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Students' Perspectives on Innovation of Mathematics Learning Online Course on Their Ability to Develop Innovative Textbooks

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Abstract.
The responsibility for developing professional and high-quality teacher candidates lies with the Education Institution for Educational Personnel (LPTK). However, achieving this goal is certainly challenging to achieve during this pandemic. This research explores student perspectives on the effectiveness of lectures in developing the ability to create innovative textbooks. The research employed quantitative descriptive methods and involved students from the mathematics education study program Universitas Negeri Semarang who were enrolled in the Innovation of Mathematics Learning course. The data were collected through questionnaires and analyzed using descriptive statistics. The results of the study indicate that preparing learning resources in modules is crucial during lectures. Additionally, activities such as synchronous lecture activities, use of Learning Management System (LMS), resources like videos, discussions with colleagues, virtual face-to-face, discussions using WhatsApp Group, presentation of each assignment, group assignments, and projects should be prepared during lectures. These results highlight the necessity of implementing a team-based project model to develop students' abilities in developing innovative textbooks.

Keywords: innovative textbooks, mathematics learning online course, students' perspectives.

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1. INTRODUCTION

The development of professional and qualified teacher candidates is the responsibility of the Education Institution for Educational Personnel (LPTK). Education Institutions for Educational Personnel must produce quality graduates who can change their thinking and act toward meaningful goals in life both individually, in society, and in the Country [1]. However, this goal is certainly challenging to achieve during this pandemic. The Covid-19 pandemic in Indonesia has caused various multidimensional problems, including education. The impact of Covid-19 has provided challenges for universities in carrying

out the learning process. The Circular Letter of the Ministry of Education and Culture Number 1 of 2020 concerning preventing the spread of Covid-19 in universities has emphasized that lectures must be carried out online by the conditions of universities. Many universities respond responsively to government instructions, including Universitas Negeri Semarang. Through a circular regarding vigilance and prevention of the spread of Covid-19 infection in the Universitas Negeri Semarang, it was determined that lectures were carried out online, either asynchronously through Elena or other learning management systems and synchronously through video communication provided by Universitas Negeri Semarang or with other video conference services.

The concept of online learning is not new [2]. Since 2009, the concept of online learning has been applied in Indonesia [3]. However, the applied learning has yet to be by student expectations. During online lectures, Indonesian students need help regarding internet connection, electricity, online devices, the environment, personal problems, and uninteresting learning [3]. In addition, Widodo & Nursaptini's research also shows that 96.4% of students experience difficulties in online learning, and evaluations are needed in various aspects, as shown in Fig. 1 [4].

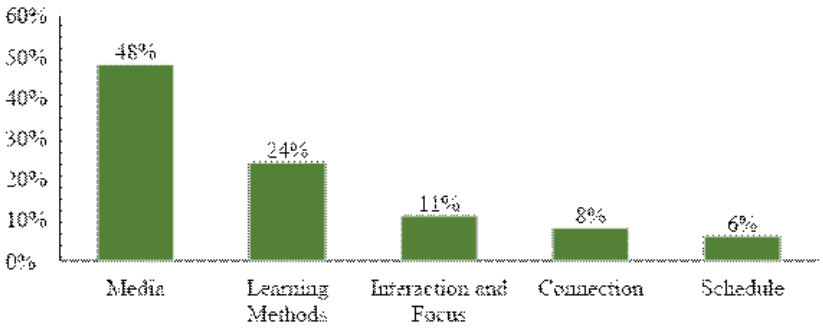

Figure 1: Difficulties in online learning.

Figure 1 shows that 48% of students expect an evaluation of the media used in lectures, and 24% require an evaluation of the learning methods used. So that the evaluation is in accordance with the needs of students, it is necessary to analyze the perspectives of students regarding online lectures, one of which is in mathematics learning innovation courses. Mathematics learning innovation courses are one of the courses that focuses on developing students' abilities to produce various learning innovations, especially in developing innovative textbooks. The ability to develop innovative textbooks is very important to produce innovative teacher candidates who are able to provide textbooks that suit the needs and characteristics of students.

In order to improve students' abilities in developing innovative textbooks, apart from lectures according to the student's perspective, lectures must also consider the quality

of lectures and 'Merdeka Belajar-Kampus Merdeka' (MBKM) or Freedom to Learn-Independent Campus policies. Through the MBKM policy, the Ministry of Education, Culture, Research, and Technology suggests implementing the Team-Based Project model. A team-Based Project is a learning model that can maximize interaction between students [5]. Team-Based Project will give students the freedom to collaborate in terms of defining and setting goals, offering various ideas, and taking responsibility, so as to develop student communication, collaboration, and leadership skills [6]. This model can support mathematics learning innovation lectures in order to develop students' abilities in developing innovative textbooks.

Based on the description above, the authors conducted research on students' perspectives on the innovation of mathematics learning online courses on their ability to develop innovative textbooks. This is important to do in order to determine the media, learning models, and everything that must be prepared before carrying out mathematics learning innovation lectures that are in accordance with student perspectives and MBKM policies while still considering the quality of lectures. This study is important, considering that prospective teachers need to be well prepared in preparing for learning. By considering their perceptions and still attaching importance to the achievement of learning outcomes through an integrated lecture process, it is hoped that the professional competencies of prospective teachers can be well prepared; in this case is how prospective teachers can develop innovative teaching materials for learning mathematics.

2. RESEARCH METHOD

This research was carried out in a quantitative descriptive using an online survey method. The results of the research are presented in several tables and graphs so that they can illustrate how students' perspectives on the implementation of effective lectures on the ability to develop innovative books. Then look for the average for each item in the questionnaire and then sort according to student perceptions. Thus, the right conclusions will be obtained to answer the research questions.

A total of 78 students of the mathematics study program of Universitas Negeri Semarang who took the Innovation of Mathematics Learning course have filled out the questionnaire. The questionnaire was developed online using Google form with several question items.

3. RESULT AND DISCUSSION

The implementation of online lectures is still an interesting thing to study. Creating qualified teacher candidates during the pandemic is a challenge for LPTKs to solve immediately. Paying attention to input from students also needs to be considered. With this study, it can be obtained an overview of how to carry out effective online lectures on the ability of students to develop innovative books.

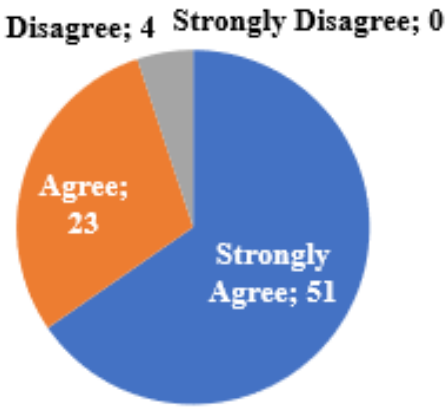

Figure 2: Student's perspective questionnaire results regarding implementation of synchronous online lectures.

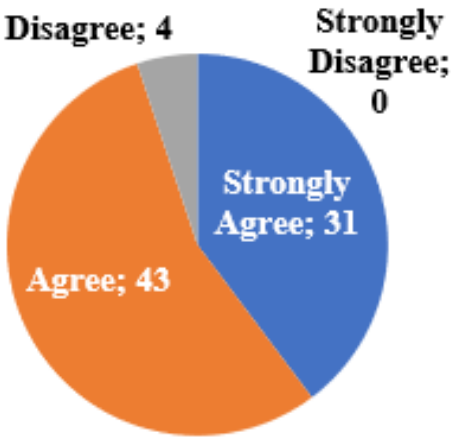

Figure 3: Student's perspective questionnaire results regarding face-to-face implementation in online lectures.

The first study to analyze is how the strategy for implementing online lectures is carried out. The results, as presented in Fig. 2 show that many students agree that the lectures are carried out synchronously. Furthermore, to maximize the synchronous implementation of lectures, it is necessary to hold virtual face-to-face meetings so that students can discuss directly with lecturers or with other students. These results are presented in Fig. 3 which interprets that most students agree to carry out face-to-face

lectures. In addition, there needs to be a flexible discussion forum by utilizing social media such as WhatsApp Group or Telegram Group. The results in Fig. 4 show that students agree to use the application as a discussion forum either with lecturers or between students. The use of a learning management system (LMS) is also an integral part of online lectures. Most of the students also agreed to use the LMS during their lectures. The results are presented in Fig. 5. This strategy is the best strategy to maximize graduate learning outcomes during online lectures. Synchronous activities will make it easier for students to continue to discuss with lecturers and other students directly, either by virtual face-to-face or through the discussion forums that have been provided. The use of LMS can also make it easier for students to obtain learning resources that are shared by lecturers, check the process of each assignment, and ensure that the completed assignments have been assessed by the lecturer. This can then have an impact on the success of achieving graduate learning outcomes, one of which is the ability to develop innovative books that prospective teacher students need to have.

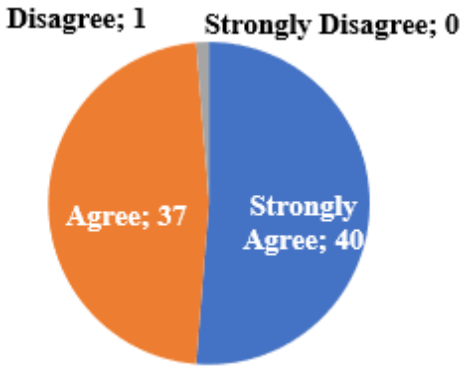

Figure 4: Student's perspective questionnaire results regarding the use of LMS in online lectures.

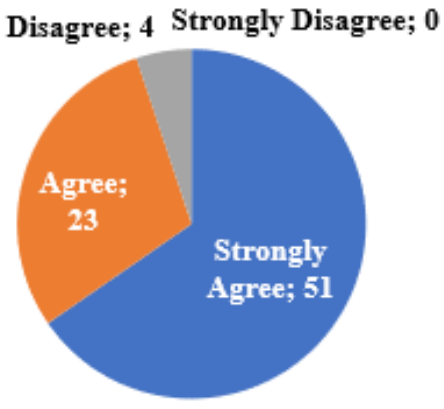

Figure 5: Student's perspective questionnaire results regarding the availability of discussion forums.

Learning resources will be the next study. Learning resources for students are a primary need for both offline and online lectures. Learning resources can be in the form of modules, learning videos, media, or others. In this study, it will be studied how much students need related to learning modules and videos for Innovation of Mathematics Learning lectures in order to increase their ability to develop innovative textbooks. All students agree that the module is necessary in this course (see Fig. 6). Furthermore, Fig. 7 shows that almost all students also agree on the availability of learning videos. Learning with modules allows students to learn independently because in the module students have been given various instructions that make learning easier and have clear learning objectives [7, 8]. Video can have a positive effect on student performance given its function as an effective educational tool so as to enhance learning [9, 10]

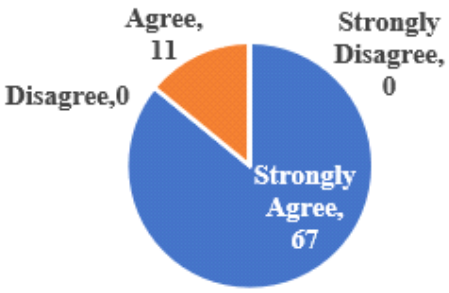

Figure 6: Student's perspective questionnaire results regarding availability of modules.

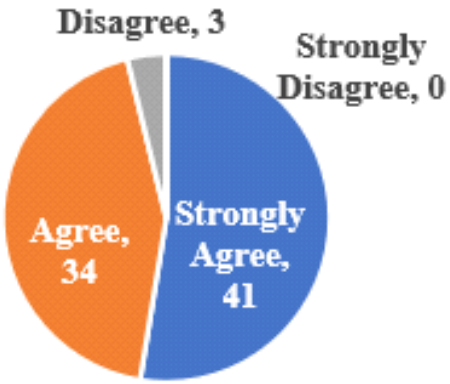

Figure 7: Student's perspective questionnaire results regarding availability of learning videos.

The last study observed in this lecture is student assignments. It is necessary to prepare relevant assignments so that the learning outcomes of graduates can be achieved by considering the opinions of students. This study compares students' opinions regarding assignments independently or individually. The results of the study (see Fig. 8 and Fig. 9) show that students are more likely to agree that assignments are completed in groups than individually. The 25% of students disagreed that assignments

were completed individually. Assignments during online lectures are in the spotlight of various parties. Quantity and quality are always debated. Students tend to think that the assignments given are too many (in terms of quantity), but the lecturers have another view regarding the achievement of competencies or learning outcomes (in terms of the quality of learning). Alternative solutions emerge through group assignments which are the impact of collaborative learning. Suchyadi & Karmila stated there were significant differences in concept understanding for prospective teacher students and positive responses to the implementation of group assignment [11]. With group assignments (in small groups) can increase the acquisition of better learning, the achievement of more learning objectives, and more active student participation [12].

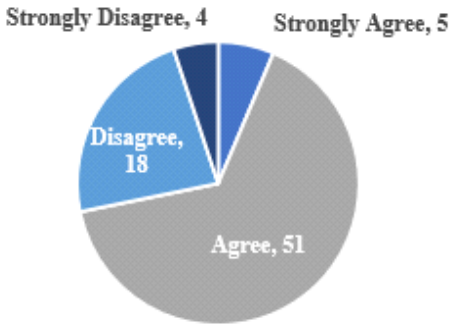

Figure 8: Student's perspective questionnaire results regarding individual assignments.

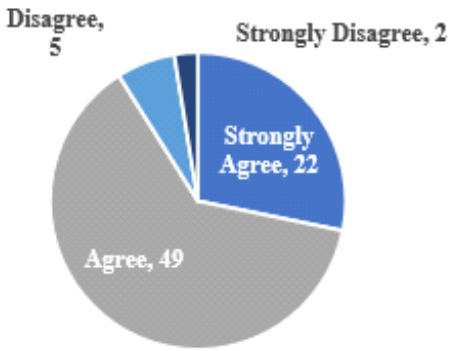

Figure 9: Student's perspective questionnaire results regarding group assignments.

Furthermore, the form of project assignment is the student's choice to measure the achievement of graduate learning outcomes for the Mathematics Learning Innovation course (see Fig. 10). Project assignment can increase students' motivation, attractiveness, and understanding [13, 14]. Emphasis on in-depth investigation of broad memorization of knowledge is essential in a project [15]. Student motivation will increase when the project is relevant.

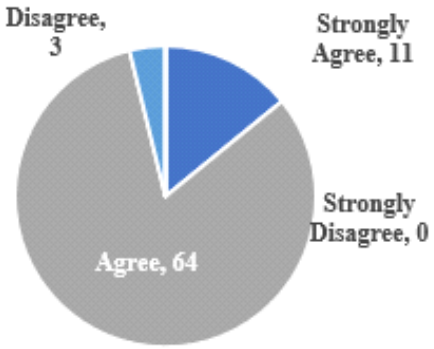

Figure 10: Student's perspective questionnaire results regarding project assignments.

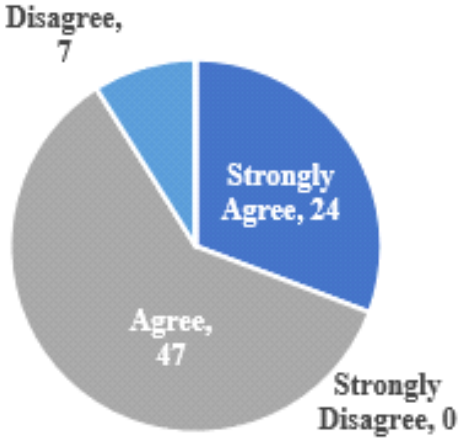

Figure 11: Student's perspectives regarding the results of the assignment need to be presented in class to get insight from lecturers and colleagues.

The activity of presenting the results of student work becomes an interesting study to ensure the achievement of student graduate learning outcomes. Figure 11 represents students' perspectives on the results of the assignment need to be presented in class to get insight from lecturers and colleagues where 47 students (60%) agree, and 24 students (31%) strongly agree. Then, students agree that assignments need to be presented in class to get suggestions from lecturers and colleagues. Through presentations made by students, they will know their strengths and weaknesses and how to improve existing weaknesses.

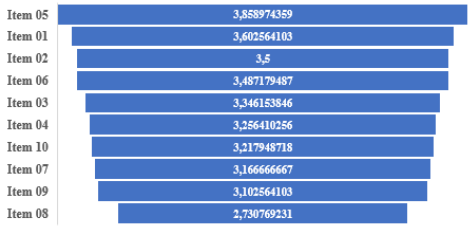

Figure 12: Student's perspective questionnaire results.

The result of the study shows that the availability of modules as learning resources is the first thing that needs to be considered in implementing Mathematics Learning Innovation lectures in order to develop innovative textbooks. Sequentially, synchronous lectures, the use of LMS, learning resources in the form of videos, and virtual face-to-face are other combinations that need to be considered as well. Things that do not need to be implemented in lectures (according to students' opinions) are individual assignments. This study will be a contribution for lecturers in developing online mathematics learning innovation lectures.

Table 1: Implementation of the team-based project model in innovation of mathematics learning course.

Syntax	Statement
Reflection	Students are motivated to become Professional Educators. Students are directed to the context of problems related to the Urgency of Innovative Textbooks. Students get inspiration through Innovative Textbook Products that have been developed.
Research	Students obtain material related to Mathematics Learning Research Trends and Textbook Development Procedures. Students analyze the results of national and international studies to obtain Innovative Textbook Product Designs.
Discovery	Students develop Innovative Textbook Products.
Application	Students test Innovative Textbook Products.
Communication	Students present the Results of Innovative Textbook Products.

The follow-up that can be done by lecturers to maximize Mathematics Learning Innovation lectures is to integrate team-based project model. Team-based projects can be regarded as a choice of methods that can be used to maximize interaction between students during online lectures [5]. This kind of learning has been widely disseminated and also widely applied as a learning method in universities to improve various student skills, especially those that play a role in social interaction [16]. Project-based learning provides free space for students to determine their collaborative learning and requires students to be able to offer various ideas in working on projects based on the knowledge that students have. Therefore, the ability to work in teams, consisting of communication skills, leadership skills, collaboration skills, and relationships between students, can be trained in learning carried out in teams [17,18].

The interesting thing about implementing this model is that the Team-Based Project is a mandate from the Curriculum Policy of Merdeka Belajar Kampus Merdeka. By implementing this model, it has indirectly supported the Indonesian government in implementing the Curriculum Policy of Merdeka Belajar Kampus Merdeka. Table 1 is an example of implementing the Team-Based Project model in Mathematics Learning Innovation lectures.

4. CONCLUSION

Preparing professional teacher candidates is a shared obligation to improve the quality of education in Indonesia. Policies issued by the Government of Indonesia must be carried out by considering the achievements of graduates. Students' perceptions also need to be considered considering that students are the subjects in the educational process, so that the spirit of Independent Learning can be achieved properly. The results of this study indicate that lectures need to be prepared with a "complete package" starting from the availability of learning resources (modules and learning videos), choosing a synchronous lecture strategy with virtual face-to-face discussions and discussion forums from flexible applications, as well as the use of a learning management system that is flexible can make it easier for students during online lectures. Assignment is another thing that must be observed. Assignment of project types is an option to be completed in groups and discussions related to project results are also carried out.

The "complete package" has been presented in the Team-Based Project model that can maximize interaction between students during online lectures. This learning model provides free space for students to determine their collaborative learning and requires students to be able to offer various ideas in working on projects based on the knowledge possessed by these students. Therefore, the ability to work in teams, consisting of communication skills, leadership skills, collaboration skills, and relationships between students, can be trained in learning carried out in teams.

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References

[1] Bahasoan AN. Wulan Ayuandiani, Muhammad Mukhram, and Aswar Rahmat, "Effectiveness of online learning in pandemic Covid-19.," *International Journal of Science*. Technology & Management. 2020;1(2):100–6.

[2] Almarashdi H, Jarrah AM. Mathematics distance learning amid the COVID-19 Pandemic in the UAE: high school students' perspectives. International Journal of

Learning, Teaching and Educational Research. 2021;20(1):292–307.

[3] Ladyanna S. “Problems and challenges of online lectures in indonesia during the pandemic COVID-19.,” Presented at the (2021). https://doi.org/10.2991/assehr.k.210202.016.

[4] A. Widodo and N. Nursaptini, “Problematika pembelajaran daring dalam perspektif mahasiswa.,” *ELSE (Elementary School Education Journal) : Jurnal Pendidikan dan Pembelajaran Sekolah Dasar*. vol. 4, no. 2, p. 100, 2020. https://doi.org/10.30651/else.v4i2.5340.

[5] Tekad T, Pebriana R. “Pengaruh model pembelajaran team-based project terhadap keterampilan komunikasi dan keterampilan kolaborasi pada mata kuliah Bahasa Indonesia.,” *Jurnal PTK dan Pendidikan*. vol. 7, no. 2, p. 2022. https://doi.org/10.18592/ptk.v7i2.5445.

[6] I. Chan, Y.-Y. Lau, W. Sze, and W. Lee, *Adoption of Knowledge Creation Model in Team-based Project to Support Student Engagement.*, 2020.

[7] Rahmawati R, Lestari F, Umam R. Analysis of the effectiveness of learning in the use of learning modules against student learning outcomes. Desimal: Jurnal Matematika. 2019;2(3):233–40.

[8] Mulyadi R. Syahrul, Atmazaki, and Agustina, “The Development of e-modules based on adobe flash for indonesian subjects at IAIN Bukittinggi.,” In: *Journal of Physics: Conference Series*. pp. 012002 (2020).

[9] Laugerman MR, Saunders KP. Supporting student learning through instructional videos in business statistics. Decis Sci J Innovative Educ. 2019;17(4):387–404.

[10] Luna-Lucero M, O’Donnell Oppenzato C, Uscianowski C, Almeda MV, Ginsburg HP. Ma.V. Almeda, and H.P. Ginsburg, “‘Magic math minute’ videos to foster understanding of early mathematics learning,”. Int J Des Learn. 2020;11(3):47–66.

[11] Suchyadi Y, Karmila N. The application of assignment learning group methods through micro scale practicum to improve elementary school teacher study program college students’ skills and interests in following science study courses [Journal of Humanities and Social Studies]. JHSS. 2019;3(2):95–8.

[12] Kooloos JG, Klaassen T, Vereijken M, Van Kuppeveld S, Bolhuis S, Vorstenbosch M. Collaborative group work: effects of group size and assignment structure on learning gain, student satisfaction and perceived participation. Med Teach. 2011;33(12):983–8.

[13] Ngereja B, Hussein B, Andersen B. Does Project-Based Learning (PBL) promote student learning? a performance evaluation. Educ Sci (Basel). 2020;10(11):1–15.

[14] Shin MH. Effects of project-based learning on students’ motivation and self-efficacy. Engl Teach. 2018;73(1):95–114.

[15] M.M. Grant, “Learning, beliefs, and products: Students’ perspectives with project-based learning,.” *Interdisciplinary Journal of Problem-Based Learning*. vol. 5, no. 2, p. 2011. https://doi.org/10.7771/1541-5015.1254.

[16] Lee HJ, Lim C. Peer Evaluation in blended team project-based learning: what do students find important? J Educ Technol Soc. 2012;15(4):214–24.

[17] Hartini S, Dewantara D, Mahtari S. Pengembangan alat peraga fisika energi melalui perkuliahan berbasis project based learning. Vidya Karya. 2018;33(1):42.

[18] Umam HI, Jiddiyyah SH. Pengaruh pembelajaran berbasis proyek terhadap keterampilan berpikir kreatif ilmiah sebagai salah satu keterampilan abad 21. Jurnal Basicedu. 2020;5(1):350–6.