



Development of Instruction Model for Bachelor Program: Flipped Classroom Based on Learning Management System (Model Plays)

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Abstract. A needs analysis has been carried out in 2022-2023 at four universities. Of the 142 respondents, 88% of students agreed that learning would be developed as a flipped classroom learning model based on an online learning management system, 65% offline. The aim of the research is to develop a learning model in the undergraduate program, namely a flipped classroom based on learning management system (Model Plays). This development research method consists of ten stages. Development research has been successful and produced a development product in the form of a learning model in the undergraduate program, namely a flipped classroom based on learning management system (Model Plays). Based on the results of the product effectiveness test on Tadulako University health and recreation physical education students, It is known that the value of Asymp. Sig (2-tailed) is $0.000 < 0.05$, it can be concluded that there is a difference in learning outcomes between the experimental class and the control class, so it can be said that there is an influence of using the flipped classroom model based on the learning management system (Model Plays) on student learning outcomes.

Keywords: Flipped Classroom, Learning Management System, Model Plays.

1 Introduction

Information and communication technology has changed many areas of our lives, including education and learning [1], [2]. The rapid development of technology has transformed classrooms into intelligent learning environments [1], [3], [4]. Technology continues to improve, smart learning features are available from various Information and communication Technologies such as computers, internet, and mobile devices which basically leads to the development and introduction of one important genre of technology and information based educational tools known as Learning Management System (LMS) [3], [5], [6].

LMS first appeared in the 1990s known as a computer-based integrated learning system [1], [6], [7]. It was then adopted by educational institutions in many developed countries with good internet infrastructure, such as the UK and the United States [1], [5]. It is also an integral part of the learning experience for Australians, Chinese as well as a significant percentage of foreign students in Australia [11], [12]. Likewise, radically changing classroom environments in Turkey [1], [14], in the Middle

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B. Bustang et al. (eds.), *Proceedings of the Second Makassar International Conference on Sports Science and Health (MICSSH 2023)*, Advances in Health Sciences Research 74,

https://doi.org/10.2991/978-94-6463-354-2_15

East and Far East [1], [15], [16] to support the tradition of face-to-face teaching in blended learning settings[1], [8]–[10]. Currently, LMS adoption in higher education institutions (PT) has become a more attractive option [6], including many higher education institutions in Indonesia[11], [12]. Currently, LMS at faculty of teaching and education (FKIP) Tadulako University has become an attractive option since the Covid 19 pandemic hit the world[2]. This health crisis has been so severe that it has forced restrictions and even the closure of educational institutions as a form of virus prevention[1], [13]. LMS has become a platform to maintain learning implementation despite the physical distance between teacher to student and student to student[1], [14], [15].

LMS consists of a diverse group of software and programs equipped with a wide range of pedagogical and learning administration tools to support traditional and modern education, all the way to web-based learning activities[1], [3]. Specifically, its functions include providing a form platform for conveying information, managing learning materials, collecting and assessing student output from assessments given, assigning assignments, storing and sending grades and feedback to students, submitting reports[1], [2], [8], [9], [16], [17]. Some examples of LMS include Adobe Captivate Prime, Blackboard, Brightspace, Canvas, Edmodo, Moodle, Saba Software, Schoology, and WizIQ[1], [10].

Currently, many students in undergraduate physical education study programs cannot participate in the learning process for various reasons, both offline and online.[18]–[20]. Not to mention that students have a tendency to use the internet with mobile devices and laptops only used for Short Message Service (SMS), telephone, chat, Facebook, Instagram and entertainment such as games, YouTube and listening to music.[21]–[23]. For this reason, both teachers and lecturers need to present a learning model, strategy or approach that is effective, dynamic and can help students reduce negative habits in using the internet, both via mobile devices and laptops, so they don't miss out on learning material.[5], [24]–[27]. Flipped Classroom (FC) was developed by Bergmann and Sams[14],[28]. The aim is to ensure that students who for various reasons are unable to attend class will be able to keep up with the pace of learning and are not disadvantaged by lack of attendance[5], [28], [29].

Flipped Classroom (FC) encourages video recording and distribution, and in addition, it allows teachers to focus more attention on the individual learning needs of each student[5], [28]. Flipped Classroom Learning as “a pedagogical approach in which direct instruction is shifted from a group learning dimension to an individual learning dimension, transforming the remaining group space into a dynamic and interactive learning environment[5], [14], [30]. Therefore, the flipped classroom approach is based on active learning, defined as any learning method that involves students in the learning process[5], [30]–[33].*Flipped Classroom*(FC) and Learning Management System (LMS) can be platforms for implementing both online and offline learning in higher education[2], [15].

Flipped Classroom (FC) offers students learning through interactive technology such as watching videos at home and preparing themselves to apply active learning strategies[5], [14], [29]. Previous studies have found that the Flipped Classroom (FC) has many benefits for learners, including improved performance, increased engagement and motivation, increased self-regulation, increased learner autonomy, increased learner collaboration, increased creativity, higher course

satisfaction, and increasing the effectiveness of soft skills[5], [14], [29]. With the Flipped Classroom strategy, students learn not only in the classroom but outside the classroom, they can access or view the material provided by the teacher or lecturer repeatedly with the help of the internet or learning videos.[5], [29], [34]. Flipped Classroom is a strategy that can be provided by teachers or lecturers by minimizing the amount of direct instruction in their teaching practice while maximizing interaction with each other.[5], [14], [29]. This strategy utilizes technology that provides additional supporting learning materials that can be easily accessed online[14], [29], [35].

In general, undergraduate programs teach the theory and practice of skills in a variety of ways including face-to-face demonstrations, practice by experts, online and offline videos, demonstrations, and case studies using various simulation models[30], [35]–[37]. Online and offline theoretical and practical learning has long been carried out in the physical education undergraduate program environment[30], [38]–[41]. However, a lack of consistent teaching strategies and evaluation methods occurs in the physical education undergraduate program environment[25], [39], [40]. Flipped Classroom, which is a mixed teaching strategy carried out by introducing students to the content before attending face-to-face teaching offline, is something interesting to apply in the physical education undergraduate program environment.[36], [42][30], [35]. Various literature supports the Flipped Classroom as an effective learning method[35], [40]. The flipped classroom has become popular in educational literature[5], [14], [29]. However, research regarding the use of these models, strategies and methods is still limited for teaching theory and practical skills in undergraduate physical education programs[40], [43], [44].

Overall, both pupils and students have cell phones, so they can use their cell phones to access online learning in the LMS before learning begins.[29], [39]. Apart from that, the long-term goal is to develop this learning model to help reduce the negative impact of internet use among students and students[5], [21],[5], [21], [22], [45]. Therefore, the main aim of this research is to develop a flipped classroom (FC) model in undergraduate learning-based programs Learning Management System (LMS) which is shortened to the model plays.

2 Method

The development research design used uses the Borg and Gall research development model. This research aims to develop a flipped classroom model in undergraduate classes based on a learning management system (Model Plays).

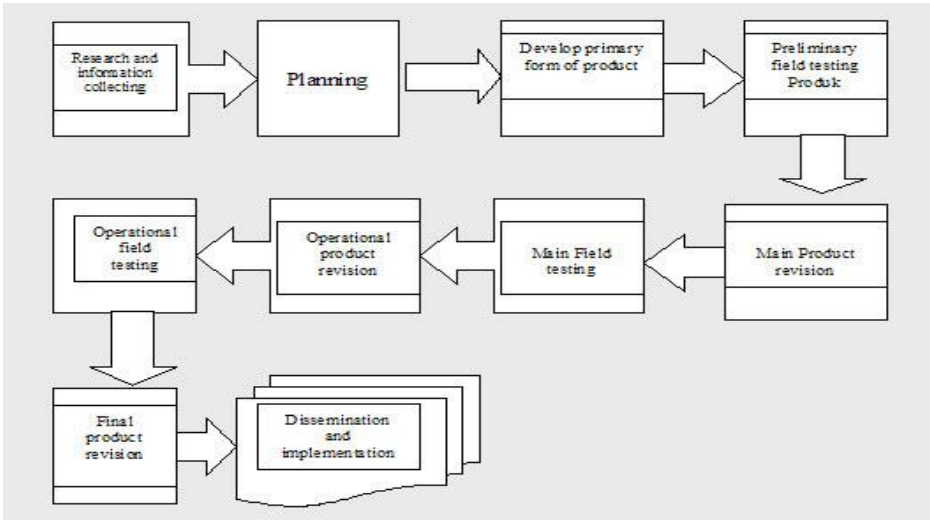


Fig 1. Development model chart Borg & Gall [46]–[49].

1. Information gathering (Field Study)

At this stage the researcher conducted research and gathered information to explore the extent to which this product was needed by undergraduate students. At the information collection stage, there were 142 respondents.

2. Planning

In connection with the formulation of narrative text descriptions of anatomy lecture material, learning model plans and instruments for planning. Identify learning variations that can increase student interest and learning outcomes

3. Initial product development Model *Plays*

Building the initial form of the model product *Plays* which can be carried out in field testing refers to the Bergman and Moore model development concept which consists of: Analysis, Design, Development, Production, Authoring, and Validation.

4. Initial testing of the model *plays*

The purpose of initial field testing is to obtain an initial qualitative evaluation of the product. The field trial consisted of a small group experiment with test subjects of ten (10) students who were taking or had taken anatomy/anatomy lectures. After the trial, observations, interviews and questionnaires were carried out.

5. Revise the results of initial testing of the model *plays*

In all phases of the research and development cycle involving product evaluation.

6. Main field trial (Large group test)

Phase II trials through field testing with a larger number of respondents. The test subjects were twenty (20) students who were taking or had taken anatomy/anatomy lectures. The goal is to prove that the model *Plays* that is developed meets the stated objectives, taking place in an environment suitable for the final product. During the trial, interviews and questionnaires were distributed.

7. Product Revision

Evaluate the product after large group trials to suit training objectives.

8. Operational Test (Test product effectiveness)

Test the effectiveness of the product to determine whether the Model Plays which is being developed to improve student learning outcomes. Testing with experiments, the type of experiment used is poor experimental design. The research design used is the static group comparison design. The effectiveness test was carried out on students who took class A anatomy lectures with a class B control group.

Model Plays (Class A)	Learning outcomes
Regular Model (Class B)		Learning outcomes

Fig 2. The Static Group Comparison Design [50], [51].

9. Revise the final product before the product is disseminated
10. Final Model Product Plays. Model Plays disseminated and ready to use.

3 Results

The research developed a flipped classroom model in undergraduate classes based on a learning management system (Model Plays), with undergraduate students as the subject, which was carried out at several universities. The results of research on the development of a flipped classroom model in undergraduate classes based on a learning management system (Model Plays) are as follows:

3.1 Field study

From the results of the needs analysis in the table above, there are several important points that are keywords for the need to develop learning models:

1. Of the 142 respondents, 65% did not like all course material with various learning models
2. Of the 142 respondents, 61% of students had never read material about the flipped classroom learning model
3. Of the 142 respondents, 79% of students said that lecturers had not used the flipped classroom learning model in delivering material and practice.
4. Of the 142 respondents, 88 students agreed that learning should be developed in the form of a flipped classroom learning model using smartphones/laptops based on an online learning management system, 65% offline.
5. 100% of students use the internet to support their activities on a daily basis. What's even more sophisticated when using the internet is that you don't have to go to an internet cafe, but directly use the cellphone or smartphone that is always in your hand.

3.2 Planning

In general, product development planning is carried out after obtaining the results of preliminary research or needs analysis in the field. In planning this research, researchers

formed a teamwork according to their expertise and prepared facilities and infrastructure to support product development research, including: 1) Professional IT expert, 2) Learning expert, 3) Learning multimedia expert, 4) Professional photographer, 5) Draft validation instrument, 6) draft test instrument, and 7) Draft model script or learning innovation Initial product development Model Plays.

3.3 Model Plays Initial Product Development

Developing a flipped classroom model in undergraduate classes based on a learning management system (Model Plays) contains 12 (twelve) core materials related to learning human anatomy in sports in higher education. The result of developing the flipped classroom model in undergraduate classes based on the learning management system (Model Plays) is a product in the form of a learning platform. The components contained in this product include text in the form of word, PDF, video and images. The following is a design for a flipped classroom model in undergraduate classes based on a learning management system (Model Plays) that has been developed by researchers.

3.4 Initial Trial Model Plays (Small Groups)

Table 1. Results of Small Group Trials

No	Meet- ing	Question	Sub- ject	Score				Information
				4	3	2	1	
1	1-16	Main menu display	10	1	8	1	0	80% Feasible/Interesting/ Satisfying/easy
2	1-16	Display of learning topics	10	1	7	2	0	70% Feasible/Interesting/ Satisfying/easy
3	1-16	Material on each main topic	10	2	3	5	0	50% Fairly interesting/ Fairly satisfactory/fairly easy
4	1-16	Material content on each topic	10	3	5	2	0	50% Feasible/Attractive/ Fulfilling/easy
5	1-16	Material on each topic in video form	10	6	1	3	0	60% Strongly agree/ Very interesting/very fulfilling/very easy
6	1-16	Material on each topic in image form	10	5	5	0	0	50% Very feasible/Very interesting/very fulfilling/very easy
7	1-16	Material on each topic is in PPT form	10	3	6	1	0	60% Feasible/Attractive/ Satisfying/easy
8	1-16	Material on each topic is in word/PDF form	10	5	4	1	0	50% very feasible/very interesting/very fulfilling/very easy

9	1-16	The existence of Model Plays learning	10	6	3	1	0	60% very feasible/very interesting/very fulfilling/very easy
10	1-16	Ease of application	10	2	2	6	0	60% Fairly interesting/Fairly satisfactory/fairly easy
11	1-16	Feasibility and approval in developing Plays model learning	10	1	6	3	0	60% Feasible and agree/Interesting/Satisfying/easy

Information:

- 4: Very feasible and very agree/Very interesting/very fulfilling/very easy
 3: Feasible and agree/Interesting/Fulfilling/easy
 2: Interesting enough/Quite fulfilling/fairly easy
 1: Less interesting/less fulfilling/not easy

3.5 Revising Initial Test Results of Model Plays

From the results of the small group trial, it can be concluded that overall developing the flipped classroom model in undergraduate classes based on the learning management system (Model Plays) which was developed for students can be applied in learning because all the trial subjects were on a small scale, namely 10 students, 60% stated that the model play is feasible and agrees/interesting/fulfills/easy to what the researcher put together. These results indicate that product development can be continued in the next trial group, namely large group trials involving a larger number of trial subjects.

3.6 Main Field Trial (Large Group)

The model develops a flipped classroom model in undergraduate classes based on a learning management system (Model Plays) for students which has been tested in small groups, then tested in large groups. The research subjects in the large group trial involved 40 students consisting of: 20 students from the UWN Palu nutrition study program; and 20 students from the UNISMUH Palu sports science study program.

3.7 Product Revision

Large group trials that have been carried out by researchers have produced several notes to be used as material for correction and evaluation, especially in the implementation of development products in learning during lectures. Some notes that researchers can collect are:

- 1) In general, the learning model can be applied and carried out by all subjects, consisting of two trial groups, namely 20 students from the Muhammadiyah University (UNISMUH) sports science study program and 20 students from the Widya Nusantara University (UWN) Palu Nutrition Study Program..

- 2) Of the 40 respondents, 85% stated that the play model was feasible and strongly agreed/very interesting/very fulfilling/very easy to use in the learning process
- 3) Due to unstable internet signal/network conditions in several regions in Indonesia, including several regions in Central Sulawesi, it is hoped that the size of the materials in the LMS will be made as small as possible without reducing the quality.
- 4) Material that must be downloaded on the LMS should pay attention to the file/video size so that students' cellphone/laptop memory is not burdened.

On the basis of the notes, suggestions and findings in the large group trials above, it can be concluded that in general 85% of respondents stated that the learning model developed could be used on a large scale for learning in higher education while still paying attention to the size of the files/videos contained in learning management systems (LMS). Thus the model developing a flipped classroom model in undergraduate classes based on a learning management system (Model Plays) can be continued with effectiveness testing, in order to find out to what extent the development product is effective in achieving the goal of increasing student motivation and learning outcomes.

3.8 Operational Test (Product Effectiveness Test)

The success of a product development or product brings benefits or has a positive impact on learning, so it is necessary to implement/test the effectiveness of the product being developed. Does the product being developed really have a significant impact or vice versa? The data that will be used as a basis for concluding the results of the effectiveness test of the flipped classroom model based on the learning management system (Model Plays) in human anatomy/anatomy courses must go through several research data analyzes:

Normality test. Based on the output of the normality test, a significance value (sig) was obtained for all data both in the Kolmogorov Smirnov test and the Shapiro Wilk test of $0.001 < 0.05$, so it can be concluded that the research data is not normally distributed. Because the research data is not normally distributed, to determine whether there is a difference in the averages of two unpaired samples, a test was carried out using the Mann Whitney test.

Mann Whitney Test. The Mann Whitney test is used to determine whether there is a difference in the means of two unpaired groups (experimental class post test and control class post test). Based on the statistical test output, it is known that the value of Asymp. Sig (2-tailed) is $0.000 < 0.05$, so it can be concluded that there is a difference in learning outcomes between class A (experimental class) and class B (control class). Because there are significant differences, it can be said that there is an influence of using the flipped classroom model based on the learning management system (Model Plays) on student learning outcomes in human anatomy/anatomy courses.

3.9 Product Revision

The flipped classroom model based on the learning management system (model play) has improved the appearance and size of all material in the LMS so that it is easily accessible to all students wherever they are.

3.10 Final Product (Model Plays)

Because the results of the data analysis are significant, the Plays Model is ready to be used and disseminated nationally and internationally.

4 Conclusion

Based on the results of needs analysis, field trials, effectiveness tests and discussion of development research results on learning model development products in undergraduate programs, namely the flipped classroom based on learning management system (Model Plays), it can be concluded that:

1. Development research has been successfully carried out and has produced development products in the form of learning models in undergraduate programs, namely *flipped classroom* based on learning management system (Model Plays).
2. Based on the results of product effectiveness tests on students of the Tadulako University physical education, health and recreation study program, it is known that the value *Asymp. Sig*(2-tailed) of $0.000 < 0.05$, it can be concluded that there is a difference in learning outcomes between class A (experimental class) and class B (control class). Because there are significant differences, it can be said that there is an influence of using the flipped classroom model based on the learning management system (Model plays) on student learning outcomes.

References

- [1] H. Toring *et al.*, "Asia Pacific Management Review Evaluation of students' satisfaction toward an adopted learning management system at Indiana Aerospace University: A structural equation modelling approach," *Asia Pacific Manag. Rev.*, no. xxxx, 2022, doi: 10.1016/j.apmr.2022.12.002.
- [2] M. K. Mohammadi, A. A. Mohibbi, and M. H. Hedayati, *Investigating the challenges and factors influencing the use of the learning management system during the Covid-19 pandemic in Afghanistan*, vol. 26, no. 5. Springer US, 2021. doi: 10.1007/s10639-021-10517-z.
- [3] H. Tinnmaz and J. H. Lee, "An analysis of users' preferences on learning management systems: a case on German versus Spanish students," *Smart Learn. Environ.*, vol. 7, no. 1, 2020, doi: 10.1186/s40561-020-00141-8.
- [4] Gunawan, F. Dlis, and Widiastuti, "Effect of Interactive Multimedia Learning To Learn," *J. Educ. Heal. Sport*, vol. 9, no. 9, pp. 263–270, 2019, [Online]. Available: <http://ojs.ukw.edu.pl/index.php/johs/article/download/7407/9065>
- [5] M. Barranquero-Herbosa, R. Abajas-Bustillo, and C. Ortego-Maté, "Effectiveness of flipped classroom in nursing education: A systematic review of systematic and integrative reviews," *Int. J. Nurs. Stud.*, vol. 135, 2022, doi: 10.1016/j.ijnurstu.2022.104327.
- [6] T. X. Huang, H. H. Kuo, T. S. Lo, C. C. Liang, Y. H. Lin, and H. H. Chou, "Combing pre-workshop, web-based learning and hands-on workshop as a flipped classroom clinical skill training model during the COVID-19 pandemic," *Taiwan. J. Obstet. Gynecol.*, vol. 61, no. 5, pp. 755–760, 2022, doi: 10.1016/j.tjog.2021.10.008.
- [7] H. J. Becker and N. Hativa, "History, theory and research concerning integrated learning systems," *Int. J. Educ. Res.*, vol. 21, no. 1, pp. 5–12, 1994, doi: 10.1016/0883-0355(94)90019-1.

- [8] D. Turnbull, R. Chugh, J. Luck, D. Turnbull, and R. Chugh, "Learning management systems: a review of the research methodology literature in Australia and China methodology literature in Australia and China," 2021, doi: 10.1080/1743727X.2020.1737002.
- [9] D. Turnbull, "Issues in learning management systems implementation: A comparison of research perspectives between Australia and China," 2021.
- [10] R. Kraleva, M. Sabani, and V. Kralev, "An Analysis of Some Learning Management Systems," vol. 9, no. 4, pp. 1190–1198, 2019.
- [11] B. I. Maliki, J. W. Kusuma, M. B. Tabrani, and H. Hamidah, "Identification of education in Indonesia and learning models in student learning with learning management system (LMS)," *Int. J. Econ. Educ. Entrep.*, vol. 1, no. 1, pp. 37–46, 2021, [Online]. Available: <http://ije3.esc-id.org/index.php/home/article/view/5%0Ahttps://ije3.esc-id.org/index.php/home/article/download/5/5%0Ahttps://lens.org/084-340-654-149-532>
- [12] M. A. A. Al-furqan, Ahmad Ardillah Rahman, "Adopting Learning Management System in Indonesian Higher Education: The Encountering Challenges to the Transformation," vol. 23, no. 3, pp. 83–97, 2019.
- [13] S. T. Cortes, "Flexible Learning as an Instructional Modality in Environmental Science Course during COVID-19," *Aquademia*, vol. 4, no. 2, p. ep20024, 2020, doi: 10.29333/aquademia/8444.
- [14] I. Y. Alyoussef, "Acceptance of a flipped classroom to improve university students' learning: An empirical study on the TAM model and the unified theory of acceptance and use of technology (UTAUT)," *Heliyon*, vol. 8, no. 12, p. e12529, 2022, doi: 10.1016/j.heliyon.2022.e12529.
- [15] A. M. Al-rahmi, W. M. Al-rahmi, U. Alturki, A. Aldraiweesh, S. Almutairy, and A. S. Al-adwan, "Exploring the factors affecting mobile learning for sustainability in higher education," *Sustain.*, vol. 13, no. 14, pp. 1–22, 2021, doi: 10.3390/su13147893.
- [16] N. T. Nguyen, "A study on satisfaction of users towards learning management system at International University – Vietnam National University HCMC," *Asia Pacific Manag. Rev.*, vol. 26, no. 4, pp. 186–196, 2021, doi: 10.1016/j.apmr.2021.02.001.
- [17] A. Marks and K. Rietsema, "Learning Management Systems : A Shift Toward Learning and Academic Analytics," vol. 11, no. 4, pp. 77–82, 2016.
- [18] U. Löfgren, B. M. Wälivaara, U. Strömbäck, and B. Lindberg, "The nursing process: A supportive model for nursing students' learning during clinical education - A qualitative study," *Nurse Educ. Pract.*, vol. 72, no. August, 2023, doi: 10.1016/j.nepr.2023.103747.
- [19] L. H. Chen, "Moving Forward: International Students' Perspectives of Online Learning Experience During the Pandemic," *Int. J. Educ. Res. Open*, vol. 5, no. August, 2023, doi: 10.1016/j.ijedro.2023.100276.
- [20] L. Li, R. Zhang, and A. M. Piper, "Predictors of student engagement and perceived learning in emergency online education amidst COVID-19: A community of inquiry perspective," *Comput. Hum. Behav. Reports*, vol. 12, no. January, p. 100326, 2023, doi: 10.1016/j.chbr.2023.100326.
- [21] M. Kolhar, R. N. A. Kazi, and A. Alameen, "Effect of social media use on learning, social interactions, and sleep duration among university students," *Saudi J. Biol. Sci.*, vol. 28, no. 4, pp. 2216–2222, 2021, doi: 10.1016/j.sjbs.2021.01.010.
- [22] A. C. De Araújo, J. Knijnik, and A. P. Ovens, "How does physical education and health respond to the growing influence in media and digital technologies? An analysis of curriculum in Brazil, Australia and New Zealand," *J. Curric. Stud.*, vol. 53, no. 4, pp. 563–577, 2021, doi: 10.1080/00220272.2020.1734664.
- [23] M. R. Febriansyah, Nicholas, R. Yunanda, and D. Suhartono, "Stress detection system for social media users," *Procedia Comput. Sci.*, vol. 216, pp. 672–681, 2023, doi: 10.1016/j.procs.2022.12.183.
- [24] A. David, D. Mihai, M. E. Mihailescu, M. Carabas, and N. Tapus, "Scalability through

- Distributed Deployment for Moodle Learning Management System,” *Procedia Comput. Sci.*, vol. 214, no. C, pp. 34–41, 2022, doi: 10.1016/j.procs.2022.11.145.
- [25] K. E. Wilson and J. R. Hobbs, “Innovative use of a flipped-classroom approach to teach fundamental nursing skills,” *Teach. Learn. Nurs.*, vol. 000, pp. 8–11, 2022, doi: 10.1016/j.teln.2022.08.002.
- [26] P. Joy, R. Panwar, R. Azhagiri, A. Krishnamurthy, and M. Adibatti, “Flipped classroom – A student perspective of an innovative teaching method during the times of pandemic,” *Educ. Médica*, vol. 24, no. 2, p. 100790, 2023, doi: 10.1016/j.edumed.2022.100790.
- [27] T. M. Alqahtani, F. D. Yusop, and S. H. Halili, “Dataset on the relationships between flipped classroom approach, students’ learning satisfaction and online learning anxiety in the context of Saudi Arabian higher education institutions.,” *Data Br.*, vol. 45, p. 108588, 2022, doi: 10.1016/j.dib.2022.108588.
- [28] J. B. and A. Sams, *Flip YOUR Classroom Reach Every Student in Every Class Every Day*. 2012.
- [29] R. V Staddon, “A supported flipped learning model for mathematics gives safety nets for online and blended learning,” *Comput. Educ. Open*, vol. 3, no. September, p. 100106, 2022, doi: 10.1016/j.caeo.2022.100106.
- [30] Saira, F. Ajmal, and M. Hafeez, “Critical review on flipped classroom model versus traditional lecture method,” *Int. J. Educ. Pract.*, vol. 9, no. 1, pp. 128–140, 2021, doi: 10.18488/journal.61.2021.91.128.140.
- [31] İ. Y. Kazu and C. K. Yalçın, “the Relationship Between Secondary School Teachers and Students’ Readiness of Using Flipped Classroom,” *J. Effic. Responsib. Educ. Sci.*, vol. 15, no. 1, pp. 1–9, 2022, doi: 10.7160/eriesj.2022.150101.
- [32] R. Talbert, “Learning MATLAB in the inverted classroom,” *ASEE Annu. Conf. Expo. Conf. Proc.*, 2012.
- [33] R. Talbert and A. Mor-Avi, “A space for learning: An analysis of research on active learning spaces,” *Heliyon*, vol. 5, no. 12, p. e02967, 2019, doi: 10.1016/j.heliyon.2019.e02967.
- [34] C. Marnewick, “Student experiences of project-based learning in agile project management education,” *Proj. Leadersh. Soc.*, vol. 4, no. August, p. 100096, 2023, doi: 10.1016/j.plas.2023.100096.
- [35] S. Damrongpanit, “Video Lectures in Online EFL Flipped-Classroom: Effectiveness, Students’ Evaluation and Experiences,” *Eur. J. Educ. Res.*, vol. 10, no. 3, pp. 1075–1088, 2022, [Online]. Available: https://www.researchgate.net/profile/Suntonrapot-Damrongpanit/publication/356662582_Effects_of_Mindset_Democratic_Parenting_Teaching_and_School_Environment_on_Global_Citizenship_of_Ninth-grade_Students/links/61a6dda685c5ea51abc0f7b6/Effects-of-Mindset-Dem
- [36] H. Jung, S. W. Park, H. S. Kim, and J. Park, “The effects of the regulated learning-supported flipped classroom on student performance,” *J. Comput. High. Educ.*, vol. 34, no. 1, pp. 132–153, 2022, doi: 10.1007/s12528-021-09284-0.
- [37] M. Parrish, “Integrating Technology into the Teaching and Learning of Dance,” *J. Danc. Educ.*, vol. 1, no. 1, pp. 20–25, 2001, doi: 10.1080/15290824.2001.10387169.
- [38] C. H. Yu, “Hybrid teaching mode including physical, online, and flipped classroom learning for dental education in Taiwan,” *J. Dent. Sci.*, vol. 17, no. 1, pp. 624–625, 2022, doi: 10.1016/j.jds.2021.09.026.
- [39] O. Østerlie, J. Sargent, C. Killian, M. Garcia-Jaen, S. García-Martínez, and A. Ferriz-Valero, “Flipped learning in physical education: A scoping review,” *Eur. Phys. Educ. Rev.*, vol. 29, no. 1, pp. 125–144, 2023, doi: 10.1177/1356336X221120939.
- [40] A. Ferriz-Valero, O. Østerlie, S. García-Martínez, and S. Baena-Morales, “Flipped Classroom: A Good Way for Lower Secondary Physical Education Students to Learn Volleyball,” *Educ. Sci.*, vol. 12, no. 1, 2022, doi: 10.3390/educsci12010026.

- [41] N. Xiao, D. Thor, and M. Zheng, "Student preferences impact outcome of flipped classroom in dental education: Students favoring flipped classroom benefited more," *Educ. Sci.*, vol. 11, no. 4, 2021, doi: 10.3390/educsci11040150.
- [42] H. J. Cho, K. Zhao, C. R. Lee, D. Runshe, and C. Krousgrill, "Active learning through flipped classroom in mechanical engineering: improving students' perception of learning and performance," *Int. J. STEM Educ.*, vol. 8, no. 1, 2021, doi: 10.1186/s40594-021-00302-2.
- [43] G. A. Dinndorf-Hogenson, C. Hoover, J. L. Berndt, B. Tollefson, J. Peterson, and N. Laudenschach, "Applying the flipped classroom model to psychomotor skill acquisition in nursing," *Nurs. Educ. Perspect.*, vol. 40, no. 2, pp. 99–101, 2019, doi: 10.1097/01.NEP.0000000000000411.
- [44] T. H. C. Chiang, S. J. H. Yang, and C. Yin, "Effect of gender differences on 3-on-3 basketball games taught in a mobile flipped classroom," *Interact. Learn. Environ.*, vol. 27, no. 8, pp. 1093–1105, 2019, doi: 10.1080/10494820.2018.1495652.
- [45] T. Jowsey, G. Foster, P. Cooper-Ioelu, and S. Jacobs, "Blended learning via distance in pre-registration nursing education: A scoping review," *Nurse Educ. Pract.*, vol. 44, no. March, p. 102775, 2020, doi: 10.1016/j.nepr.2020.102775.
- [46] _Joyce_P_Gall Meredith_D_Gall, _Walter_R_Borg, *Educational Research an introduction*. Pearson Education inc, 2003.
- [47] J. Tangkudung, *Macam-Macam Metodologi Penelitian Uraian dan Contohnya*. Jakarta: Lensa Media Pustaka Indonesia., 2016.
- [48] Sugiono, *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. 2014.
- [49] Ali Maksum, *Metodologi Penelitian*. Surabaya: Unesa University Press, 2012.
- [50] J. W. Creswell, *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. 2012.
- [51] N. E. Fraenkel, Jack R., Wallen, *How to Design and Evaluate Research in Education*. 2012.

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