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Evaluating Higher Order Thinking Skills (HOTS) During the Covid-19 Pandemic: Lecturers' Beliefs and Strategies

Didi Sukyadi[1], Ruswan Dallyono[2], Lukman Hakim[3], Eri Kurniawan[4], Supian[5]✉, Alexandra L. Lebedeva[6]
Universitas Pendidikan Indonesia, Indonesia[1,2,3,4],
Universitas Padjadjaran, Indonesia[5],
Voronezh State University, Rusia[6]
e-mail : dsukyadi@upi.edu[1], ruswan.dallyono@upi.edu[2], lukman_hakim@upi.edu[3], eri_kurniawan@upi.edu[4], supian@unpad.ac.id[5], volova25@rambler.ru[6]

Abstrak

Pandemi Coronavirus telah mengganggu proses pembelajaran di lembaga pendidikan tinggi di Indonesia, mempengaruhi hubungan dan interaksi antara dosen dan mahasiswa, serta menuntut pemahaman mengenai keyakinan dan strategi dalam mengevaluasi *Higher Order Thinking Skills* (HOTS) selama pandemi. Penelitian ini bertujuan untuk memahami keyakinan dan strategi dosen dalam mengevaluasi HOTS selama pandemi COVID-19 dengan menggunakan platform e-learning. Penelitian ini menggabungkan metode kuantitatif untuk memetakan distribusi frekuensi faktor-faktor kunci dan mensurvei keyakinan dosen tentang evaluasi hasil belajar siswa menggunakan Skala Likert. Metode kualitatif digunakan untuk menganalisis keyakinan dan strategi dosen dalam mengevaluasi HOTS melalui wawancara. Hasil penelitian mengungkap bahwa pembelajaran dalam konteks HOTS masih dapat dilakukan selama pandemi meskipun ada penyesuaian dalam penggunaan media pembelajaran yang semanya *offline* menjadi *online*. Transisi ini menjadi tantangan bagi banyak dosen, dan mereka harus melalui percobaan dan kesalahan serta mempelajari berbagai media pembelajaran yang ada. Meskipun pada awalnya dianggap sebagai masalah besar, seiring waktu para dosen menjadi terbiasa menggunakan teknologi untuk mendukung proses belajar siswa. Para dosen sangat optimis bahwa pembelajaran *online* di tingkat perguruan tinggi dapat berjalan efektif, meskipun memerlukan penyesuaian dan pembelajaran media baru, dengan strategi yang dipengaruhi oleh keyakinan, filosofi pengajaran, dan kondisi selama pandemi.
Kata Kunci: keyakinan, pendidikan tinggi, pengajaran daring, pandemic Covid-19, strategi pengajaran

Abstract

The Coronavirus pandemic disrupted learning processes in higher education institutions in Indonesia, affecting the relationships and interactions between lecturers and students, and necessitating an understanding of the beliefs and strategies in evaluating Higher Order Thinking Skills (HOTS) during the pandemic. Therefore, this study aims to examine the beliefs and strategies of lecturers in evaluating HOTS during the COVID-19 pandemic using e-learning platforms. This study combines quantitative methods to identify the frequency distributions of key factors and survey lecturers' beliefs about evaluating student learning outcomes using a Likert Scale. Qualitative methods were used to analyze lecturers' beliefs and strategies in evaluating HOTS through interviews. This study reveals that learning in the context of HOTS could still be conducted during the pandemic, although there were adjustments in using learning media from offline to online modes. This transition had been challenging for many lecturers, requiring trial, error and learning various available learning media. Initially considered a major problem, over time, lecturers had become accustomed to using technology to support student learning. Lecturers were very optimistic that online learning at the higher education level could be effective, despite requiring adjustments and learning new media, with strategies influenced by their beliefs, teaching philosophy, and the conditions during the pandemic.
Keywords: *belief, higher education, online teaching, Covid-19 pandemic, teaching strategy*

✉ Corresponding author :
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INTRODUCTION

While nation's COVID-19 infection rates varied, there were more over 1.2 billion students in 186 countries affected by school/campus closures due to the pandemic (https://en.unesco.org/covid19/educationresponse). As a result, education had altered considerably, with the notable emergence of e-learning, in which instruction was done remotely and on digital platforms. The coronavirus pandemic had also disrupted the teaching-learning process in Indonesian higher education institutions and generated changes in the relationships and interactions between lecturers and students.

During the pandemic, teachers and students worldwide had to rely on the Internet for teaching and learning. In fact, thus far, Internet-based learning has been often regarded as an alternative to conventional learning (Samir Abou El-Seoud et al., 2014). During the pandemic it was considered to be a fundamental element for maintaining the process and interaction of students-lecturers. Previous research has shown that internet-based learning has numerous advantages for students since it is more flexible (Dhawan, 2020) and it can promote contact with students by offering asynchronous and synchronous tools such as e-mail, forums, chats, and video conferences (Adnan, 2020).

Furthermore, internet technologies facilitate the simultaneous distribution of content to a large number of users; E-learning platforms provide many benefits to learners, such as control over the content, control over the time spent learning, and thus the process can be adapted according to the learner's needs and learning objectives (Suresh et al., 2018). This may lead to improved contact with students, and despite certain inherent obstacles brought on by the current crisis, E-learning may improve the learning experience for students.

At the tertiary level, the potential for learning loss also increases. When all universities turn to online learning, two problems arise. First, not all students live in big cities that have internet connections. After the university closed, some of the students returned to their hometowns, many of which were in remote areas separated by seas, mountains, dense rainforests, rivers, and hills so that internet connections were unstable or even unavailable.

Based on students' perspective, (Coman et al., 2020) revealed that higher education institutions were not equipped for solely online learning. As a result, the benefits of online learning appear to be diminishing in value, while the negatives grow more evident. In relation to student learning outcomes, (Khan & Khan, 2019) emphasized the fact that students did not understand the importance of online exams Concerns about students' and instructors' technological ineptitude, as well as skepticism in the digital infrastructure, were raised. Students thought that online assessments were too limiting for scientific courses and had resulted in lower scores, most likely as a result of the increased reliance on multiple choice questions.

However, at the end of the semester, when the learning evaluation was carried out, there were more severe problems. There are significant questions about evaluating learning outcomes: how to evaluate students' ability to understand teaching materials that have been delivered for one semester. There are problems related to the practicality of the testing instrument and objectivity. First, during this pandemic, a test kit that is easy to develop is needed because most of the time is devoted to teaching which requires a lot of preparation related to learning materials and media.

Furthermore, universities struggle to maintain course content constant and current, to communicate coherently with the academic community, and to acquire and recruit students (Marinoni et al., 2020). Students, on the other hand, had to face challenges, and according to a study focusing on students' perspectives on E-learning, the main challenges that students encountered were accessibility, connectivity, a lack of appropriate devices, and social issues represented by a lack of communication and interaction with teachers and peers (Aboagye et al., 2020).

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Second, there is also the issue of the objectivity of the assessment. If multiple-choice questions are used, the test takers will easily use the Google search engine to find out the answers. The lecturer will not be able to supervise properly because the number of students is quite large, namely 25-50 per class while they work on the questions online. If the questions are made in the form of filling in the blanks or an essay, this is also problematic because the test-takers will easily use the Google search engine on their devices. It is impossible for the lecturer to supervise because the test is conducted online.

Taking into account the aspects mentioned above, it is therefore more crucial to understand lecturers' beliefs and strategies in evaluating Higher Order Thinking Skills (HOTS) during COVID-19 pandemic. There is little information on how such internet-based learning platforms and other learning resources are employed in online learning evaluations to promote HOTS. Lecturers' beliefs and strategies can highly affect the educational process and the online environment in the process of teaching and learning, and these ideas stand at the basis of present research.

There have been several studies that have addressed various aspects of online learning and assessment during the Covid-19 pandemic. Marinoni et al (2020) investigated the multifaceted challenges universities level in maintaining course during Covid-19 pandemic. Their studies highlight the difficulty in evaluating student comprehension over the course in an online environment. Similarly, Aboagye et al (2020) identified the main challenges from students' perspectives in online learning during Covid-19 pandemic, such as accessibility issues, internet connectivity problems, lack of suitable devices, and limited social interaction with their lecturers and peers. In addition, Bao (2020) explored the immediate shift learning system from offline to online. They identified critical issues in online learning, such as technological infrastructure, student engagement, and assessment integrity. Their study emphasized the need of adaptive strategies in learning through online platform to overcome these emerging challenges.

While many studies have examined various aspects of online learning during Covid-19 pandemic, several gaps need to be further explored. Firstly, there is a lack of strategies in developing online assessment tools that are practical and easy to implement in online learning. Second, previous research has not provided sufficient innovative solution to maintain online assessments. Lastly, no study has investigated the use of Higher Order Thinking Skills (HOTS) to assess students' skill. Furthermore, this research is expected to provide new insights into the development of more effective, practical, and objective online assessment strategies by understanding and integrating lecturers' belief and strategies and utilizing appropriate online tools to improve learning outcomes and the quality of HOTS assessment.

METHODS

The aspects discussed in this section are the place of research, participants, research design and methods, data collection techniques, and data analysis.

The place of research and participants

This research was undertaken at a public university in West Java, Indonesia, involving lecturers from various fields of science as research participants.

Research Design

This research combines quantitative and qualitative methods. The quantitative method was used to map out the frequency distribution of various factors identified and to survey the beliefs of the lecturers at the selected university about evaluating student learning outcomes in the HOTS perspective using a Likert Scale. Therefore, it could be statistically ascertained what the views and beliefs of these participants were in response to the pandemic and regulations that followed.

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The qualitative method was used to process interview data with several lecturers, document analysis of test instruments developed by participants, and questionnaires with data taken from the answers of the lecturers as research participants. The qualitative analysis is needed in this study to obtain deep descriptive insights and thick descriptions regarding the background (the hows and the whys) of the lecturers' views and beliefs that underlie their decisions in using or choosing certain evaluative strategies in measuring students' learning outcomes.

Data collection techniques

Data collection techniques used in this study were questionnaires, interviews, and document analysis.

Questionnaire

Questionnaires were distributed to lecturers who teach at the university through Google Form. This questionnaire is designed to obtain data on the views, beliefs, and strategies of lecturers in evaluating student learning outcomes in the HOTS perspective. In general, this questionnaire explores the views and beliefs of lecturers about methods that are considered effective and efficient in measuring students' cognitive abilities in understanding learning materials which are HOTS skills during the Covid-19 pandemic. In a situation where facilities are completely limited, such as internet data and gadgets owned by lecturers and students, it is also implied that the students' absorption capacity is limited in understanding lessons. This study further aims to explore facts about what evaluation strategies are used by lecturers in measuring students' HOTS abilities. English. This data will be taken with the consideration that lecturers are really required to be creative in designing or developing appropriate and efficient testing instruments in a pandemic situation which is full of limitations and complex problems such as the problem of limited resources, facilities, and also psychological fatigue in students.

Interview

Interviews were conducted to obtain information regarding the views and beliefs of the lecturers on the evaluation of students' HOTS through the Mid-Semester Examination and the Final Semester Examination. Higher education requires high thinking skills so that they do not memorize lessons, but they should be able to process their knowledge and understand the assumptions in their knowledge, as well as the logic behind theories, hypotheses, or rules in science and moral implications; social and cultural aspects of the epistemological depth of the knowledge they study. In this case, it is clear that an adequate form of evaluation is needed to accommodate this need. However, it should also be realized that the current condition is not normal. In a pandemic, the situation becomes complex and difficult. Perhaps their parents are also experiencing financial hardship which is worth considering because their likes or dislikes are directly related to their ability to provide facilities for their children. This study aims to explore facts about how lecturers view this issue and what their beliefs about appropriate evaluation are in the sense that they are not too pragmatic but also not too difficult for students. Things like this can only be explored in depth through in-depth interview techniques.

Document Analysis

The documents to be analysed are divided into two types, namely middle and final exam questions, and student answer sheets or projects done by students such as papers and research reports.

Test instrument documents

We collected copies of questions that were used realistically and authentically by lecturers at the university. We only asked for the questions in MS word or PDF format and sent via email specifically for research purposes, not the printout so it would not be too much trouble for the participants.

The second document was copies of student work such as the essays they wrote, essay question answer sheets, and research reports assigned by their lecturers during middle and final exams. If the exam is in the form of a project, the student's work may also be in the form of a video presentation or even in the form of a product

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such as a painting or sculpture. If the product is in the form of a product, just collect the photos. Both forms of documents are important for our research because they serve as validation and verification of the answers submitted through questionnaires and interviews. In addition, these documents are also useful for measuring the level of complexity of exam questions or instruments used by lecturers as a means of evaluating one semester's learning outcomes in the HOTS perspective.

RESULTS AND DISCUSSION

Results

The perception of lecturers about university capacity to deal with online learning

To be serious for a moment, at the first time, lecturers and students were unprepared for the abrupt move to entirely online learning and teaching, but they attempted to devise techniques to adapt to and meet the new difficulties. Table 1 shows the findings of the analysis. Technological competence is the first issue. University lacked the technological competence to provide ideal circumstances for online learning; 70.3% of respondents reported having technical challenges using university-provided platforms on a regular or very frequent basis (connecting to the platform, signal loss, delayed viewing of messages, the sound was not clear). A count index was constructed using four indicators that addressed different technological challenges in the delivery of online courses (the category frequently and very frequently was counted). The highest possible score is 4 and the lowest possible score is 0. Maximum score 4 indicates that technical problems occurred frequently and very frequently (connection difficulties, signal loss, delayed display of messages, blurred sound); minimum value 0 indicates that such problems did not occur frequently and very frequently.

As a result, some lecturers explored alternate solutions by using other platforms, however this has caused worry among some students because there has been no clear information about when and where the course will be delivered on other platforms (2.8% of students mentioned this aspect). Access to those platforms was occasionally limited, and there were connection issues here as well, particularly when there were a large number of students connecting. Furthermore, students' lack of adequate technologies for participating in online learning has overlapped with these issues (poor internet connection, lack of laptops/computers, mobile connection that only partially provides access to resources provided by lecturers and platforms), as mentioned by 16.8% of respondents.

Lecturers lacked the requisite technical skills and were unable to adjust their teaching style or appropriately connect with students in the online environment in order to ensure high standards of the teaching process in such a short period of time. Lecturers' technical skills can be represented by their ability to use various functions provided by the E-learning platform in order to adapt their teaching style to the online environment, such as using the video conference function, in which students can actively participate because lecturers can make them moderators. These technical skills also include the ability to present topics via screen sharing, to use synchronous chat during presentations, to allow students to work in groups during seminars, to post various links on the platform with references to various sources of information, and to create and post short videos for specific laboratories/seminars. As a result, some lecturers were able to discover answers, while others were unwilling to put up the effort to learn how to teach online.

Furthermore, in response to an open question, 16% of lecturers stated that lecturers lacked the requisite abilities and did not appear keen to enhance their online teaching skills. Furthermore, 23.8% of lecturers stated that the biggest difficulty they experienced was a lack of adaptation of the teaching style to the online environment, which hampered their ability to digest and comprehend the contents given throughout the courses. In terms of the courses, 30.5% of respondents stated that the timetable was not followed: lecturers did not offer breaks, and sessions did not begin or conclude at the designated times.

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Table 1. The Frequency Distribution of Factors Relating to the University's Ability to Give Knowledge in the Process Of Solely Online Learning

Variables	Category	Percentage
Technological competence	Problems with technology when learning online (frequently and very frequently) 1 (open question)	70.3%
	Use of several online platforms (depending on the preferences of the lecturers) (open question)	2,8%
	Inadequate student technologies (open question)	16.8%
Technical competence of lecturers	Use of the E-learning platform's functionalities in a variety of ways (at least 9 out of the 11 instruments mentioned) (closed question)	44.3%
	Inadequate technical abilities on the part of the teacher (lack of interest for improving their skills, disorganization) (open question)	16%
Subservience to the offline teaching/learning system's current teaching guidelines	Noncompliance with the timetable in the online environment (closed question)	30.5%
Style of instruction	Inadequate adaptation of teaching style for the online context (resulting in challenges with absorption and comprehension) (open question)	23.8%
	Unbalanced teaching style (theory versus-practical tasks) (either only theoretical or just practical challenges) (open question)	66.1%
	Unbalanced workload distribution (students either have too little free time or too much) (closed question)	70.5%
	Imbalance in the assignment of activities that must be accomplished within a certain amount of time (open question)	7.7%
	Inadequately defined requirements (closed question)	4.4%
	a lack of capacity to keep students' attention (closed question)	6.5%
Lecturers and students interaction	Lecturers' lack of involvement in the learning process (deficient interaction) (closed question)	11.3%
	Inadequate engagement with peers/lecturers (closed question)	7.5%

Most lecturers stated that, by using online, students had less free time than they did prior to online learning since they assigned them more chores than normal to students. This is also supported by the responses to the open-ended question, in which 7.7% of lecturers stated that the biggest issue was imbalance in the assignment of activities that must be accomplished within a certain amount of time. Furthermore, some lecturers (4.4%) did not properly state the criteria and expectations they had from students and failed to sympathize with students or provide them help for their concerns (11.3%). Some lecturers also reported a lack of engagement with their professors (7.5%) and a loss of attention and concentration in the online setting (6.5%).

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The perceptions of the lecturers about the use of the E-learning platform

According to the Technology Acceptance Model (TAM), the perceived ease of use of the platform's instruments, as well as the perceived utility of those instruments, impact real platform utilization. In this regard, it is worth noting that no lecturer cited the platform being difficult to use in response to the open question concerning challenges faced when using the platform. As a result, 73.1% of lecturers have previously used the platform and reported little difficulty in utilizing and manipulating the instruments it provides.

Table 2. The Frequency Distribution of Variables Connected to Lecturers' Perceptions of the E-Learning Platform's Utilization.

Variables	Category	Percentage
Prior knowledge	Previous experience with the E-learning platform	73.1%
The extent to which the E-learning platform is used	At least seven of the eleven tools reviewed were used often or very frequently.	75.4%
The E-learning platform's utility	People who thought at least seven of the eleven devices examined were useful or highly useful	66.1%
	Utilization of tools that promote collaborative learning	45.6%
Intention to utilize	Preferred e-learning platform	54.3%

Although the majority of lecturer had used the E-learning platform previous to the pandemic their opinions regarding the use of the online environment for learning are divided. Some of them, (36.4%) consider it an appropriate environment for learning, some consider that is not very suitable (32%), and a third is undecided (31.6%). The same thing happens when it comes to the level of satisfaction towards their online learning experience: 26.7% being very satisfied and satisfied by the E-learning process, 43.3% were undecided, and 30% were dissatisfied.

Processing material is more difficult in the E-learning system (55.5%), and one-third of lecturers believe that even presenting seminar work online is more difficult in the online environment (32.9%). However, if the classes were given via a videoconferencing system, the level of understanding and information processing would improve (75%). In this regard, it is worth noting that during courses/seminars, the clear majority of lecturers prefer to engage with students in writing, on chat/forum (52%), and use the microphone less frequently.

Table 3. The Frequency Distribution of Variables Connected to the Capacity of Lecturers to Integrate And Teaching-Learning Online

Variables	Category	Percentage
Interaction with students	Live answer in a video conference	44.5%
	Providing an answer on chat/forum	52%
	NR/NA (no answer)	3.5%
Presentation of projects	It is more difficult	32.9%
	It is easier	33.3%
	It is the same	33.7%
It is easier to process	The course is carried out audio	20.5%

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information when	The course is carried out audio and video	75%
	The course is carried out on the chat/forum	4.5%
Compared to offline teaching, online information processing is	Easier	19%
	More difficult	55.5%
	The same	25.5%
General perspective towards learning in the online platform	Dissatisfied	30%
	Neither satisfied nor dissatisfied	43.3%
	Very satisfied + satisfied	26.7%
The online environment is appropriate for learning and evaluating	Very little extent + little extent	32%
	Neither little nor great measure	31.6%
	Very great extent + great extent	36.4%
Preference for online learning	Would prefer the unfolding online courses	12.6%
	Would prefer the unfolding of face to face courses	45.3%
	Would prefer a combination between the online and offline courses	42.1%

Table 4. Chi-Square Test Related to Degree

Variables	Pearson Chi-Square Value	Df	Asymp. Sig. (2-sided)
Teaching online is more difficult	21.44	2	0.00
Preference for the E-learning platform	4.13	1	0.04

Taking into consideration the difficulties they faced, lecturers believe that the conventional face-to-face method is the best approach to carry out the teaching-learning process, with the E-learning platform serving as a supplement to aid the educational process. Thus, 45.3% of lecturers would choose face-to-face teaching/learning, 42.1% would prefer a combination of online and offline courses, and 12.6% would prefer purely online learning/teaching.

The use of other platforms was permitted solely to remedy technical difficulties that developed as a result of the servers that hosted the E-learning platform. The majority of lecturers often employed a significant variety of E-learning resources (75.4% of lecturers mentioned this aspect). However, a lesser proportion of lecturers thought at least seven of the eleven instruments were beneficial (66.1%).

Lecturers' views and beliefs on the use of the E-learning platform in the HOTS context during the Covid-19 Pandemic (a qualitative view)

The views and beliefs of the lecturers on the evaluation of learning in the HOTS context during the pandemic are that in general they believe that learning in the HOTS context can still be carried out during this pandemic, although there have been adjustments in the use of learning media, which were all offline and then turned online. Most lecturers use Zoom and video as a medium for student learning. Their view is that learning during a pandemic should be no different from learning in ordinary times because with the help of IT technology they can actually move classes from physical classes to online classes through various learning

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platforms such as synchronous platforms (Zoom and Google Meet) and asynchronous platforms (Google Classroom, *Spot*, and *Spada*).

It is recognized that moving from offline learning to online learning is certainly not easy. To carry out digital migration, lecturers must go through trial and error, and study various existing learning media. All research subjects for interview data stated that they were very optimistic for the college level that online learning was not too much of a problem. At first, it was seen as a big problem, but over time they became accustomed to using technology to support the student learning process.

They are of the view that learning at the tertiary level does require the delivery of HOTS domains, namely analyzing (C4), evaluating (C5), and creating (C6). They argue that analytical skills are indispensable for all study programs. Prospective undergraduates are required to be able to solve problems by breaking down (outlining) the components of the problem so that they can be easily solved. Evaluation skills are needed so that they can justify the decisions they make using logical and coherent arguments. Prospective scholars are also required to be able to assess various value systems in a changing society in order to assess what the moral implications of these changes are and to what extent these values can still be supported and rationally justified. Finally, the skill to create (creative) is something that must be mastered by prospective scholars who will later enter the community. Graduate candidates are expected to be able to produce various products or concepts that can be offered to the public or to advance the industrial sector, service sector, and the world of education so that they can be more relevant to the demands of an increasingly sophisticated era.

According to Subject 1, the biggest challenge for university graduates is to prepare students to be able to compete in the industrial revolution 4.0 era; even industrial revolution 5.0 where there will be fundamental changes in various aspects of human life, namely the use of Artificial Intelligence (AI) and Internet of Things (IoT). If the students are not equipped with high-level thinking skills, it will be difficult for them to even survive in the industrial revolution. In fact, this pandemic is an initial benchmark for the readiness of universities in preparing the younger generation to meet the revolution. In a number of countries such as China and Japan, block chain technology has even begun to be implemented for the use of digital currencies such as bit-coin which is included in the industrial revolution scheme. In other words, we have actually entered the early chapter of the industrial revolution.

Indeed, their contribution will be adjusted to the scientific discipline they are pursuing on campus. Graduates of the Music Arts Study Program will be required to create beautiful musical compositions, graduates of the English Language and Literature Study Program will be required to be able to write scientific papers, speeches, novels, or articles in English, while graduates of the Mechanical Engineering Study Program may be required to be able to create a mechanical structure that high efficiency, fuel efficient and environmentally friendly.

They believe that learning the three thinking skills is not a problem as long as learning facilities are met, such as the provision of LMS and professional Zoom applications. According to them, online learning is actually a diversion from the context of the classroom atmosphere to the online context. Thus, ideally all the demands of the offline curriculum should be carried out online.

However, for some fields such as music, it seems that there are some obstacles in the re-contextualization of offline to online learning. In the past, before the pandemic, it was possible to learn musical instruments such as the piano individually. Students can study for hours under the direct guidance of the lecturer so that students' piano skills become very proficient. Learning musical instruments can still be done through the Zoom application, but it is felt that it is not optimal in terms of space and time.

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Lecturers' strategy on the use of the E-learning platform to evaluate the HOTS context during the Covid-19 Pandemic ((a qualitative view)

Strategy in this case is interpreted as a "plan of action" or action plan. In general, lecturers prepare a number of strategies that are used in evaluating student learning. Their strategy is greatly influenced by their beliefs about teaching methods that are already common practice, their philosophy about teaching, and of course they must also take into account the conditions at that time, namely during the pandemic.

Initially, they tried various types of evaluation such as essay questions, multiple choice, and filling in gaps. Theoretically, these forms of questions can indeed measure students' abilities in the HOTS context, however, it was later discovered that there were obstacles in the use of these types of questions. An obstacle in the form of essay questions is that students will easily find answers on the Internet. With a Google search, students will find answers to exam questions in this form. If in the physical classroom the teacher can easily confiscate the student's cell phone if it is found that students are cheating from online sources, in the online class it is very difficult for the lecturer to supervise the exam directly. They never know whether the student is cheating or cooperating on the exam questions.

Therefore, the lecturers developed the alternative strategy. There are lecturers who switch to the form of project-based assessment. By using this form of assessment, students automatically cannot copy from the Internet or from their friends because each student is given a different project according to the topic he is discussing. There are also lecturers who use problem-based assessment as in the field of mathematics. Students are given trigonometric cases that must be solved. The solution to this trigonometry case cannot be found on the Internet. The solution is purely to be solved by students with the provision of basic understandings in the field of trigonometry.

On the other hand, there are also lecturers who insist on using the form of multiple choice questions but with modifications. This lecturer uses an application that allows the lecturer to make multiple-choice questions whose processing is limited in time so that students who are late in doing them will be stopped by the system. Thus, the form of multiple choice assessments is also effective to be used to measure the HOTS domain with the use of this application. However, in general, of the 6 subjects we interviewed, 4 lecturers preferred to use project-based assessment, one person used a problem-solution assessment and another person used multiple-choice assessment.

Presentation of interview findings with Subject 1 (Mechanical Engineering Lecturer)

Subject 1 is a lecturer who teaches engineering mechanics, strength of materials, machine elements, metallurgy and welding testing, and testing of cast objects. Interviews were conducted via the Zoom application.

According to subject 1, the first strategy used was to use a PowerPoint presentation (PPT) delivered through the Zoom application. This strategy is quite difficult to implement because the mathematical formulas require symbols that are difficult to type in the PPT. Symbols such as roots, integrals, divisions, and differential symbols can indeed be created using the symbols in the MS word program but it takes quite a long time.

The second disadvantage of using media like this is that student responses are less than optimal because students tend to focus on numbers and mathematical symbols but focus less on the concepts of the formula itself, which is actually much more important than just examples of calculations presented through PPT.

The third disadvantage is that the use of PPT for the presentation of mathematical equations does not allow for a step-by-step solution as is usually presented on a white board using a marker. There are obvious equation changes such as the process of division-multiplication, quadratic, integration and differentiation. PPT can't present solving equations dynamically one step at a time but it is done right away. In other words, there

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is no process that can be represented visually and gradually so that students do not understand the calculation of equations in this way. Finally, subject 1 decided to buy a more sophisticated computer. Although the price is very expensive, which is IDR 17,000,000, -, this new computer can help subject 1 to solve the problem.

The superior feature possessed by this computer is the quality of the LCD which is a touch screen. Subject 1 can easily use the screen on the powerpoint program to write using a mechanical pen so that he can write freely on the screen the same as when he writes on a white board. Thus, the presentation of mathematical equations becomes more communicative and dynamic. For example, subject 1 can describe starting from the very beginning the solution to an engineering mechanics problem by calculating the forces acting at a point where Σ m = 0. It can be seen that step by step changes from solving the problem can be seen.

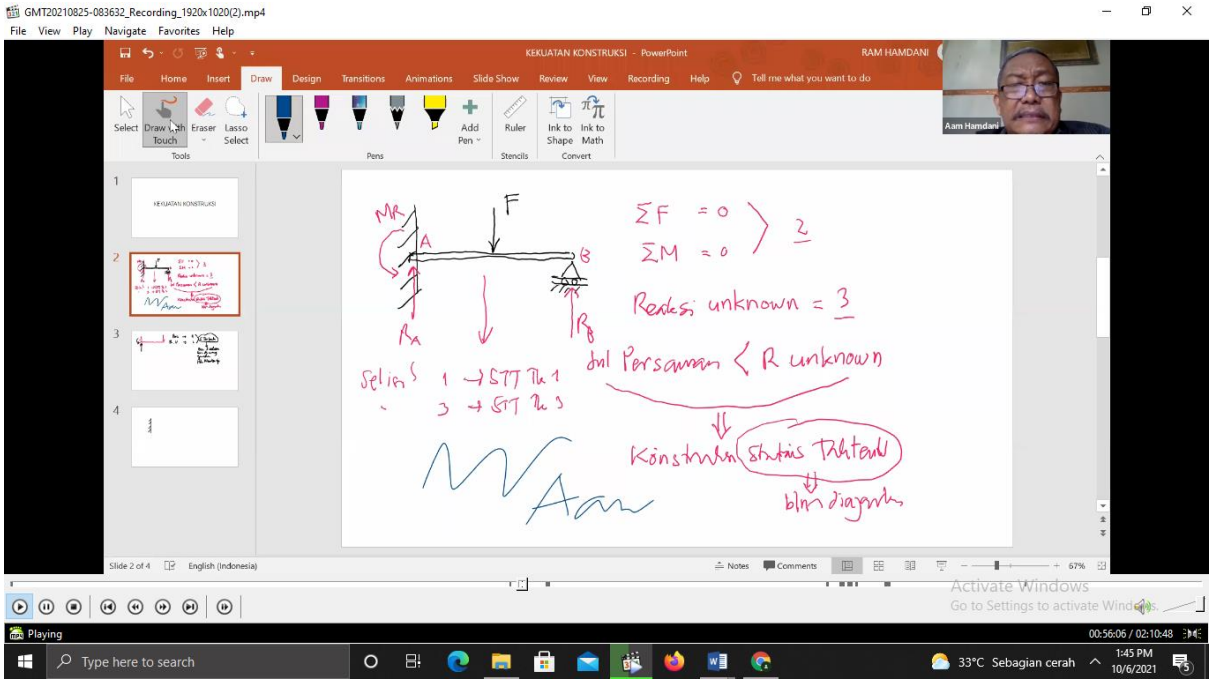

Figure 1: The Use of Mechanical Pen On PPT Screen

By using a mechanical pen on a power point, the screen can be used as a white board as in the picture above. Subject 1 can write and draw using a mechanical pen by applying different colors to accentuate certain parts of the equation. By using a touch screen, it is also possible for lecturers to make questions that test analysis, evaluation, and creating skills. According to subject 1, the exam questions for the college level must all be HOTS-based. It is too simplistic if Mechanical Engineering students are given HOTS-based questions.

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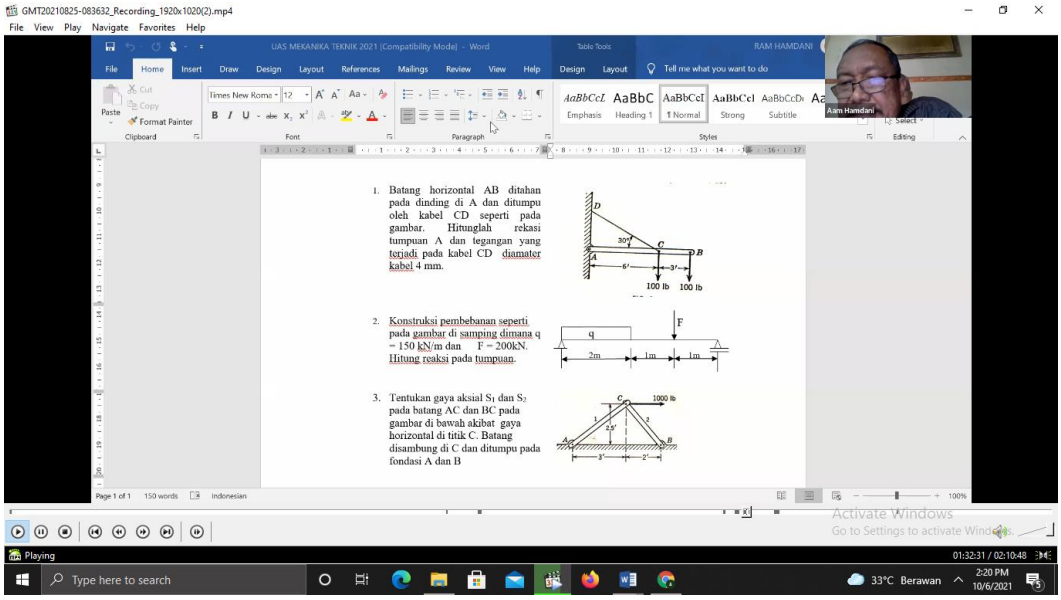

Figure 2: Example of UTS questions for Mechanical Engineering Students

Subject 2 (IPSE Lecturer)

Unlike subject 1, subject 2 actually maximizes asynchronous learning. The reason is because the LMS features are very complete so that they can be used for the learning and teaching process very effectively and efficiently. Regarding the LMS media used, subject 2 prefers SPADA to SPOT. The reason is because the files stored in the SPOT are often lost. Student work can't be downloaded all at once so it's quite time consuming to download one by one.

Subject 2 teaches several subjects, namely Mathematics and Physics, Mathematics Science and Engineering Technology, Solar Cell, Electricity and Magnetics, and Earth and Space. There was a bad experience experienced by subject 2 a while ago when he uploaded all the teaching materials he had developed for a long time. It turned out that after the semester ended all the materials disappeared because the SPOT system deleted all the materials that were uploaded at the scheduled times.

On the other hand, SPADA is very reliable for storing all learning files, both textual and audio-visual. The questions developed by subject 2 are all stored neatly in SPADA and can be accessed directly by students. Likewise, learning videos are stored neatly on the SPADA LMS and can be viewed or downloaded directly by students.

According to subject 2, in maximizing the use of SPADA facilities, it is actually not totally asynchronous. At the initial meeting, subject 2 uses Zoom to explain to students what activities will be done during one semester starting from the lesson plans, the references used, the tasks that must be done for each course and the schedules for completing assignments, and task.

If there is a project, then it is explained what the project is like, whether it is an individual project or per group, the assessment criteria, the discussion of the materials, and what the design looks like are all explained at the first meeting of the lecture. Because there is no access to the laboratory, subject 2 provides videos for laboratory practicum visualization, multimedia flash, and worksheets, to show a causal relationship model in science, and is also enriched with self-study experiences. Sometimes meetings with Zoom are also held to explain mathematical calculations using a pen tablet for a more systematic explanation.

The methods used by subject 2 are inquiry and project-based methods. In learning with the inquiry method, students are guided to observe scientific phenomena and ask questions (hypotheses) about something in science. Then, they are guided to answer these questions by collecting data and conducting research until

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they finally find a formula or law. Students are also given a project to make a learning video about a topic in science, for example about electricity in living things, and then upload it to YouTube. Each batch has a YouTube channel for student projects.

Subject 3 (Tourism lecturer)

Subject 3 basically uses Zoom during the teaching and learning process, but there are obstacles, namely the lack of response from students during discussions (questions and answers) with students. According to subject 3, the characteristics of tourism students are different from those of science students. In general, they are not skilled in HOTS because they still think procedurally. Tourism science is still considered as a science about the procedures for organizing a tourism business or serving tourists, it has not been considered as an empirical study that requires critical thinking. Their skills are still at the level of recalling (memorizing procedures), understanding procedures, and implementing existing procedures in the world of tourism. Thus, it is generally recognized by subject 3 that tourism students are still at the low-thinking skill level (LOTS).

According to subject 3, HOTS skills can only be developed at the postgraduate level (master and doctorate) because postgraduate students are people who already intend to study tourism as an empirical discipline that has its own research methodology and its own references so that it can be developed as a scientific discipline that methodologically validated and verified.

At the undergraduate level, students still do not have the same paradigm of thinking because in the tradition of tourism science as in traditional tourism science schools their orientation is still on mastering tourism procedures. Studies like this are still prescriptive about right and wrong, not yet reaching the descriptive (explanatory) paradigm.

As a result, during lectures there are still many students who are off-camera because they are not interested in scientific tourism studies. They are more interested in hands-on learning experiences such as direct tourist visits, which of course are not allowed during the pandemic.

Students' Perceptions on the use of HOTS in the classroom

The following is a table taken from a survey using a Google form which is distributed to university students. This survey is more about validating and verifying the claims of research subjects on qualitative analysis. In general, students' perceptions can be said to confirm the views, beliefs, and strategies of the lecturers who are prepared to overcome obstacles in learning during the pandemic.

Table 5. Students' Perception On the Use of HOTS

Faculty	N	Mean	St. Dev
Postgraduates	13	4.03	0.69
Early Childhood and Primary Education	211	3.60	0.57
Engineering Faculty	47	3.63	0.65
Arts Faculty	163	3.43	0.54
Sports Faculty	96	3.53	0.70
Science Faculty	101	3.54	0.56
Language and Literature Faculty	113	3.67	0.48
Economics and Business Faculty	416	4.49	0.54
Social Sciences Faculty	145	3.50	0.59
Education Faculty	112	3.58	0.54
TOTAL	1417	3.55	0.57

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In this survey, there were 1417 students responding to our questions. They come from 9 faculties and 1 graduate school. From the table above, we can see that the highest responses were from students of the Faculty of Economics and Business Education, with an average of 4.49 with a standard deviation of 0.54 and the second highest ranking was from graduate students with an average of 4.03 and a standard deviation of 0.69. While being in the third highest rank was the response from students of the Faculty of Language and Literature Education, with an average of 3.67 with a standard deviation of 0.48. Finally, the lowest response was from the Faculty of Art and Design with a mean of 3.43 and a standard deviation of 0.54.

From the data above, it can be concluded that student responses are quite varied towards the use of lecturer strategies in the learning process during the pandemic, but in general it is still above the average of 3.5, except for students from the Faculty of Fine Arts and Design. It is understandable why the responses from these art faculty students were the lowest compared to students from other faculties, perhaps because they needed more practice to play musical instruments to compose songs. This is not possible due to strict university rules in implementing health protocols.

Meanwhile, only 2 faculties have an average of 4.00 or above 4.00. At least, it can be concluded that the average tendency is towards good. It may be that these data to a certain extent confirm the student's response to what the lecturers have done in order to best use various strategies to organize the online teaching and learning process.

Discussion

The present study has contributed in two significant changes in the higher education system during the crisis caused by the Coronavirus pandemic: digitalization and the shift to a student-centered E-learning process, both of which occurred in a very short period of time.

Because E-learning platforms prefer this sort of teaching/learning, lecturers were obliged to convert to a more student-centered manner of teaching as a result of digitalization (Joubert, 2014). Previous research has found that when utilized as a supplement to the traditional educational process, online learning platforms assist students. Furthermore, the majority of the researches cited suggest that students have generally good attitudes regarding online learning (Burac et al., 2019; Lochner et al., 2016; Odit-Dookhan, 2018) despite the fact that they occasionally face technological challenges and believe that they process knowledge better in traditional courses (Alsaaty et al., 2016).

Furthermore, other studies show that online learning has a variety of advantages, including increased flexibility and potential for better information (Dhawan, 2020), adapting courses to students' needs (Babu & Sridevi, 2018), flexibility offered by online learning (Hodges et al., 2020), innovations in educational technology and learning (Zhao & Watterston, 2021), and removing barriers of space and time, all of which encourage students to participate in conversations and exchange opinions (Arkoful & Abaidoo, 2014). The quality of the educational process in the online environment is determined by a number of factors, including the level of training that teachers have in using technology, their teaching style, interaction with students, strategies used to capture students' attention, encouraging contact between students and faculty, collaborative learning, quick feedback, active learning, task time–encouraging students to allocate more time for completing tasks, and high expectations (Cable & Cheung, 2017).

Taking these factors into account, the present study examined how lecturers managed to offer information during the Coronavirus epidemic. Simultaneously, the present study focused on examining lecturers' perceptions of their experiences during solely online learning, as well as the influence this style of learning had on developing student capacity to learn and absorb information.

According to the findings of this study, while studying solely online, some of the previously described benefits and advantages become less valuable, while negatives become more obvious. Lecturers who replied

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to the survey feel that only online learning has no benefits for absorbing and processing knowledge, that it is more difficult to study and focus online, and that teaching is likewise more challenging. Furthermore, lecturers believe that presenting seminar work online is more difficult. It's also worth noting that, whereas students used to actively participate in offline seminar activities, relatively few do so online.

In terms of the drawbacks of online learning, the findings are consistent with previous research (Sadeghi, 2019). Lecturers believe that students are quickly distracted and lose concentration because lecturers do not have well-implemented ways to keep students engaged, as well as a lack of expertise with this sort of learning. In addition to these factors, environmental disruptors such as noise from family members or neighbors, as well as a lack of suitable working space, have an impact on the length of time students can concentrate when learning online. Isolation is another drawback identified by our research. Lecturers believe that students feel isolated as a result of a lack of engagement, particularly with lecturers, as they spend more time inside, in front of the internet, and as a result of the pandemic, which pushed individuals to socially remove themselves from others.

The findings are consistent with earlier research Adedoyin & Soykan (2023) that show lecturers and students value conventional education more than online education, preferring to use E-learning platforms in conjunction with traditional, face-to-face teaching/learning. Furthermore, lecturers perceive that the process of learning and digesting knowledge in the online environment is inadequate, which may result in lower learning results. The study found that online learning can have an impact on students' performance since respondents reported poor knowledge absorption, particularly when taking more challenging courses with teachers who did not have well-adapted memorization tools.

The findings of the present study are in line with the findings of previous researchers such as Admiraal et al., (2015) who found that in general a higher perception of online testing as a form of assessment is more valid for measuring student performance. Our research also confirms Appiah & van Tonder (2018) who concluded from their study that online testing or what they call e-assessment becomes more effective if the assessment is credible and lecturers make a concerted effort to create an assessment that is authentic, consistent, transparent and practical, and higher. Order grading assignments can also be graded via electronic grading.

Good perceptions of online testing may also have something to do with reduced student anxiety levels. For example, the speaking test for students of the English Language and Literature Study Program might be very nervous if the test is in the form of face-to-face interviews. This finding is in line with the findings of a previous study, namely Hollis and Was (2016) who reported the relationship between exam anxiety and online learning environments, noting that students with high in-class anxiety benefit from the reduced pressure of online exams.

Finally, there are also the results of another study by Hosseini (2017) which revealed that the test performance of participants in PPT and CBT did not show a statistically significant difference between the two sets of scores obtained from the two test formats, and the test scores of participants did not differ in the test-based version; paper and computer based. Although their research is not about online testing, there are similarities between online testing and computer-based testing.

CONCLUSION

In general, the subject lecturers believe that learning in Higher Order Thinking Skills (HOTS) can still carried out during this pandemic even though there are adjustments in the use of learning media which are all offline and then turned online. Most lecturers use Zoom and video as a medium for student learning. Many lecturers can actually move classes from physical to online classes through various learning platforms such as

synchronous platforms (Zoom and Google Meet) and asynchronous platforms (Classroom, Spot, and Spada). All interview data from all subjects suggested a shared enthusiasm for tertiaries attempting online learning. Although it was considered as one of the major hurdles, through continued modification this change has resulted in a relative ease with virtually teaching from technology support. Lecturers say the answer is in all study programs that there are still HOTS domains for analyzing (C4), evaluating (C5) until creating. Analytical skills are considered as vital to solve problems by analyzing it down into smaller portions, and Evaluative is needed for justified decision-making based on logical arguments. Lecturers' teaching philosophies and on-the-ground realities during the pandemic shape what strategies are used. In an attempt to decrease academic dishonesty, some have moved away from traditional in-class exams and utilized project-based assessments where students were given different projects geared toward the topics they chose. While some have resorted to taking home and problem-based assessments like, especially in mathematics where there is a lot of practical oriented problems which cannot be solved by using online resources. Some stragglers have deployed multi-choice questions but time bound and system locked down to prevent a breach.

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