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How to Apply HOTS-based E-learning in Higher Education?

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ABSTRACT

This research is qualitative research with the type of case study to describe the implementation of e-learning based on HOTS in higher education. E-learning is a necessity that must be used by lecturers when teaching at universities, especially during the current pandemic. The learning must be based on HOTS as the demands of the industrial revolution 4.0 and society 5.0, to produce prospective teachers who can guide their students to have the ability to solve problems in life. The research subjects were 196 people who took the Philosophy of Science course at the PPKN PIPS FKIP Study Program, Mataram University. Data were collected through observation techniques, interview documentation, and tests. After conducting a holistic and specific qualitative analysis, the results show that HOTS-based e-learning is carried out through the stages of preparation for the implementation of learning and evaluation for 16 learning activities. The contents of the activities include discussion of textual material, independent contextual exercises, and completing exams. During the activity, lecturers and students gave positive responses to various supporting factors and existing challenges. This activity has an impact on the acquisition of positive student learning outcomes. As a follow-up suggestion, full vigilance is needed to seek more varied activities to be actively involved in learning activities and successfully pass lectures.

KEYWORDS

e-learning; high order thinking skills; learning outcomes

INTRODUCTION

The more cutting-edge findings in technology will affect human change with the support of technology. That is, technological advances and the needs of human life are two factors that influence each other. It also happens in learning activities in educational institutions. According to (Yaniawati, 2013), the more advanced technological findings affect the use of these technologies in learning activities. As confirmed by (Nisa, 2018), there is a shift in the paradigm of thinking and real action in educational institutions. Initially, technology only supported learning, but the technology was a determinant of learning activities (Rijal & Sofiarini, 2019).

E-Learning is proof that learning activities are no longer carried out conventionally (Wu & Plakhtii, 2021). However, learning activities can be carried out entirely with the help of the latest technology (Saadé et al., 2012). The learning process is no longer limited by a particular time and a specific room (Saifudin & Suharso, 2020). At this time, learning can be done anytime and anywhere the party responsible for learning is located (Munna & Mazumdar, 2021). The learning process is no longer limited to a room where educators and students can meet face to face. Educators and students can do today's learning through e-learning without being limited by a specific time, and they do not have to be in the same place.

Higher education is an institution that produces prospective teachers, cannot be separated from the need for e-learning (Pratiwi et al., 2021). The learning process is carried out by lecturers and students in different places but is virtually met face-to-face (Purnomo, 2019). At this time, the need is unavoidable. Moreover, the COVID-19 pandemic has resulted in everyone being encouraged to maintain physical and social distance and avoid direct contact in groups (Hindun et al., 2021). Lecturers and students take advantage of learning platforms that are currently easy to obtain, free of charge, and affordable.

The essence of learning, both offline and online, must still uphold the primary mission to be achieved (Yusuf et al., 2018). Along with the industrial revolution 4.0 and society 5.0, the demand for higher-order thinking is a necessity that cannot be negotiated—the more advanced the face of life impacts, the more complex all needs, and affairs for the needs in the field of education (Yusuf et al., 2021). Everything runs more complex and is accompanied by the emergence of complex educational issues as well. The complexity of this educational affair requires handling a high level of thinking (HOTS).

Higher education graduates become prospective teachers with high-level thinking skills, and the entire learning process must be designed based on HOTS (Mahendra et al., 2019). If each course has been designed based on HOTS and implemented and evaluated on the same basis, higher education graduates will have the expected HOTS abilities (Mitarlis et al., 2020). Lecturers and students are required to have HOTS-based thinking. Such a paradigm shift in thinking is an essential requirement so that the complexity of educational issues can be adequately resolved and appropriately.

E-learning is not something new (Khairani et al., 2020). Some advanced universities have long started designing e-learning-based lectures—however, not all higher education practices (Ichsan et al., 2020). The Covid-19 pandemic situation forces all parties so that the learning process is no longer held offline. With the online pattern, e-learning has become a must for learning implementation activities in higher education. The implementation of e-learning indeed remains in the corridor to create qualified teacher candidates with high-level thinking skills.

For higher education accustomed to conducting HOTS-based e-learning, once the COVID-19 pandemic situation occurs, the institution will not face any significant problems. On the other hand, for higher education, which is relatively new in organizing HOTS-based e-learning, this is a problem in itself. At least, the results of the observations that the researcher did show in the Prodi PPKn PIPS FKIP Universitas Mataram prove this. A small number of lecturers do not feel the burden of situations that require the implementation of e-learning as a necessity. Likewise, some students are accustomed to using technology to help themselves understand the concept of the course. However, on the other hand, most of the other lecturers feel obstacles and discomfort in learning activities. Likewise, some students are not accustomed to using technology to help them learn to master the concepts of courses.

Based on the findings from these observations, it appears that there needs to be an in-depth study on how to implement HOTS-based e-learning in higher education. Regardless of any obstacles faced by lecturers and students, regardless of the situation and conditions, HOTS-based e-learning activities must continue. Lecturers and students must try to find the right way to develop HOTS-based e-learning in higher education continuously. Without this effort, higher education graduates will not face the latest challenges and needs in real life.

Understanding in-depth the situation and conditions faced by lecturers and students, a proper understanding of HOTS-based e-learning becomes a critical case to be studied. Following the dimensions of the case study, this study aims to examine cases on how to implement HOTS-based learning in higher education. Specifically, the main problems studied include everything that needs to be done by lecturers and students in carrying out

such educational activities. The responses of lecturers and students on all stages of the learning activities. The factors that are driving and inhibiting if such learning is carried out at higher education. The impact on student learning outcomes. What are the valuable lessons that lecturers and students can take from implementing HOTS-based e-learning?

RESEARCH METHODS

This research is a case study on qualitative research at the Prodi PPKn PIPS FKIP Universitas Mataram. Through the case study, at least three important things are revealed from the case, namely what is meant by the case, why it can be a critical case that needs to be studied in-depth, and how the case can occur (Creswell, 2009) and (Bogdan & Biklen, 2011). In this study, the subject of the t-shirt research was the Philosophy of Science course. This course is fostered by a lecturer and attended by 196 students.

For this research to obtain a comprehensive and, at the same time, a specific description of all essential themes in the existing cases, the researchers used interviews, observations, and documentation (Gerring, 2007) and (Fitrah & Luthfiyah, 2017). Interviews were used to obtain data on the responses of lecturers and students to HOTS-based e-learning. The researcher used observation for obtaining data about the implementation of Philosophy of Science learning through HOTS-based e-learning. Documentation is used to obtain data on the results of the semester learning design (RPS), specific notes on the learning process, student assignments, student test answer sheets, and student learning outcomes.

To analyze the research data, the researcher conducted it holistically and specifically. All existing cases are analyzed in depth by considering the links between existing cases (Muliawan, 2014) and (Yin, 2014). So that the description of the shirts can be described in chronological order, each specific case section is also analyzed in-depth (Catone & Diana, 2017). Through this pattern, the researcher obtains a holistic picture of the entire t-shirt unit and, at the same time, a specific picture of each part of the case that completes the building of the entire case holistically.

RESULTS AND DISCUSSION

The data obtained based on the problems of all cases in this study can be described in the following discussion:

HOTS-based E-Learning in Higher Education

In general, what we commonly know is learning inside and outside the classroom. In these learning activities, both educators and students communicate and interact directly inside and outside the classroom. They have communication and interaction as a group with all students as a whole. Besides, there is also communication and interaction between educators and students individually. Educators communicate and interact individually with students, then students with other students individually also communicate and interact. Such a process will create a multi-directional and simultaneous communication pattern and interaction to create a good quality of learning and impact optimal learning outcomes.

In typical situations and conditions, the learning process can be done like that (Ansari et al., 2021). However, what if the situation and conditions are better, where direct meetings between education and students are not possible (Nedungadi & Raman, 2012). In one example caused by long distances and other factors that make it impossible to communicate and interact directly between education and students, will the learning process still be carried out? Moreover, during the Covid-19 pandemic, there were situations and conditions in which educators and students had to avoid direct communication and interaction patterns in the

classroom (Fuady et al., 2021). Everyone must maintain physical and social distance. In this way, it is believed to prevent the spread of the virus from developing without any control.

The learning process is no longer carried out directly but indirectly by using technology assistance (Herianto, 2013). This learning process is known as e-learning (Farman & Chairuddin, 2020). Through e-learning, educators and students can still communicate and interact, but virtually without being hindered by distance and time (Rahmayanti et al., 2020). Wherever and whenever both educators and students can communicate and interact virtually. In today's modern era, electronic applications facilitate communication and interaction between educators and students (Sudihartinih & Wahyudin, 2019). In Higher Education, the commonly used learning platforms are the online learning system (SPADA), Zoom Meeting, Google Meet, WhatsApp, Edmodo, Edublogs, Skype, Wikispaces, Schoology, OpenStudy, Quora, Pinterest, and others. The use of various learning platforms is tailored to each lecture's needs, situations, and conditions.

Educators and students find it easy to organize learning indirectly (Suhaeri et al., 2020). The learning implementation is held virtually, where educators and students are in different places simultaneously (Sumarmi et al., 2021). The learning process is carried out as usual activities, namely, educators and students communicating and interacting (Bunari et al., 2021). The various activities are following the lecture material and the context (Cahyaningtyas et al., 2020). In this way, it appears that the implementation of e-learning is no different from conventional learning. It is just that, through this e-learning activity, both educators and students do not meet physically in a learning room (Utami et al., 2020). Educators and students do virtual meetings in different places, but the meeting time is simultaneous.

E-learning held in higher education must refer to the needs of the 21st century, where the content in each activity must be HOTS-based. All e-learning activities, including planning, implementation of learning, and evaluation, must contain HOTS. Through the HOTS reinforcement, students will familiarize themselves with the use of HOTS. If they are used to using HOTS in every learning activity, then when they graduate, they will be able to do the same in every learning activity. As prospective teachers, graduates of higher education must familiarize themselves with HOTS-based e-learning so that the students they mentor have high-level thinking skills in solving life problems.

How to Create HOTS-based E-Learning in Higher Education

In the Philosophy of Science course learning, activities are carried out online, where lecturers and students use technology assistance in all activities. This lecture is carried out in three critical stages, namely preparation, implementing learning, and evaluation.

Preparation

The course lecturer prepares a semester learning plan (RPS) which is valid for one semester. This RPS is compiled online on the HOTS basis through various activities, namely, discussing conceptual material, completing assignments to discuss textual material, and completing lecture exams (Chotimah et al., 2021). Lecturers carry out this activity offline by utilizing. The conceptual discussion of lecture material is intended to provide opportunities for lecturers and students to explore all conceptual material based on theoretical foundations, expert opinions, and relevant references. Through this process, students have the opportunity to test theories, expert opinions, and original arguments based on expert opinion and theory from relevant references. This activity is carried out online using the help of zoom meetings, google classroom, and WhatsApp Groups.

Completion of assignments independently to discuss lecture material contextually (Nofrion & Wijayanto, 2018). This activity is a continuation of previous learning activities to discuss textual lecture material. On these tasks, students are allowed to develop higher-order thinking skills to evaluate lecture material, look for contextual equivalent implementation, and make creations in new, original works. This assignment activity is carried out independently by students offline (Erfianti et al., 2019). In its implementation, lecturers are always open to online consultations if students need facilitation assistance for the problems they face (Rashika et al., 2019). Lecture evaluation is the final stage in each stage of the lecture as a group. The lecture group is divided into two parts in one semester, namely the first group (mid-semester) and the second group (end of the semester). The middle of the semester refers to the lecture activities prepared; the essay starts from lectures 1 to 8, while the last semester is a continuation of lectures at the 9 to 16 meeting.

Learning Implementation

The Philosophy of Science learning activities course, as stated in the RPS, was carried out for 16 meetings, consisting of textual lectures, contextual lectures, and exams (Herianto, 2020). Textual lectures are activities to discuss lecture concepts. The implementation is online by using zoom meeting. Before implementing the previous week's lesson, the lecturer sent information via WhatsApp groups about activities and lecture materials, and links for zoom meetings. This information is just a reminder because the lecturer has given course handouts for one semester since the beginning of the semester.

For various reasons, according to the situation and condition of each student, not all students take this online course. Based on the results of the tabulation of the attendance list, it was found that 95% of students were fully present, 3% of students did not attend without any information, and the other 2% of students did not attend due to illness/other misfortune.

Contextual lectures are conducted independently by students. This activity is a follow-up to each end of the textual discussion of lecture material (Hartono & Pahlevi, 2020). This activity is intended to provide sufficient time for students to have independence in developing HOTS to implement each lecture message content textually, in the form of completing assignments, either individually or in groups (Kurniawan et al., 2021). This activity is carried out by students independently and offline. During this learning process, lecturers continue to provide online assistance if students need assistance at any time (Karsono, 2017).

At the end of the lecture, students submit individual and group assignments promptly. It is to familiarize prospective teachers always to be disciplined in solving problems that are their responsibility. Based on the recapitulation of assignment collection, information was obtained that there were 97% of students submitting assignments on time, 2% of students submitting assignments late for various reasons, and 1% of students not submitting assignments without any information.

Evaluation

As stated in the course handout, to pass this course, students are required to have scored in Assessment #1 (U1), #2 (U2), and #3 (u3). Assessment #1 is a collection of Individual Tasks 1 to 8. In addition, scores related to their active involvement during lectures 1 to 7 This group has a value of 20% of the entire lecture assessment. Assessment #2 is a combination of scores obtained by students from Tasks 9 to 11, their activity during lectures 9 to 12, and the results of the Mid-Semester Examination. This group has a value of 30% of the entire lecture assessment. Assessment #3 is a combination of scores obtained by students through their Final Projects, final project presentations, activities during the 13th to 14th lectures, and the

Semester Final Examination scores. This group has a value of 50% of the entire lecture assessment. The student's overall score will be converted to 8 levels of the rating scale, including A, B+, B, C+, C, D+, D, and E.

Responses of Lecturer and Student on Organizing HOTS-based E-Learning in Higher Education

Lecturer

Comprehensively, lecturers provide positive and constructive responses to the implementation of lectures using HOTS-based e-learning. The lecturer's response is stated at each stage of the learning activity.

At the preparation stage, lecturers are very appreciative of their efforts to realize quality learning. For lecturers, HOTs-based e-learning is a must. The teaching and learning process like this will encourage students to get used to developing their high-level cognitive abilities. Realizing the needs of the industrial revolution era 4.0 and society 5.0, the lecturer designed RPS based on HOTS for every activity, both online, offline, or a mixture of both.

In implementing learning, lecturers feel that there are challenges that are not easy (Sagala & Andriani, 2019). HOTS-based e-learning is not an old habit that students have made (Sambite et al., 2019). E-learning and HOTS are relatively new for students (Sulistyowati & Harini, 2021). As a result, they often have difficulty understanding lecture texts, implementing concepts that become contextual, and completing exams is not easy for them to complete (Suratmi et al., 2020). During lectures #1 to #16, students have been involved in every learning activity, although not all students have the same impact. If students have difficulty developing HOTS in the lecture, it will impact their ability to solve exam questions and presentations. Although students still experience many difficulties, the lecturers still strive that HOTS-based e-learning is a must and the times. Existing problems should be found to solve them so that learning like this is still carried out and its quality is improved.

Student

Student responses to HOTS-based e-learning are contained in three main stages of learning activities. Each stage has indicators, as shown in Figure 1. The preparation stage includes preparation indicators, learning systems, and references. The preparation indicator is 33%, the learning system is 36%, and the reference is 28%. It means that 77% of students do not blame the preparation that must be done before learning. As a form of learning that requires HOTS, it is appropriate to prepare early for various things. On the other hand, 33% of students felt that preparation was an additional burden and task.

Regarding the learning system, 36% of students do not have experience with HOTS-based e-learning; on the contrary, 64% of students, even though they are not familiar with HOTS-based e-learning, feel challenged to follow it. In the current era of technology, students benefit significantly from the availability of abundant and easy-to-access references. However, it turns out that 28% of students still have difficulty getting references, and on the other hand, 72% feel that it is easy to get lecture references.

In the implementation of learning, four indicators get responses from students, including discussion of textual material, implementation of contextual tasks, individual involvement, and group involvement. It was found that 40% of students had difficulty understanding textual material, the other 60% did not. 38% of students have difficulty implementing the material contextually; on the contrary, 62% do not experience it. 35% of students have not been actively involved in lectures individually, and 28% in groups have not been actively involved. On the other hand, 65% of students have tried to be actively involved in learning activities individually, and 72% in groups are active in the entire learning process. Although

there are still students who experience difficulties in the learning process, what is encouraging is that most of them have found the essence of the importance of HOTS-based e-learning. As stated by (Tyas & Naibaho, 2021), new things in HOTS-based e-learning are considered a difficult challenge to be solved optimally.

During the evaluation, there are three indicators, namely analyze, evaluate, and create. This indicator shows the stages of HOTS as stated by (Airasian et al., 2001). Students respond to each of these indicators. 38% of students are not used to thinking analytically, 33% of students are not accustomed to using their evaluation skills on educational issues, and 28% of students have difficulty creating their ideas in overcoming life problems. On the other hand, 62% of students have been able to do analysis, 67% can evaluate the latest issues of lecture material, and 72% of students can develop their ability to create cognitive concepts of lecture material.

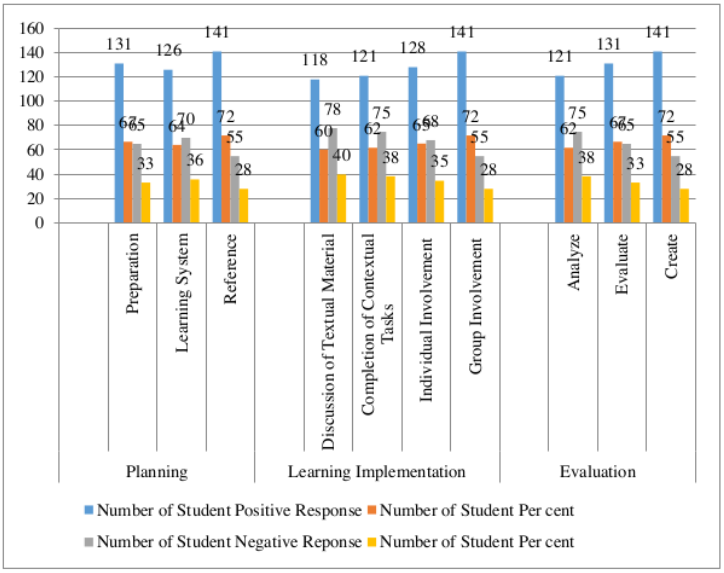

Figure 1. Student Responses on Organizing HOTS-based E-Learning in Higher Education

Factors that are Challenges in the Implementation of HOTS-based E-Learning in Higher Education

Lecturer

For lecturers, these learning challenges include using technology, mastery of the material, the ability to implement concepts textually, develop higher-order thinking skills, complete final exams, encourage students to look for references, and strengthen students to be actively and earnestly involved in lectures. These challenges require the right solution to become positive elements that can be developed in learning activities. HOT-based e-learning is a necessity, so continuous and earnest efforts in solving these challenges are the main task of lecturers in realizing quality learning.

Student

From the student side, there are supporting factors and challenges to participate in HOTS-based e-learning. Based on the data in Figure 2, 18 leading indicators show essential issues that form student responses. The indicators for the challenge factor include (1) difficulty understanding the basic concepts of the material, (3) difficulty creating a contextual

implementation of concepts, (5) reference limitations, (7) trouble getting references, (9) difficulty presenting the final project, (11) difficulty developing higher-order thinking, (13) difficulty solving exam questions, (15) virtual learning is not an obstacle, and (17) difficulty getting internet network (Herianto, 2020) and (Widiastuti et al., 2020).

The indicators for supporting factors include (2) understanding the material's basic concepts quickly and (4) creating a contextual implementation of concepts quickly. It is (6) complete references, (8) get references quickly, and (10) complete the final task efficiently. There are (12) develop higher-order thinking quickly, (14) complete exam questions efficiently, (16) virtual learning is a bottleneck, and (18) internet network is not a problem (Herianto, 2020) and (Wahono et al., 2020). The supporting factors for implementing HOTS-based e-learning are more than the challenge factors (Widodo & Kadarwati, 2013). It means that the implementation of such learning becomes desired and can be well received by students (Widiarta et al., 2019). Even if there are students who consider such learning a challenge, their number is not significant. It is natural, considering that HOTS-based e-learning is not something that brands are used to learning.

If we look more specifically at the supporting factors, it can be seen that the indicators (6) Unlimited references, (8) Get references easily, and (18) Internet network is not a problem are perceived as the highest support among other indicators. In these indicators, 77% of students feel the availability of references in abundance, 82% of students can obtain references quickly, and 71% of the internet network is not a significant obstacle in implementing HOTS-based e-learning.

On the other hand, on the negative factor, several indicators are balanced, including (1) Difficulty understanding the basic concepts of the material, (3) Difficulty creating a contextual implementation of concepts, (9) Difficulty presenting the final project, (11) Difficulty developing higher-order thinking, (13) Difficulty solving exam questions, (15) Virtual learning is not an obstacle. 48% of students are not used to studying HOTS-based concepts, and 54% are not accustomed to implementing concepts into contextual works. 45% of students admit that they are not accustomed to presenting their final project by prioritizing HOTS, 49% of students think that HOTS needs to be pursued more seriously. It impacts their ability to solve exam questions, namely 46% of students still need to improve their habits in understanding HOTS-based exam questions, and 47% of students said they need to get used to learning virtually because learning like this is still not easy to follow.

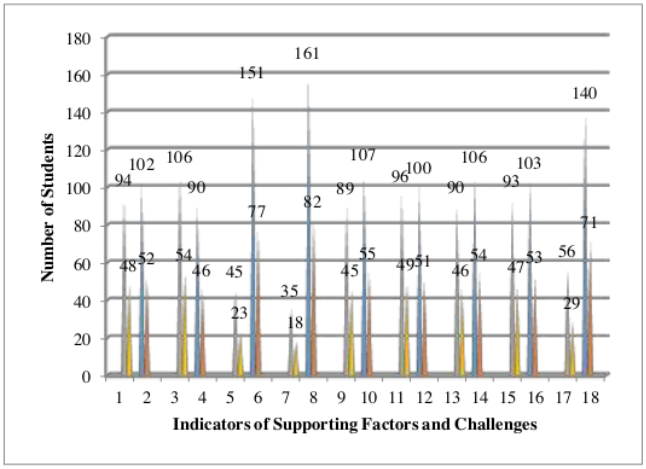

Figure 2. Supporting Factors and Challenges Students attend HOTS-based E-Learning

The Impact of HOTS-based E-Learning in Higher Education on Student Learning Outcomes

To see how successful the implementation of HOTS-based e-learning is, one of the indicators is the acquisition of student learning outcomes in the learning. In the Philosophy of Science course, which developed HOTS-based e-learning and was attended by 196 students, it can be seen that most of the students got good learning outcomes, and only a few were still in the position of poor learning outcomes.

In Figure 3, it appears that 19% of students scored excellently (A), 34% of students scored very good (B+), 18% of students scored good (B), in the category of significantly enough (C+) there is 14%, and in enough category (C) there is 3%. In the minor section, there is 2% less category (D+), 6% significantly less (D), and 5% inadequate (E). These data are certainly encouraging, considering that HOTS-based e-learning is a relatively new thing that is not used to being implemented in higher education but has shown positive results on student learning outcomes. However, of course, full vigilance is still needed to seek more varied activities to minimize the number of students who have not succeeded in showing positive learning outcomes through their participation in this learning.

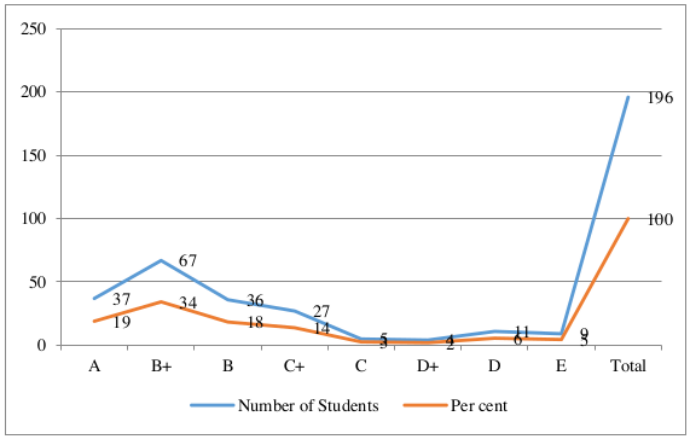

Figure 3. Learning Outcomes in the Philosophy of Science Course

CONCLUSION

HOTS-based e-learning is an essential requirement in the implementation of learning in higher education. Through this learning, prospective teachers are accustomed to solving various educational issues using higher-order thinking skills. The embodiment of this learning can be clearly described starting from the preparation contained in the RPS. In practice, this RPS is used as an essential reference for learning development and evaluation.

Lecturers and students gave positive and constructive responses to the implementation of HOTS-based e-learning as a preparation to meet the future of qualified teacher candidates. There are supporting factors and challenges in implementing HOTS-based e-learning. However, all the factors must be appropriately managed so that student learning outcomes can be positive as expected. Through this research, it is evident that the achievement of student learning outcomes is encouraging as a manifestation of the success of lecturers and students in managing the supporting factors and challenges in implementing HOTS-based e-learning.

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