUSSION

Based on the pre-test and post-test data elicited by means of questionnaires, several descriptive statistics were obtained and observations made (Table 1 to Table 7).

Table 1: Comparison of descriptive statistics on learning motivation (pre-test results of the control and the experimental class).

	Control class	Average	Experimental class	Average
N	Valid	31	Valid	30
	Missing	0	Missing	0
	Mean	80.69	Mean	81.98
	Median	80.71	Median	82.86
	Mode	78[a]	Mode	86
	Standard deviation	5.510	Standard deviation	7.167
	Variance	30.357	Variance	51.361

	Range	24	Range	28
	Minimum	71	Minimum	71
	Maximum	95	Maximum	99
	Sum	2501	Sum	2459

Based on Table 1, it can be seen that the initial values/scores of student learning motivation in both the experimental and the control class were relatively similar, which indicates that the initial conditions for the two classes were almost the same. More specifically, the frequency distribution of the students' learning motivation scores before the treatment was around 80. This shows in detail that the tendency of student learning motivation before the treatment in both the experimental and the control class had almost the same distribution.

Table 2: Comparison of descriptive statistics on learning motivation (post-test results of the control and the experimental class).

	Control class	Average	Experimental class	Average
N	Valid	31	Valid	30
	Missing	0	Missing	0
	Mean	81.41	Mean	88.12
	Median	80.71	Median	87.86
	Mode	79	Mode	88
	Standard deviation	5.880	Standard deviation	5.939
	Variance	34.574	Variance	35.274
	Range	24	Range	24
	Minimum	73	Minimum	64
	Maximum	96	Maximum	99
	Sum	2524	Sum	2644

Based on the Table 2, it can be seen that the values/scores of student learning motivation after the treatment in both the experimental and the control class were significantly different, which indicates that the conditions after the treatment have changed. More specifically, the frequency distribution of the students' learning motivation scores in the control class was around 80, while in the experimental class after the treatment the score was around 90. This shows in detail that the tendency of student learning motivation in the experimental class after the treatment has increased, while in the control class it had a fixed distribution.

Table 3: Learning motivation normality test.

No.	Group	Sig.	Conclusion
1.	Pre-test of the experimental class learning motivation	0.190	Normal
2.	Post-test of the experimental class learning	0.200	Normal
3.	Pre-test of the control class learning motivation	0.200	Normal
4.	Post-test of the control class learning motivation	0.200	Normal

In Table 3, it can be seen that the pre-test and post-test data on the learning motivation of the experimental and the control class have a sig. value > 0.05, so it can be concluded that the experimental class and the control class data are normally distributed.

Table 4: Learning motivation homogeneity test.

Class	f_{count}	Sig.	Conclusion
Pre-test motivation	3.843	0.055	Homogeneous
Post-test motivation	0.028	0.867	Homogeneous

Table 4 includes the results of the homogeneity test of the study variables. It can be seen that the f_{count} pre-test of student learning motivation was 3.843 with a sig. value of 0.055, while the f_{count} post-test of student learning motivation was 0.028 with a sig. value of 0.867. The pre-test and post-test sig. data on student learning motivation were greater than 0.05 (sig. > 0.05), so it can be concluded that the data in this study has a homogeneous variance.

Pre-test and Post-test *T*-test

The pre-test and post-test *t*-test of the experimental class aims to determine whether there is an increase in the score. Research results are defined as significant if $t_{count} > t_{table}$ at a significance level of 5% and *p* value < 0.05. The summary of the pre-test and post-test results of the experimental and the control class is shown in the following table:

Table 5: *T*-test results - the pre-test and post-test results of the experimental and the control class.

Class	Average	t_{count}	t_{table}	*p*
Pre-test of the experimental class learning	81.98	4.156	2.045	0.001
Post-test of the experimental class learning	88.12			
Pre-test of the control class learning motivation	80.69	3.153	2.042	0.223
Post-test of the control class learning motivation	81.41			

As shown in Table 5, the experimental class obtained an average pre-test score of student learning motivation of 81.98 and an average post-test score of 88.12, so this group experienced an increase of 6.14. It was also found that $t_{count} > t_{table}$ at a significance level of 5% (4.156 > 2.045) and the *p*-value < 0.05, which means that there was a significant increase in the learning motivation of the experimental class. While in the control class the average pre-test score of student learning motivation was 80.69 and the average post-test score was 81.41, so this group experienced an increase of 0.72. Also the obtained results for $t_{count} < t_{table}$ at a significance level of 5% (1.517 < 2.042) and the *p*-value > 0.05 mean that the increase in the learning motivation of the control class was insignificant.

The effect size test was used to see how much influence Google Earth with the RADEC model had on student learning motivation, and the results of the experimental class were compared with the control class. The results of the effect size test can be seen in Table 6.

Table 6: Effect size test results for the experimental and the control class.

Group	Test	Average	SD	D	Conclusion
Experimental	Pre-test	81.98	7.167	0.93	Very high
	Post-test	88.12	5.939		
Control	Pre-test	80.69	5.51	0.13	Very low
	Post-test	81.41	5.88		

Based on these calculations, it can be concluded that the score of the influence of using Google Earth with the RADEC model on student learning motivation at Muhammadiyah University of Prof. Dr. Hamka is 0.93. Based on the Cohen's value interpretation table, the influence is classified as very high. While the score of the effect of learning without Google Earth and the RADEC model on student learning motivation is 0.13. Based on the Cohen's value interpretation table, the effect is classified as very low.

There are several issues that must be considered in forming and increasing student learning motivation, and it is important to know and understand student characteristics. Also crucial is the choice of the right learning model and media for students. Lecturers must make learning meaningful, and they need to recognise and appreciate students' efforts in learning. That way, students will feel valued and encouraged. University students as other students, starting from elementary school, need to be supported and praised. Giving praise to university students will increase their self-confidence.

Student learning motivation can be divided into intrinsic and extrinsic motivation. Through media, such as the Google Earth application, lecturers can help to increase students' extrinsic motivation, because the lecturers and Google Earth support the students from outside. However, students can also get motivation from within themselves, which is referred to as intrinsic motivation. Table 7 is a comparison of students' intrinsic and extrinsic motivation.

Table 7: Intrinsic and extrinsic motivation of university students.

Motivation	Intrinsic	Extrinsic
Students	Support from within the students.	Support from outside the students.
	High interest in learning from within oneself. Having the initiative to learn without external order.	Students should be given rewards for their engagement and interest in learning. Students learn only to obtain something. So, they must be given advice and suggestions from the outside, like a lecturer.
	Students tend to be active in teaching and learning activities without having to be asked by the lecturer.	Students tend to be passive in teaching and learning activities.
	Students quickly understand the learning material provided by the lecturer.	Students tend to be slow in understanding the material provided, therefore the need for interesting learning media.

Learning Outcomes of using Google Earth and the RADEC model in the Learning Process

At the reading stage, the teacher presents the material to be taught to students. The teacher asks them to read the presented material, and get familiar with it. The reading stage includes also the use of Google Earth, so this stage is not only in the textual form presented by the lecturer, but in the form of authentic visual images. The use of these images

creates an engaging and enjoyable atmosphere. Students are motivated as this part is not text-based only and dull, but more interactive. After completing the reading stages, students are considered to have understood the material, and the teacher gives quizzes to them. Thus, by using Google Earth students can have a lively and captivating experience, which positively impacts on their learning.

At the answering stage, the teacher uses the Google Earth quiz section to provide interactive questions to students. In this section, the teacher can choose many categories and the questions be innovative. Students feel comfortable with the questions given and can easily understand them, resulting in efficient answers.

Following this stage is discussion, when the teacher and students discuss the provided material and the quiz answers based on the use of Google Earth. The last stage is creation, where students can give opinions about the provided material. At this stage, the lecture builds self-confidence and students are encouraged to present their arguments. At this stage, following the use of Google Earth as a learning medium within the RADEC model, an increase in learning and motivation was observed among the sampled students in Jakarta.

Learning motivation is one factor determining the maximum effectiveness of the student learning process [16]. If students' learning motivation is high, it will create a pleasant learning atmosphere. Learning will be of higher quality, because of the response and feedback given to students in the learning process. So, it is essential to stimulate student learning motivation through different means, one of which is by using technological media, namely the Google Earth application [18-20].

The advantage of using Google Earth as a learning medium in universities is that it can make it easier for lecturers to explain material concretely and in a lively three-dimensional way with visual images. Thus, students can understand the material and get to know cities and even countries that they have never visited. Using Google Earth with the quizzes can enable students to think critically [12], and provides them with an interactive and engaging activity.

CONCLUSIONS

The results of this study indicate that the influence of using the RADEC model and Google Earth on student learning motivation at the University of Muhammadiyah Prof. Dr. Hamka, Jakarta was significant.

This is evidenced by the values obtained in the hypothesis testing of student learning motivation in the experimental class with $t_{count} > t_{table}$ (4.156 > 2.045) at a significance level of 5%. So, it can be concluded that the application of Google Earth and the RADEC model had a significant effect on student learning motivation.

The hypothesis testing in the control class obtained $t_{count} > t_{table}$ (1.517 < 2.042) at a significance level of 5%, so it can be concluded that learning without Google Earth had no significant effect on student learning motivation. These two test results prove that learning based on Google Earth with the RADEC model further increases student learning motivation compared to the control where Google Earth was not involved.

The calculation of the effect size test in the pre-test and post-test of learning motivation in the experimental class obtained the result of D = 0.93, so it can be concluded that the effect of the application of Google Earth-based learning on student learning motivation is at a very high level. While the calculation of the effect size test in the pre-test and post-test of control class learning motivation obtained the result of D = 0.13, so it can be concluded that the effect of learning without Google Earth on student learning motivation is at a very low level. These two test results prove that learning with the help of Google Earth and the RADEC model has a greater effect on increasing student learning motivation than learning without this help.

Learning within the RADEC model and including Google Earth at Muhammadiyah University of Prof. Dr. Hamka in Jakarta, Indonesia, attracted students' attention and increased their learning motivation much better than conventional learning. The new approach created an engaging learning atmosphere and facilitated the understanding the the study material.

It is hoped that future researchers can utilise new technology as an innovative and compelling learning medium for university students. One of those technologies is Google Earth that based on the RADEC model can increase learning motivation of university students. Also, further research is needed regarding the factors that influence the success of using Google Earth in increasing university student motivation. It is hoped that this study will be a step forward in finding more factors impacting the use of Google Earth on university student learning motivation, leading to model development that would consider the successful use of Google Earth at Muhammadiyah University of Prof. Dr. Hamka, Jakarta, Indonesia.

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