24 (1), 2023, 152-160

Jurnal Pendidikan MIPA

e-ISSN: 2685-5488 | p-ISSN: 1411-2531

http://jurnal.fkip.unila.ac.id/index.php/jpmipa/

Application of Kahoot-Based Digital Assessments in Basic Physics Lectures: The Case of Muhammadiyah Makassar University

Nurlina[1], Dewi Hikmah Marisda[2,*] & Nurfadilah[2]

[1]Doctoral Program in Educational Science, Universitas Muhammadiyah Makassar, Indonesia

[2]Department of Physics Education, Universitas Muhammadiyah Makassar, Indonesia

Abstract: Previous research has developed digital assessments in basic physics courses. This study aims to measure the effectiveness of implementing Kahoot-based digital assessments in Basic Physics courses at a private university in Makassar. This research is a pre-experimental study with a pretest-posttest design in one experimental class. The research sample is a saturated sample with 13 students as respondents. This study tested three types of questions, namely quiz, true-false, and multiple choice. The results of the data analysis show that the mean value for the pretest is 54.46 and the posttest is 85.87. In addition, an increase (n-gain) value of 0.68 was obtained in the medium category. The n-gain percentage value is 68.06 which means the effectiveness of the instrument is in the fairly effective category. Testing the pretest and posttest scores for each type of question shows an increase in learning outcomes for the type of question being tested. The pretest and posttest results for the three types of questions are presented in the form of a frequency distribution graph. After obtaining data on the effectiveness of using the Kahoot-based digital basic physics assessment, it is further suggested to test the practicality of the Kahoot-based basic physics assessment developed.

Keywords: Learning assessment, basic physics, Kahoot application.

Abstrak: *Penelitian sebelumnya telah mengembangkan asesmen digital pada perkuliahan fisika dasar. Penelitian ini bertujuan untuk mengukur efektifitas penerapan asesmen digital berbasis kahoot pada perkuliahan Fisika Dasar di salah satu Universitas swasta di Makassar. Penelitian ini merupakan pra eksperimen dengan desain pretest-posttest pada satu kelas eksperimen. Sampel penelitian adalah sampel jenuh dengan jumlah responden 13 mahasiswa. Penelitian ini mengujikan tiga jenis soal yaitu jenis kuis, benar-salah, dan pilihan ganda. Hasil analisis data memperlihatkan rekapitulasi nilai mean untuk pretest 54,46 dan posttest 85,87. Selain itu, diperoleh juga nilai peningkatan (n-gain) sebesar 0,68 berada pada kategori sedang. Nilai persentasi n-gain sebesar 68,06 yang berarti efektifitas instrumen berada pada kategori cukup efektif. Pengujian nilai pretest dan postest untuk masing-masing jenis soal memperlihatkan peningkatan hasil belajaruntuk jenis soal yang diujikan. Hasil pretest dan posttest untuk ketiga jenis soal tersebut disajikan dalam bentuk grafik distribusi frekuensi. Setelah memperoleh data efektifitas penggunaan asesmen digital fisika dasar berbasis kahoot, selanjutnya disarankan untuk menguji kepraktisan dari asesmen fisika dasar berbasis kahoot yang dikembangkan.*

Kata kunci: *asesmen pembelajaran, fisika dasar, aplikasi Kahoot.*

▪ INTRODUCTION

Technological developments have touched the realm of Education (Kurniawan, 2020). Technology in Education is integrated through technology in learning. Technology in Education and learning has several aspects, namely: technology as a skill and competency (Gary & Seow, 2016); learning technology as infrastructure in learning; learning technology as a learning resource (Camileri & Camileri, 2017); learning technology as a learning aid; and learning management support.

Dewi Hikmah Marisda
*Email: dewihikmah@unismuh.ac.id

DOI: http://dx.doi.org/10.23960/jpmipa/v24i1.pp152-160
Received: 25 February 2023
Accepted: 19 March 2023
Published: 21 March 2023

Learning technology consists of Design, Development, Utilization, Management, and Assessment. The use of technology has been applied to the learning process, learning tools (media and teaching materials), and learning assessment (Ediyanto, Sunandar, Ramadhani, & Aqilah, 2022). The use of technology in learning is very necessary for the relationship between students and learning materials or systems (Purnasari & Sadewo, 2020). The use of learning technology has the responsibility to match students with specific materials and activities, prepare students to be able to interact with the selected materials and activities, provide guidance during activities, provide an assessment of the results achieved by students, and include them in ongoing organizational procedures (Lai & Hong, 2014).

The use of technology in education has developed rapidly since the pandemic, all learning activities take place online (Sefriani, Sepriana, Wijaya, Radyuli, & Menrisal, 2021). Two years have passed, and during the new normal period, some universities are still implementing technology-based learning, some are fully online, and some are in a hybrid system (some are online, some are face-to-face) (Imania & Bariah, 2019). Assessment has the potential to support the learning process. Through assessment, a lecturer can measure the quality of learning (Schildkamp, van der Kleij, Heitink, Kippers, & Veldkamp, 2020). Assessment of Basic Physics lectures uses an assessment of Physics learning outcomes and an assessment rubric for practicum. Assessment of physics learning outcomes uses questions in the form of descriptions that students work on paper. Then when lectures took place online during a pandemic, assessment of basic physics learning outcomes was carried out online through the Google form application.

The use of the google form application in the assessment of basic physics learning outcomes has many weaknesses. According to the course lecturer, the weakness of using the Google form in the assessment is that you cannot use the equation directly because the Google Form program cannot use mathematical symbols every time you make the form. In addition, the Google Form application is limited to typing questions that are equipped with pictures and graphics. Although this can be overcome by using the menu to add questions in file form, sometimes some smartphones or laptops used by students cannot open files properly (Munawaroh, Prastowo, & Nurjanah, 2021). There are some that change the picture settings, including the numbers on the x and y axes of the graph. According to student experience after using the Google form application, the application is very good if the answers given are just short answers, not in the form of numbers with complicated equations. In addition, for questions that are complicated, students usually send them in pdf file format. However, all of this work must be completed using a laptop (Santoso, 2019).

In previous research, researchers have developed assessments in Kahoot-based digital Basic Physics courses. This assessment has been validated by five experts, consisting of experts in the field of Physics and experts in the field of instructional media (Nurlina et al., 2022). After being declared valid and reliable, then limited effectiveness is measured through the application of a Kahoot-based digital basic physics assessment in Basic Physics 1 lecture in the odd semester of the 2022/2023 academic year. Therefore, the formulation of the problem in this study is how much the learning outcomes of physics have increased after using a Kahoot-based digital basic physics assessment after being applied to Basic Physics lectures in 1 odd semester of the 2022/2023 school year. And the purpose of the study was to analyze the increase in

students' basic physics learning outcomes after using a Kahoot-based basic physics lecture assessment.

▪ METHOD

Participants, Research Design and Procedures

The population in this study were physics education students in the odd semester of the 2022/2023 academic year. The research sample is a saturated sample, that is, the total sample is the entire population. The number of research samples was 13 students consisting of two male students and eleven female students. This research is a pre-experimental study with only one group pretest-posttest design. This research lasted approximately three months.

Instrument

Students are given online learning outcomes tests through the Kahoot application, before learning basic physics and after learning physics. The pretest uses a printed version of the question sheet in the form of a quiz, true-false, and multiple-choice tests. Test instruments in the form of quizzes, true-false, and multiple choice before being tested on students are first tested for validity and reliability. The validation carried out is the validation of experts (experts). Expert validation is carried out to see expert validation (Rahmawati, Rustaman, Hamidah, & Rusdiana, 2018) of the draft instrument that has been developed (Hamed Taherdoost & Lumpur, 2016; Lichtenberger, Wagner, Hofer, Stern, & Vaterlaus, 2017; Marisda, Rahmawati, Riskawati, Basri, & Anisa, 2022). The validation team consists of five experts, who are experts in Physics and learning media. The validation results can be seen in the table below.

Table. 1. Validation results of digital basic physics assessment instruments based on kahoot

No.	Instrument type	Value	Criteria
1.	Quiz Questions	1	Valid
2.	Really wrong thing	1	Valid
3.	Multiple choice questions	1	Valid

Testing the reliability of the instrument using the Cronbach alpha formula and intraclass correlation coefficients. The reliability value of the instrument can be seen in the following table.

Table 2. The reliability result of digital basic physics assessment instruments based on kahoot

No.	Instrument type	Value	Criteria
1.	Quiz Questions	0.763	Reliabel
2.	Really wrong thing	0.875	Reliabel
3.	Multiple choice questions	0.786	Reliabel

Data Analysis

After the instrument is declared valid, the instrument is tested on the research sample. After that, the data were analyzed by descriptive statistical analysis and the N-gain test with the IBM SPSS Version 25 application for Macbook. The effectiveness measured in this study is the effectiveness of using Kahoot-based digital assessments. This effectiveness can be seen by obtaining student learning outcomes tests in basic physics 1 lectures. The N-gain value category according to Meltzer and the N-gain effectiveness interpretation category according to Hake can be seen in tables 1 and 2 below:

Table 3. categories of n-gain values

N-Gain Value	Categori
$g > 0.70$	High
$0.30 \leq g \leq 0.70$	Medium
$g < 0.30$	Low

(Ramdhani, Khoirunnisa, & Siregar, 2020)

Table 4. Categories of interpretation of the effectiveness of the n-gain value

Persentase	Tafsiran
$X < 40$	Ineffective
40-55	Less effective
56-75	Effective enough
$X > 76$	Effective

(Wahab, Junaedi, & Azhar, 2021)

Apart from being analyzed using SPSS version 25 for Macbook, digital Basic Physics questions were also analyzed for each type of question using the Excel application. Then the excel tabulation is converted into a graph to show the difference in obtaining the mean value for each type of question.

▪ RESULT AND DISSCUSSION

After developing a digital-based Basic Physics assessment with the Kahoot application. Then tested the effectiveness of the assessment that was developed. The effectiveness test is used to measure how much the learning outcomes of basic physics have increased with the application of a Kahoot-based digital basic physics assessment (Lin, Chen, & Liu, 2017). This assessment was tested on 13 students participating in Basic Physics I course. The test results can be seen in the Table 5 below

Table 5. Descriptive statistics on the effectiveness of using kahoot-based basic physics digital assessments

	N	Minimum	Maximum	Mean	Standard Deviation
Pretest	13	41.67	74.00	54.46	9.54
Postest	13	79.00	90.00	85.87	3.40

From Table 1, it can be seen that the acquisition of the mean before the Kahoot-based digital basic physics assessment was applied, when students still used manual assessments with the printed version of the question sheets. The mean value obtained is 54.46 with a standard deviation of 9.50. After applying the Kahoot-based digital basic physics assessment, the mean (posttest) was 85.87 with a standard deviation value of 3.40. This data shows an increase in students' basic physics learning outcomes after implementing a Kahoot-based digital assessment. These results are in line with research using the Kahoot application as a student evaluation tool, which also shows an increase in learning outcomes (Daryanes & Ririen, 2020). In addition, by looking at the standard deviation value which is smaller than the standard deviation of the pretest value, it shows that the distribution of the research sample data is better than the acquisition of the pretest standard deviation value (Amrhein, Trafimow, & Greenland, 2019).

From the descriptive statistical analysis in Figure 1 above, it also shows the acquisition of the N-gain value for the application of Kahoot-based digital basic physics assessment. The N-gain value obtained is 0.68. Referring to table 2 of the N-gain category, the increase in learning outcomes after using a Kahoot-based digital assessment is in the medium category. Then by looking at the percentage of N-gain it can be seen the level of effectiveness of the assessment used. In this study, the percentage value of N-gain was 68.06. Then referring to table 3 of the categories of interpretation of the effectiveness of the N-gain value, it is known that the effectiveness of this study is in a fairly effective interpretation.

In addition to data being analyzed using SPSS version 25 for Macbook, Kahoot-based digital basic physics assessment questions were also analyzed for each type of question. The following is a graphical form for each type of question.

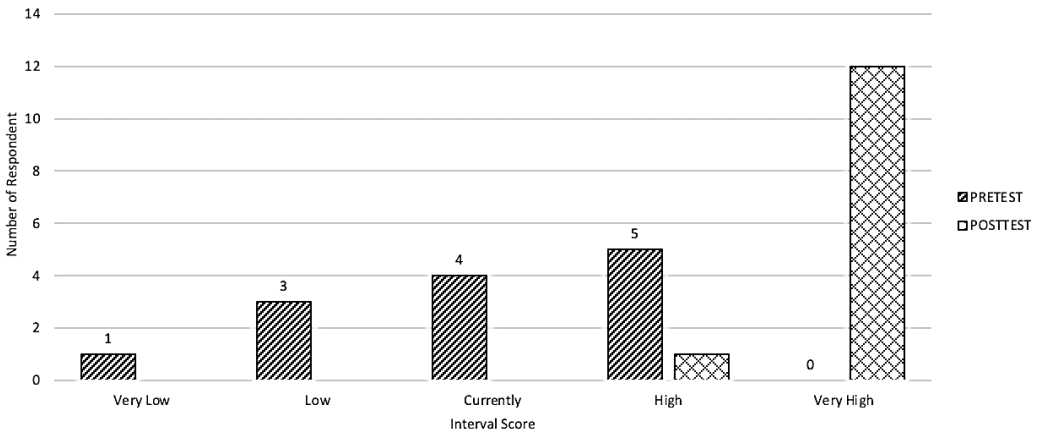

Figure 2. Frequency distribution diagram for quiz questions

The frequency distribution diagram for the types of quiz questions shows a significant increase from the pretest to the posttest results. In the pretest results, it can be seen that the highest frequency distribution category is only in the high category. While the post-test results have reached a very high category. And there are no more frequency distributions that are in the very low, low, and sufficient categories. This is also in line

with research that analyzes the use of the Kahoot application in science learning for quiz questions, which also shows a significant increase in student learning outcomes and responses (Lisnani & Emmanuel, 2020)

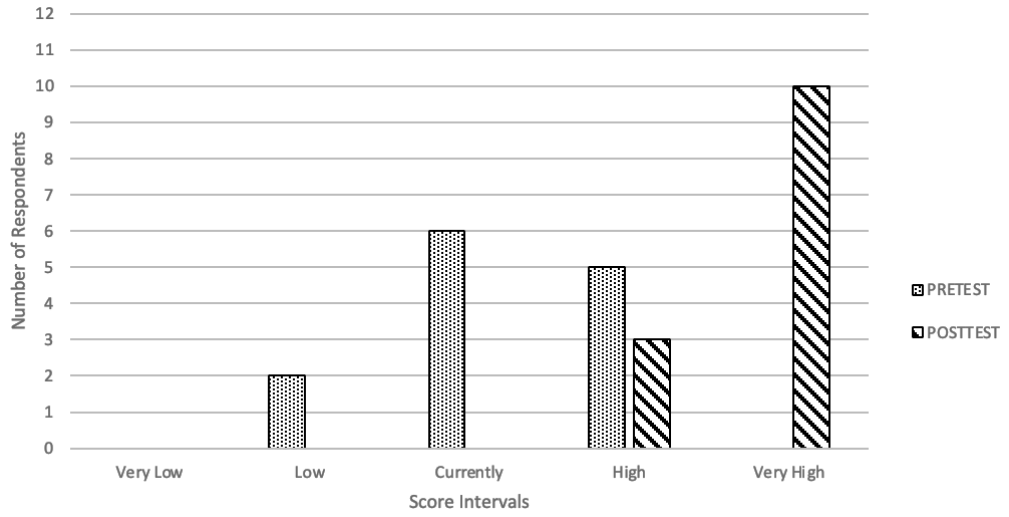

Figure 3. Frequency distribution diagram for true-false types of questions

In Figure 3, the frequency distribution diagram for true-false types of questions shows that the distribution of data in the pretest is no longer in the very low category. And, the highest distribution is in the high category. Then, the post-test results show that the lowest data distribution is in the high category, and the more is in the very high category.

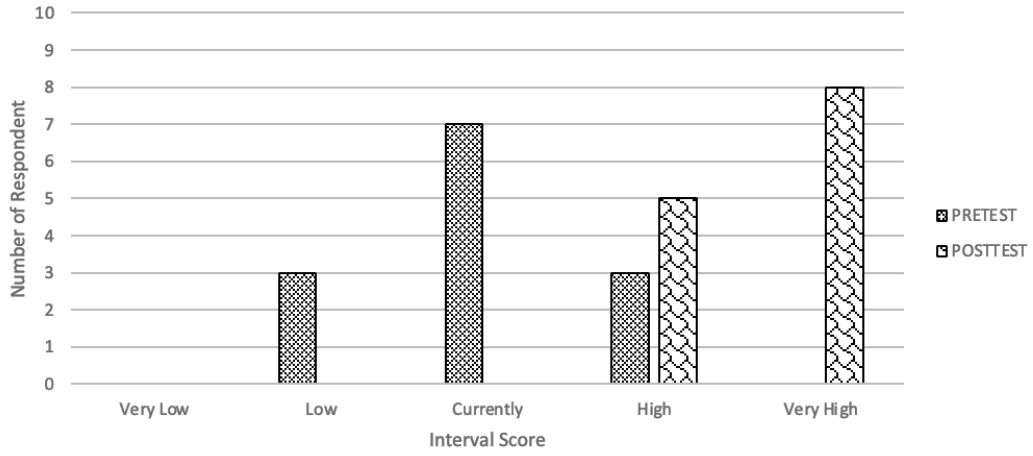

Figure 4. Frequency distribution diagram for multiple choice questions

The frequency distribution diagram in Figure 4 for the type of multiple-choice questions shows that the distribution of data for pretest results is in the low, sufficient, and high categories. There is no distribution of data that is in the very low category. Then the highest frequency is in the sufficient category. The post-test results show that the data

distribution is in the high and very high categories, and the highest distribution is in the very high category. Some of the advantages of Kahoot-based digital assessment applications are that they are interactive so they are more liked by students in working on Basic Physics questions. This is in accordance with research using digital snakes and ladders game media (Novita & Sundari, 2020). Other advantages are practical in using (Khamidah, Winarto, & Mustikasari, 2019), according to the times, the response is faster in knowing whether a student's answer is right or wrong, easily accessible anywhere and anytime. This is in accordance with the research that applies Quizizz game media in learning mathematics (Mulyati & Evendi, 2020).

▪ CONCLUSION

The results of the study found that the pretest mean the value was 54.46 and the posttest mean value was 85.87. The results of the increased test (n-gain) were 0.68 in the medium category, and the n-gain percentage value of 68.06 stated that the Kahoot-based basic physics assessment instrument was quite effective. In addition, the pretest and posttest data for each type of question are presented in the form of a frequency distribution graph. After obtaining data on the effectiveness of the use of Kahoot-based digital basic physics assessments, it is then suggested to test the practicality of the Kahoot-based basic physics assessments that have been developed.

▪ REFERENCES

Amrhein, V., Trafimow, D., & Greenland, S. (2019). Inferential statistics as descriptive statistics: there is no replication crisis if we don't expect replication. *American Statistician*, 73(sup1), 262–270. Retrieved from https://doi.org/10.1080/00031305.2018.1543137

Camileri, M. ., & Camileri, A. . (2017). Digital learning resources and ubiquitous technologies in education. *Tech Know Learn*, 22, 65–82.

Daryanes, F., & Ririen, D. (2020). *Efektivitas penggunaan aplikasi kahoot sebagai alat evaluasi pada mahasiswa*. *jnsi: journal of natural science and integration* (Vol. 3). Retrieved from https://kahoot.com/

Ediyanto, E., Sunandar, A., Ramadhani, R. S., & Aqilah, T. S. (2022). Sustainable instrument development in educational research. *discourse and communication for sustainable education*, 13(1), 37–47. Retrieved from https://doi.org/10.2478/dcse-2022-0004

Gary, P., & Seow, P.-S. (2016). A critical review of information technology competencies and skills development. *Journal of Education for Business*, 91(3), 166–175.

Hamed Taherdoost, A., & Lumpur, K. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. International journal of academic research in management *(IJARM)* (Vol. 5). Retrieved from https://ssrn.com/abstract=3205040

Imania, K. A., & Bariah, S. K. (2019). *Rancangan pengembangan instrumen penilaian pembelajaran berbasis daring*. *Jurnal Petik*, 5(1), 31–47. Retrieved from https://doi.org/10.31980/jpetik.v5i1.445

Khamidah, N., Winarto, W., & Mustikasari, V. R. (2019). *Discovery learning : penerapan dalam pembelajaran ipa berbantuan bahan ajar digital interaktif*

untuk meningkatkan prestasi belajar siswa. JIPVA (Jurnal Pendidikan IPA Veteran), 3(1), 87. Retrieved from https://doi.org/10.31331/jipva.v3i1.770

Kurniawan, B. (2020). *Implementasi pendidikan tekhnohumanistik berbasis 4c dalam membentuk karakter peserta didik*. *Indonesian Values and Character Education Journal*, 3(1), 40–46.

Lai, K.-W., & Hong, K.-S. (2014). Technology use and learning characteristics of students in higher education: Do generational differences exist? *British Journal of Educatrional Technology*, 46(4), 725–738.

Lichtenberger, A., Wagner, C., Hofer, S. I., Stern, E., & Vaterlaus, A. (2017). Validation and structural analysis of the kinematics concept test. *Physical Review Physics Education Research*, 13(1). Retrieved from https://doi.org/10.1103/PhysRevPhysEducRes.13.010115

Lin, M. H., Chen, H. C., & Liu, K. S. (2017). A study of the effects of digital learning on learning motivation and learning outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(7), 3553–3564. Retrieved from https://doi.org/10.12973/eurasia.2017.00744a

Lisnani, L., & Emmanuel, G. (2020). *Analisis penggunaan aplikasi kahoot dalam pembelajaran ipa*. *Jurnal IPA & Pembelajaran IPA*, 4(2), 155–167. Retrieved from https://doi.org/10.24815/jipi.v4i2.16018

Marisda, D. H., Rahmawati, ., Riskawati, ., Basri, S., & Anisa, . (2022). Analyzing the Validity of Interactive Multimedia-based Learning on Acid Rain Content. *KnE Social Sciences*, 2022. Retrieved from https://doi.org/10.18502/kss.v7i12.11534

Mulyati, S., & Evendi, H. (2020). *Pembelajaran matematika melalui media game quizizz untuk meningkatkan hasil belajar matematika smp*. *GAUSS: Jurnal Pendidikan Matematika*, 3(1), 64–73. Retrieved from https://doi.org/10.30656/gauss.v3i1.2127

Munawaroh, R. Z., Prastowo, A., & Nurjanah, M. (2021). *Efektivitas penilaian pembelajaran menggunakan google form pada pembelajaran daring. JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 5(3). Retrieved from https://doi.org/10.36312/jisip.v5i3.2152

Novita, L., & Sundari, F. S. (2020). *Peningkatan hasil belajar siswa menggunakan media game ular tangga digital. Jurnal Basicedu*, 4(3), 716–724. Retrieved from https://doi.org/10.31004/basicedu.v4i3.428

Nurlina, Marisda, D. H., Riskawati, Sultan, A. D., Sukmawati, & Akram. (2022). Assessment on digitalization of basic physics courses: need analysis on the use of digital-based assessment. *Jurnal Pendidikan IPA Indonesia*, 11(4), 531–541. Retrieved from https://doi.org/10.15294/jpii.v11i4.39191

Purnasari, P. D., & Sadewo, Y. D. (2020). *Pemanfaatan teknologi dalam pembelajaran sebagai upaya peningkatan kompetesnsi pedagogik. Publikasi Pendidikan*, 10(3), 189. Retrieved from https://doi.org/10.26858/publikan.v10i3.15275

Rahmawati, Rustaman, N. Y., Hamidah, I., & Rusdiana, D. (2018). The development and validation of conceptual knowledge test to evaluate conceptual knowledge of physics prospective teachers on electricity and magnetism topic. *Jurnal Pendidikan IPA Indonesia*, 7(4), 483–490. Retrieved from https://doi.org/10.15294/jpii.v7i4.13490

Ramdhani, E. P., Khoirunnisa, F., & Siregar, N. A. N. (2020). *Efektifitas modul*

elektronik terintegrasi multiple representation pada materi ikatan kimia. *Journal of Research and Technology*, 6(1), 162–167. Retrieved from https://journal.unusida.ac.id/index.php/jrt/article/view/152

Santoso, P. B. (2019). *Efektivitas penggunaan media penilaian google form terhadap hasil belajar pelajaran tik effectiveness of google form assessment media on ict learning outcomes. Kebijakan Dan Pengembangan Pendidikan Di Era Revolusi Industri 4.0.*, (September), 287–292.

Schildkamp, K., van der Kleij, F. M., Heitink, M. C., Kippers, W. B., & Veldkamp, B. P. (2020). Formative assessment: A systematic review of critical teacher prerequisites for classroom practice. *International Journal of Educational Research*, 103(June), 101602. Retrieved from https://doi.org/10.1016/j.ijer.2020.101602

Sefriani, R., Sepriana, R., Wijaya, I., Radyuli, P., & Menrisal. (2021). Blended learning with edmodo: The effectiveness of statistical learning during the covid-19 pandemic. *International Journal of Evaluation and Research in Education*, 10(1), 293–299. Retrieved from https://doi.org/10.11591/IJERE.V10I1.20826

Wahab, A., Junaedi, J., & Azhar, M. (2021). *Efektivitas pembelajaran statistika pendidikan menggunakan uji peningkatan n-gain di pgmi*. *Jurnal Basicedu*, 5(2), 1039–1045. Retrieved from https://doi.org/10.31004/basicedu.v5i2.845