

## Online lectures with local wisdom context: efforts to develop students' higher-order thinking skills

Hikmawati<sup>1</sup>, I Wayan Suastra<sup>2</sup>, Ketut Suma<sup>2</sup>, A. A. Istri Agung Rai Sudiatmika<sup>2</sup>

<sup>1</sup>Department of Education, Postgraduate, Universitas Pendidikan Ganesha, Bali, Indonesia

<sup>2</sup>Department of Physics Education, Universitas Pendidikan Ganesha, Bali, Indonesia

### Article Info

#### Article history:

Received Jan 18, 2023

Revised Aug 20, 2023

Accepted Aug 27, 2023

#### Keywords:

Google Meet

HOTS

Local wisdom

Online lectures

Zoom cloud meeting

### ABSTRACT

Indonesian students have low higher-order thinking skills (HOTS), so efforts are needed to improve these skills. This research aims to examine the effect of online learning with local wisdom context on students' HOTS. The online learning in question is a lecture using Zoom Cloud Meeting (ZCM), Google Meet (GM), and a combination of GM and learning management system (LMS) SPADA Universitas Mataram. This study took a sample of 77 5th-semester students who took the 2021/2022 Physics Curriculum Study course at Universitas Mataram, Indonesia. This quantitative research method uses a posttest-only group design. The student HOTS data were obtained based on the essay test after the treatment. The data analysis used to test the research hypothesis is one-way ANOVA with calculations using the SPSS 25 application. The research results showed that the class combining GM and SPADA UNRAM with local wisdom context significantly affects students' HOTS scores. The average score of HOTS with the lecture model is the highest compared to the other two classes. Thus, online lectures with local wisdom context using a combination of GM and SPADA UNRAM can be an effort to develop HOTS for prospective physics teacher students.

This is an open access article under the [CC BY-SA](#) license.



### Corresponding Author:

Hikmawati

Department of Education, Postgraduate, Universitas Pendidikan Ganesha

St. Udayana Nomor 11, Singaraja, Bali, Indonesia

Email: hikmawati@undiksha.ac.id

## 1. INTRODUCTION

The public experienced various fears during the COVID-19 pandemic, such as failure in education, loss of social relations, and family security. Therefore, the world of education requires an online learning system utilizing technology [1]. After COVID-19, social media, various learning platforms, and educational websites have rapidly increased. Teachers and students can easily and flexibly exchange information through learning content. It brings new habits for the community, which are more accustomed to utilizing technology needed in the digital era [2]. Other skills besides higher-order thinking skills (HOTS) that can be obtained through online learning that utilize technology are inquiry skills, social communication, and scientific skills. These skills are a provision for students in the future to find a job or to solve various problems in everyday life. These skills need to be trained early, including in prospective teachers. After all, prospective teachers are educators who will shape the students' characters at school [3].

The use of technology during the COVID-19 pandemic through online learning requires teachers as facilitators to assist students in improving their learning outcomes, including in HOTS aspects. The online learning in question is distance learning using an asynchronous management system and synchronous video conferencing technologies such as Zoom, Google Meet (GM), Microsoft Teams, and others. Online learning can be integrated with new things, including local wisdom around students. It is expected to help students

master the studied concepts [4]. The teacher's role in online learning is as a facilitator who creates a pleasant situation and does not burden students. Thus, effective online learning can be realized. In this case, the parents' role is vital in accompanying their children when learning online at home [5]. Various shortcomings in online learning faced by teachers and students include network connectivity (internet), lack of teaching materials at home, lack of laptop and computer facilities, inconducive learning environments at home, and insufficient knowledge about information, communication, and technology (ICT) [6].

Online and project-based learning, including local wisdom integration in learning, can increase HOTS more than online learning alone [7]. Online learning can be combined with other learning models, such as project-based learning models and other models, according to the material's and students' characteristics. Students' responses to HOTS-oriented online learning are included in the good category. In this case, the competencies developed are the ability to analyze, evaluate, and create [8]. ICT-based learning can increase the HOTS score significantly from the pretest to the posttest in the experimental class compared to the control class [9]. Online learning integrating local wisdom, such as ethnosience, has a better effect than conventional online learning. The effect in question includes that integrating ethnosience, as part of local wisdom in online learning, can make teacher-student interactions more effective, students easily understand the material, and students are more active in creative and critical thinking, so that HOTS can increase. HOTS is a students' competency that must be developed in the 4.0 era [10].

Contextual online learning must be developed as a technological innovation in 21st-century learning. Contextual in question is a phenomenon students experience or see and feel directly, such as various cases regarding the living environment and local wisdom context [11]. Learning with local wisdom context is proven more effective in improving students' learning outcomes than conventional learning [12]. Online university learning requires the lecturer to design lectures that effectively affect students' satisfaction levels. An alternative design that can be used is integrating things close to everyday life, such as local wisdom. Traditional architecture, such as the Sasak Traditional House, has many things that can be studied to be integrated into learning, not only science subjects but also mathematics or social and cultural fields [13].

Local wisdom in the surrounding environment, such as lakes or beaches as tourist attractions, can be utilized by students as a source of contextual learning. It is because problems in the local environment will provide meaningful learning experiences for students [14]. Local wisdom is ethnosience and an education system based on local cultures in Indonesia. This education system trains HOTS and increases students' moral and religious values. Of course, local wisdom impacts strengthening character [15].

Exploration of local wisdom, especially in Indonesia, is the foundation of character education. Strengthening character education is even an essential part of the current curriculum. Exploring local wisdom is also part of the teacher's efforts to present contextual learning content [16]. The uniqueness of Indonesian people, including the Sasak tribe, has the potential to be integrated into the curriculum. Thus, local wisdom must be integrated in learning from early childhood education, elementary schools, and universities [17]. Therefore, this research aims to examine the effect of online learning with local wisdom context on students' HOTS. The online learning in question is a lecture using Zoom Cloud Meeting (ZCM), GM, and a combination of GM and learning management system (LMS) called *Sistem Pembelajaran Daring* (SPADA) Universitas Mataram (UNRAM).

## 2. RESEARCH METHOD

The sample in this study consisted of all 5th-semester students who took the 2021/2022 Physics Curriculum Study course at Universitas Mataram. The number of samples was 77 from three classes, where the classes were given different treatments. This study's students' HOTS score data were obtained based on an essay test after treatment. HOTS score data analyzed came from three classes with treatment: i) online lectures using ZCM (26 people); ii) online lectures using GM (28 people); iii) online lectures with local wisdom context using a combination of GM and SPADA UNRAM (LMS) (23 people). SPADA UNRAM is accessible at <https://daring.unram.ac.id>, and the menus on the main page include courses (*matakuliah*), guides (*panduan*), related links (*link terkait*), and login. The main page of LMS is presented in Figure 1.

To test the research hypothesis, the SPSS 25 application was used for the data analysis. In this study, the normality test (data were normally distributed) and the homogeneity test (variants between groups were homogeneous) were performed prior to the one-way ANOVA test. The normality test is based on the assumption that the data are normally distributed if the significance value is greater than 0.05, while the data are not normally distributed if the significance value is lower than 0.05. The homogeneity test is based on the fact that data are considered homogeneous if the significance value is greater than 0.05, while data are considered non-homogeneous if the significance value is lower than 0.05. Last but not least, in an ANOVA, decisions are based on whether or not the average HOTS score for each group is the same if the significance value is greater than 0.05. However, the average score differs if the significance value is less than 0.05.

In this study, post-hoc tests were used to identify which classes had similar and different average scores. The Tukey HSD test, a multiple comparison test, was used to determine whether the analysis of variance numbers for the average HOTS score are significant. The significance value of the SPSS output results can be used to determine whether there is a difference in the average HOTS score between the classes (the ZCM class and the GM class, the ZCM class and the GM class, and the ZCM class with a combination class of GM and SPADA UNRAM).

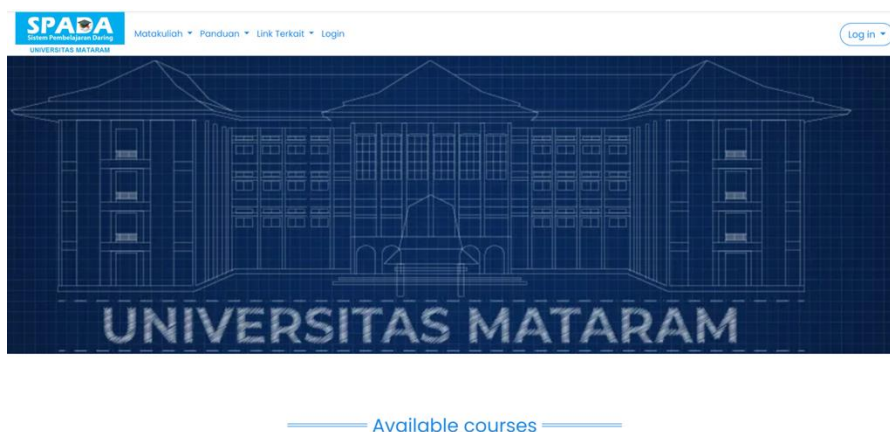


Figure 1. LMS main page on SPADA UNRAM

### 3. RESULTS AND DISCUSSION

One of the efforts that can be made to develop students' HOTS during the pandemic is through online lectures in the context of local wisdom. Due to the pandemic, direct interaction between lecturers and students requires lecturers to innovate in designing lectures so that learning can continue. Contextual learning will provide a meaningful learning experience for prospective teachers. Contextual, in this case, means that there is an integration of various phenomena students directly observe and experience in their environment, including various local wisdom. The local wisdom can be in the form of local customs or culture with noble values and local knowledge or ethnoscience. Online lectures with local wisdom context that combines GM and LMS SPADA UNRAM in the Physics Curriculum Study course are shown in Figures 2 to 4.

Figure 2 shows a menu list in the Physics Curriculum Study course at SPADA UNRAM. The research team made a menu of attendance lists, materials, discussions, group distribution lists, and assignments. The discussion menu on the LMS is displayed in Figure 3. Figure 3 shows discussion activities based on topics that are divided into topics for the tenth, eleventh, and twelfth grades. A group of students the lecturer divide discusses each topic. Assessment in the local wisdom context was discussed in the 10th meeting. An example of the assessment students discuss is shown in Figure 4. Figure 4 shows an example of an assessment in the local wisdom context for the eleventh grade, which is the subject of student discussion at LMS or SPADA UNRAM. Examples of questions discussed are about sound waves.

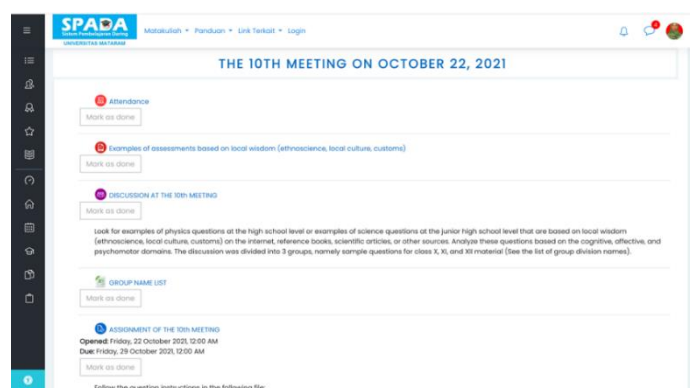


Figure 2. Menu list in the Physics Curriculum Study course at SPADA UNRAM

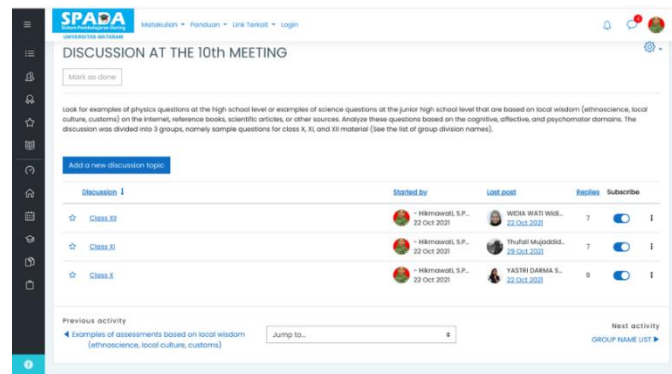


Figure 3. Discussion menu on SPADA UNRAM

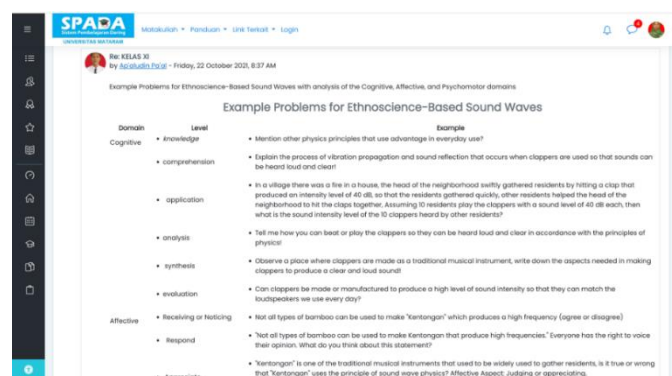


Figure 4. Student group discussion activities

The average HOTS score of students after learning is 77.31 using ZCM, 77.14 using GM, and 82.61 using GM and SPADA UNRAM. Thus, the students' highest average HOTS score is using GM and SPADA UNRAM, as shown in Table 1. The normality test using Shapiro-Wilk shows that the value of Sig. for the ZCM class is 0.681, for the GM class, it is 0.481, and for the combined GM and SPADA UNRAM class, it is 0.292. Value of Sig. are all greater than the value of Sig. Alpha of 0.05. Thus, it can be concluded that the data is normally distributed, and the first condition in the ANOVA test has been met. The result is presented in Table 2.

Table 1. Descriptive test results

Group	N	Mean	Std. Deviation	Minimum	Maximum
ZCM	26	77.31	4.697	68	86
GM	28	77.14	6.587	64	96
GM and SPADA	23	82.61	6.700	70	94
Total	77	78.83	6.467	64	96

Table 2. Normality test using Shapiro-Wilk

Group	Statistic	df	Sig.
ZCM	0.972	26	0.681
GM	0.966	28	0.481
GM and SPADA	0.950	23	0.292

The variance similarity test in this study used the homogeneity test. Based on the output of SPSS, a significance value (Sig.) of 0.227 was obtained. Because the significance value of 0.227 is greater than 0.05, it can be concluded that the variants of the three classes (ZCM, GM, and the combination of GM and SPADA UNRAM) are the same or homogeneous. Thus, the assumption of homogeneity in the one-way ANOVA test is fulfilled, as shown in Table 3.

Table 3. Homogeneity test

Variances based on	Levene statistic	df1	df2	Sig.
Mean	1.511	2	74	0.227
Median	1.258	2	74	0.290
Median and with adjusted df	1.258	2	64.539	0.291
Trimmed mean	1.532	2	74	0.223

The ANOVA test in this study was conducted to test whether the three samples had the same or different HOTS average scores. Based on the SPSS output, the sig value is 0.003, smaller than Sig. Alpha of 0.05. Therefore, it can be concluded that the average HOTS scores for the three classes (ZCM, GM, and the combination of GM and SPADA UNRAM) are significantly different. The ANOVA test is shown in Table 4.

Table 4. ANOVA test

ANOVA	Sum of squares	df	Mean square	F	Sig.
Between groups	468.360	2	234.180	6.394	0.003
Within groups	2710.445	74	36.628		
Total	3178.805	76			

The HOTS score in the ZCM and GM classes has a significance value of 0.995, which is higher than the Alpha of 0.05, as indicated by the results of multiple comparisons. The difference in the descriptive average of the HOTS scores between the ZCM and GM classes is “insignificant” because their average scores are “the same”. The significance value of the HOTS score in the ZCM class and the GM and SPADA combination class is 0.009, which is lower than the Alpha’s value of 0.05. The two classes have “different” average values, so there is a “significant” difference in the descriptive average value of HOTS between the two classes. The significance value of the HOTS score in the GM class and the GM and SPADA combination class is 0.006, which is lower than the Alpha’s value of 0.05. The descriptive average HOTS scores for the two classes differ significantly because their average values are “different.” The multiple comparison is presented in Table 5.

Table 5. Multiple comparison

	Class	Mean difference	Std. Error	Sig.
ZCM	GM	0.165	1.648	0.995
	GM and SPADA	-5.301*	1.732	0.009
GM	ZCM	-0.165	1.648	0.995
	GM and SPADA	-5.466*	1.703	0.006
GM and SPADA	ZCM	5.301*	1.732	0.009
	GM	5.466*	1.703	0.006

\*The mean difference is significant at the 0.05 level.

The similarity of the average HOTS scores in the three classes (ZCM, GM, and the combination of GM and SPADA) is evident through the Tukey HSD output in the Homogeneous Subsets section. In subset 1, there is information on HOTS scores in the GM and ZCM classes, and that implies that the average HOTS scores of understudies in the two classes do not altogether contrast. To put it another way, students in the GM and ZCM classes have the same average HOTS scores. Students in the combined class of GM and SPADA only have data on their HOTS scores in subset 2, indicating that their scores significantly differ from those of the other two classes (GM and ZCM). Thus, learning in the GM and SPADA combination class significantly affects the difference in students' HOTS scores. The learning in question is online lectures with local wisdom in the physics curriculum study course. The homogeneous subset is displayed in Table 6.

Table 6. Homogeneous subsets

Class	N	Subset for alpha=0.05	
		1	2
GM	28	77.14	
ZCM	26	77.31	
GM and SPADA	23		82.61
Sig.		0.995	1.000

The integration of local wisdom in learning can improve students' critical thinking skills as part of the HOTS, which needs to be continuously developed for students' provision in the future [18]. Integrating local wisdom in learning makes it easier for students to master the material or concepts studied [19]. In addition, the integration of local wisdom in learning can also develop aspects of students' attitudes and character [20], multiple intelligence [21], problem-solving skills [22], and social attitudes [23]. Contextual learning with the integration of local wisdom, including online learning due to the pandemic, will provide meaningful learning experiences useful for students' future.

Online learning can not only improve HOTS in the ability to analyze and evaluate but can also digital literacy in the form of media literacy, collaboration and communication, privacy management, ICT literacy, learning skills, digital knowledge, and information literacy. Thus, online learning can be an alternative solution to increase HOTS and digital literacy during the COVID-19 pandemic [24]. Thus, ICT is a must to support learning during the COVID-19 pandemic [25]. Online learning in this study uses ZCM, GM, and LMS. The choice of platforms as media in online lectures is based on various considerations.

ZCM is media intellectuals use for academic purposes, such as online learning processes, seminars, and meetings. ZCM applications are available for free and paid. This application is easy to get and use [26]. Using various learning media and activities is needed in learning using ZCM [27]. ZCM can reduce students' misconceptions [28]. Students' motivation to use ZCM during the pandemic has increased, and students are getting used to online learning systems [29]. Learning through ZCM in the pandemic era is effective at the high school and university levels and the early childhood education level [30]. One of the efforts to increase the effectiveness of implementing ZCM is to provide training and assistance to teachers in schools [31].

The use of ZCM in the learning process is very effective in stopping the spread of COVID-19, even though the learning process cannot be optimal compared to face-to-face learning. The obstacle in using ZCM is that the network and the internet quota are extensive. The advantages of ZCM are the availability of good features and quality, convenience, and flexible access. The weaknesses of ZCM in the learning process are learning conditions that cannot be felt and are not optimal, students becoming lazy, and a low sense of togetherness. To overcome these weaknesses, the teacher must apply effective strategies so students can interact. The teacher must also deliver the material directly with audio and visuals [32]. ZCM can also be combined with Google Classroom to improve students' learning outcomes [33].

GM can be one of the media chosen to conduct video conferencing as a substitute for face-to-face learning due to the pandemic, which does not allow direct physical meetings and interactions. However, teachers still have to innovate in designing learning through GM and creating creativity that can increase students' interest in learning so that learning becomes fun and learning objectives can be achieved [34]. GM is very helpful for teachers and students during the pandemic. Teachers can present material and interact with students online through video conferencing. Students' discussions and interactions can also run well if they are facilitated by the teacher [35].

Using GM in learning during the pandemic can increase students' learning motivation [36]. Online learning, such as through GM, needs to be done so that the learning is in line with technological developments. Through GM, learners will find new experiences in the learning process [37]. Teacher-student and student-student interactions in online learning through GM are excellent, and all students are complete in learning, which is indicated by the percentage of student learning outcomes completed by 100% [38].

The LMS is one of the learning system solutions during the pandemic, limiting face-to-face classroom meetings (school) meetings. LMS can also solve various problems due to limited space, time, and the number of meetings between teachers and students [39]. The application of LMS in the online learning system (SPADA) is easy to implement, practical, and effective. Various competencies that can be trained in LMS-based learning are observing, asking, discussing, reasoning, and trying [40]. The application of LMS improves students' learning outcomes and activeness in the learning process [41]. LMS-based online learning is applied in general high schools, vocational schools [42], and at the university or college level [43].

Online learning can also use Google classroom, WhatsApp, and Telegram. Online assessments after learning can take advantage of various applications, including Kahoot, Padlet, and Quizziz. Through online learning, teachers can have various experiences and knowledge about lesson planning, implementation of learning, and assessment of students' learning outcomes based on the application used. Some obstacles in online learning are related to teacher and student mastery of using applications, students' anxiety due to the short time to complete assignments, and students' attitudes on the team [44].

To increase the effectiveness of using LMS, ZCM, and GM, other applications are needed to facilitate coordination in completing various activities and tasks. The application in question is, for example, WhatsApp [45] or Telegram. The combination of WhatsApp Group with LMS, ZCM, and GM can be applied in universities and high schools [46]. If a university does not yet have an LMS, another alternative to use is Facebook as online learning media in the form of a closed-class Facebook group (FBG) [47].

#### 4. CONCLUSION

Online lectures with local wisdom context using a combination of Google Meet and LMS SPADA UNRAM significantly affects students' HOTS scores in the Physics Curriculum Study course. The online lecture model with local wisdom context can be an effort to develop HOTS for prospective physics teacher students. Lectures with local wisdom context can be done in the Physics Curriculum Study course and other subjects. It can be one of the university's efforts to prepare prospective teachers with a sense of responsibility to preserve the archipelago's local wisdom and strengthen students' character values.

#### ACKNOWLEDGEMENTS

The author would like to thank the University of Mataram, which has provided financial assistance for this research through the educational funding assistance program or the education costs to continue doctoral studies for lecturers based on the PPK BLU FKIP Decree of the University of Mataram, Number: 2745/UN18.19/PPK/KU/2021, on July 21, 2021.




#### REFERENCES

- [1] R. S. Al-Marouf, S. A. Salloum, A. E. Hassanien, and K. Shaalan, "Fear from COVID-19 and technology adoption: The impact of Google Meet during Coronavirus pandemic," *Interactive Learning Environments*, vol. 31, no. 3, pp. 1293–1308, Apr. 2023, doi: 10.1080/10494820.2020.1830121.
- [2] C. W. M. Malinao and M. M. Sotto, "Home quarantined: Privacy at risk in technologically-oriented learning amidst COVID-19 pandemic," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 224–238, Mar. 2022, doi: 10.11591/ijere.v11i1.22059.
- [3] S. D. Fatmaryanti, U. Pratiwi, R. W. Akhdinirwanto, and D. Sulisworo, "A task model for supporting virtual laboratory based on inquiry skills, social and scientific communication," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 385–391, Mar. 2022, doi: 10.11591/ijere.v11i1.21737.
- [4] M. A. Camilleri and A. C. Camilleri, "The acceptance of learning management systems and video conferencing technologies: Lessons learned from COVID-19," *Technology, Knowledge and Learning*, vol. 27, no. 4, pp. 1311–1333, Dec. 2022, doi: 10.1007/s10758-021-09561-y.
- [5] A. R. Nasution and A. B. D. Nandiyanto, "Utilization of the Google Meet and Quiziz applications in the assistance and strengthening process of online learning during the COVID-19 pandemic," *Indonesian Journal of Educational Research and Technology*, vol. 1, no. 1, pp. 31–34, Mar. 2021, doi: 10.17509/ijert.v1i1.33367.
- [6] A. K. Singh and M. K. Meena, "Challenges of virtual classroom during COVID-19 pandemic: An empirical analysis of Indian higher education," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 207–212, Mar. 2022, doi: 10.11591/ijere.v11i1.21712.
- [7] R. Eliyasni, A. K. Kenedi, and I. M. Sayer, "Blended learning and project based learning: The method to improve students' higher order thinking skill (HOTS)," *Jurnal Iqra': Kajian Ilmu Pendidikan*, vol. 4, no. 2, pp. 231–248, Dec. 2019, doi: 10.25217/ji.v4i2.549.
- [8] S. W. Widyarningsih, I. Yusuf, Z. K. Prasetyo, and E. Istiyono, "Online interactive multimedia oriented to HOTS through e-learning on physics material about electrical circuit," *JPI (Jurnal Pendidikan Indonesia)*, vol. 9, no. 1, pp. 1–14, Mar. 2020, doi: 10.23887/jpi-undiksha.v9i1.17667.
- [9] I. Z. Ichsan, D. V. Sigit, M. Miarsyah, A. Ali, T. Suwandi, and Titin, "Implementation supplementary book of green consumerism: Improving students HOTS in environmental learning," *European Journal of Educational Research*, vol. 9, no. 1, pp. 227–237, 2020, doi: 10.12973/eu-jer.9.1.227.
- [10] A. Widyawati and S. Sujatmika, "Electronic student worksheet based on ethnoscience increasing HOTS: literature review," in *International Conference on Technology, Education and Sciences*, 2020, vol. 2, no. 1, pp. 27–31.
- [11] H. Rahmayanti et al., "Diffmol: Indonesian students' HOTS and environmental education model during COVID-19," *Journal of Sustainability Science and Management*, vol. 15, no. 7, pp. 10–19, 2020, doi: 10.46754/jssm.2020.10.002.
- [12] A. Laila, C. A. Budiningsih, and K. Syamsi, "Textbooks based on local wisdom to improve reading and writing skills of elementary school students," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 10, no. 3, pp. 886–892, 2021, doi: 10.11591/ijere.v10i3.21683.
- [13] L. M. Fauzi, F. Hanum, J. Jailani, and J. Jatmiko, "Ethnomathematics: Mathematical ideas and educational values on the architecture of Sasak traditional residence," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 250–259, Mar. 2022, doi: 10.11591/ijere.v11i1.21775.
- [14] A. Yani, M. Amin, F. Rohman, E. Suarsini, and M. Rijal, "Pre-service biology teacher's perception on local environment problems as contextual learning resources," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 10, no. 3, pp. 768–780, Sep. 2021, doi: 10.11591/ijere.v10i3.21091.
- [15] N. Naim, A. Aziz, and T. Teguh, "Integration of Madrasah diniyah learning systems for strengthening religious moderation in Indonesian universities," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 108–119, Mar. 2022, doi: 10.11591/ijere.v11i1.22210.
- [16] A. Bin Jamaluddin, S. Zubaidah, S. Mahanal, and A. Gofur, "Exploration of the Indonesian Makassar-Buginese Siri' educational values: The foundation of character education," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 10–19, Mar. 2022, doi: 10.11591/ijere.v11i1.21670.
- [17] A. Tohri, A. Rasyad, M. Sururuddin, and L. M. Istiqlal, "The urgency of Sasak local wisdom-based character education for elementary school in East Lombok, Indonesia," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 1, pp. 333–344, Mar. 2022, doi: 10.11591/ijere.v11i1.21869.
- [18] A. Ramdani, A. W. Jufri, G. Gunawan, M. Fahrurrozi, and M. Yustiqlar, "Analysis of students' critical thinking skills in terms of gender using science teaching materials based on the 5E learning cycle integrated with local wisdom," *Jurnal Pendidikan IPA Indonesia*, vol. 10, no. 2, pp. 187–199, Jun. 2021, doi: 10.15294/jpii.v10i2.29956.




- [19] Y. Arti and J. Ikhsan, "The profile of junior high school students' critical thinking skills and concept mastery level in local wisdom based on outdoor learning," *Journal of Physics: Conference Series*, vol. 1440, no. 1, p. 012105, Jan. 2020, doi: 10.1088/1742-6596/1440/1/012105.
- [20] A. Mappiare-at, Rusmiyati, M. Ramli, and B. B. Lasan, "Internalizing the values Of Madura local wisdom 'Karapan Sapi' for student character development," *Review of International Geographical Education Online*, vol. 11, no. 10, pp. 11–12, 2021.
- [21] A. R. Agusta, "Learning model Gawi Sabumi based on local wisdom to improve student's high order thinking skills and multiple intelligence on elementary school," *International Journal of Social Science and Human Research*, vol. 04, no. 11, pp. 3269–3283, Nov. 2021, doi: 10.47191/ijsshr/v4-i11-29.
- [22] A. Kristanto, Suharno, and Gunarhadi, "Promoting local wisdom in international primary curriculum aims to develop learners' problem solving skills," *International Journal of Educational Research Review*, vol. 4, no. 3, pp. 439–447, 2019, doi: 10.24331/ijere.573947.
- [23] S. Uge, A. Neolaka, and M. Yasin, "Development of social studies learning model based on local wisdom in improving students' knowledge and social attitude," *International Journal of Instruction*, vol. 12, no. 3, pp. 375–388, 2019, doi: 10.29333/iji.2019.12323a.
- [24] R. A. K. Dewi and K. Fatkhiyani, "Blended learning: Can it be a solution to improve digital literacy and HOTS for PGSD students in a pandemic situation?," *International Journal of Elementary Education*, vol. 5, no. 4, pp. 601–611, Oct. 2021, doi: 10.23887/ijee.v5i4.39411.
- [25] D. M. Sani, Sukarmin, and Suharno, "The needs analysis for the development of electronic learning module (e-module) based on local wisdom information search in senior high schools' physics online learning during COVID-19 pandemic," *Journal of Physics: Conference Series*, vol. 1796, no. 1, p. 012020, Feb. 2021, doi: 10.1088/1742-6596/1796/1/012020.
- [26] F. Fitriyani, M. D. Febriyeni, and N. Kamsi, "The use of the Zoom Cloud Meeting application in the online learning process as a solution during the COVID-19 pandemic," (in Indonesian), *Edification Journal*, vol. 3, no. 1, pp. 23–34, Aug. 2020, doi: 10.37092/ej.v3i1.221.
- [27] I. Komsiyah, "The challenge of Zoom Cloud Meeting in online learning process," *AL-ISHLAH: Jurnal Pendidikan*, vol. 13, no. 2, pp. 829–835, Jul. 2021, doi: 10.35445/alishlah.v13i2.820.
- [28] M. Erna, L. Anwar, and M. Mazidah, "Interactive E-module using Zoom Cloud Meeting platform to reduce misconceptions on salt hydrolysis material," *Journal of Education and Learning (EduLearn)*, vol. 15, no. 2, pp. 283–290, May 2021, doi: 10.11591/edulearn.v15i2.18460.
- [29] L. Nuriyah, I. M. Muhtahid, and E. Wahyuningrum, "The effect of E-Learning Zoom Cloud Meeting on motivation and visual learning style of fifth grade students of Pekanbaru Riau State Elementary School," (in Indonesian), *Aksara: Jurnal Ilmu Pendidikan Nonformal*, vol. 8, no. 1, pp. 201–212, Jan. 2022, doi: 10.37905/aksara.8.1.201-212.2022.
- [30] D. Ismawati and I. Prasetyo, "The effectiveness of learning using Zoom Cloud Meeting videos in early childhood in the era of the COVID-19 pandemic," (in Indonesian), *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, vol. 5, no. 1, pp. 665–675, Aug. 2020, doi: 10.31004/obsesi.v5i1.671.
- [31] M. Ihsan, I. A. Ramadhani, and Matahari, "Training on the use of E-learning using Zoom Cloud Meeting for teachers at SMK Muhammadiyah, Sorong," (in Indonesian), *Jurnal ABDIMASA Pengabdian Masyarakat*, vol. 2, no. 2, pp. 49–53, 2019.
- [32] A. Rahmat and N. Fachrunnisa, "An analysis of applying Zoom Cloud Meeting towards EFL learning in pandemic era Covid-19," *British (Jurnal Bahasa dan Sastra Inggris)*, vol. 10, no. 2, pp. 114–134, Oct. 2021, doi: 10.31314/british.10.2.114-134.2021.
- [33] I. W. E. Mahendra, "Triging student learning results with utilizing Google classroom and Zoom platform," *Jurnal Ilmiah Sekolah Dasar*, vol. 5, no. 2, pp. 326–333, Aug. 2021, doi: 10.23887/jisd.v5i2.34900.
- [34] A. Aswir, M. S. Hadi, and F. R. Dewi, "Google Meet application as an online learning media for descriptive text material," *Jurnal Studi Guru dan Pembelajaran*, vol. 4, no. 1, pp. 189–194, 2021, doi: 10.30605/jsgp.3.3.2020.533.
- [35] T. Hastomo and H. Zulianti, "EFL students' perceptions on the use of google meet in online learning during the time of coronavirus: A literature review," *SELTICS*, vol. 4, no. 2, pp. 102–109, Dec. 2021, doi: 10.46918/seltics.v4i2.916.
- [36] P. H. Sette-de-Souza, "Motivating learners in pandemic period through WhatsApp and Google Meet," *Journal of Dental Education*, vol. 85, no. 1, pp. 1156–1157, Jun. 2020, doi: 10.1002/jdd.12352.
- [37] H. Gleason and B. K. Heath, "Injustice embedded in Google Classroom and Google Meet: A techno-ethical audit of remote educational technologies," *Italian Journal of Educational Technology*, vol. 29, no. 2, pp. 26–41, 2021, doi: 10.17471/2499-4324/1209.
- [38] R. Adawiyah, S. M. Amin, M. Ibrahim, and S. Hartatik, "Improving the completeness of elementary school students' learning outcomes in thematic learning through E-LKPD with the help of the Google Meet application," (in Indonesian), *Jurnal Basicedu*, vol. 5, no. 5, pp. 3393–3398, Aug. 2021, doi: 10.31004/basicedu.v5i5.1339.
- [39] Muhandi, S. I. Gunawan, Y. Irawan, and Y. Devis, "Design of Web Based learning management system (LMS) in SMAN 1 Kampar Kiri Hilir," *Journal of Applied Engineering and Technological Science*, vol. 1, no. 2, pp. 70–76, 2020, doi: 10.37385/jaets.v1i2.60.
- [40] B. Saputro and A. T. Susilowati, "Effectiveness of learning management system (LMS) on in-network learning system (SPADA) based on scientific," *Journal for the Education of Gifted Young Scientists*, vol. 7, no. 3, pp. 481–498, 2019, doi: 10.17478/jegys.606029.
- [41] N. H. S. Simanullang and J. Rajagukguk, "Learning management system (LMS) based on Moodle to improve students learning activity," *Journal of Physics: Conference Series*, vol. 1462, no. 1, p. 012067, Feb. 2020, doi: 10.1088/1742-6596/1462/1/012067.
- [42] R. Rabiman, M. Nurtanto, and N. Kholifah, "Design and development E-learning system by learning management system (LMS) in vocational education," *International Journal of Scientific and Technology Research*, vol. 9, no. 1, pp. 1059–1063, 2020.
- [43] A. Aldiab, H. Chowdhury, A. Kootsookos, F. Alam, and H. Allhibi, "Utilization of learning management systems (LMSs) in higher education system: A case review for Saudi Arabia," *Energy Procedia*, vol. 160, pp. 731–737, Feb. 2019, doi: 10.1016/j.egypro.2019.02.186.
- [44] C. K. S. Singh *et al.*, "Rethinking English Language teaching through Telegram, WhatsApp, Google Classroom and Zoom," *Systematic Reviews in Pharmacy*, vol. 11, no. 11, pp. 45–54, 2020.
- [45] G. Lewis, T. Leslie, A. Leiva, and C. Lozano, "The effectiveness of combining Google Meet and WhatsApp and Zoom and WhatsApp as learning management systems at buttonwood bay Nazarene Primary School," *University of Belize*, vol. 1, no. 1, pp. 1–17, 2020.
- [46] S. Agustina and A. B. D. Nandiyanto, "The effectiveness of distance learning using learning management system media and WhatsApp Groups at senior high school," *Indonesian Journal of Multidisciplinary Research*, vol. 1, no. 1, pp. 89–98, 2021, doi: 10.17509/ijomr.v1i1.33786.
- [47] M. B. Ulla and W. F. Perales, "Facebook as an integrated online learning support application during the COVID19 pandemic: Thai university students' experiences and perspectives," *Heliyon*, vol. 7, no. 11, p. e08317, Nov. 2021, doi: 10.1016/j.heliyon.2021.e08317.






**BIOGRAPHIES OF AUTHORS**

**Hikmawati**    is a Ph.D. Candidate, Department of Education, Postgraduate, Universitas Pendidikan Ganesha, Bali, Indonesia. She is also a lecturer at Department of Physics Education, University of Mataram, Mataram, West Nusa Tenggara, Indonesia. She completed her master degree in Department of Science Education at Universitas Negeri Surabaya, Surabaya, Indonesia. Her research focuses on physics education, science education, HOTS, and local wisdom. She can be contacted at email: hikmawati@unram.ac.id or hikmawati@undiksha.ac.id.






**I Wayan Suastra**    is a Professor in the Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Pendidikan Ganesha, Bali, Indonesia. He completed his master degree at Institut Keguruan dan Ilmu Pendidikan Bandung and got a doctorate degree at Universitas Pendidikan Indonesia, Bandung, Indonesia. The interest of the author are science and learning, learning media, ethnoscience, and caring attitudes. He can be contacted at email: iwsuastra@undiksha.ac.id.



**Ketut Suma**    is a Professor in the Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Pendidikan Ganesha, Bali, Indonesia. He completed his Master Degree at Bandung Institute of Technology- Indonesia and got a doctorate degree at Universitas Pendidikan Indonesia. The interest of the author are physics teaching, assessment, and character education. He can be contacted at email: ketut.suma@undiksha.ac.id.



**A. A. Istri Agung Rai Sudiatmika**    is a Lecturer at Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Pendidikan Ganesha, Bali, Indonesia. The interest of the author is learning physics, assessment, HOTS, and scientific literacy. She can be contacted at email: rai.sudiatmika@undiksha.ac.id.