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1 Analysis of student's expectation on science virtual class models during the covid-19 pandemic era in science education study program

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Abstract. The period of the COVID-19 pandemic has forced all activities in educational institutions to maintain distance and all material delivery through unusual media and methods. To get around this unfavourable situation, online methods are one of the most effective options to overcome it. This research aims to analyse the most expected virtual class model on science learning based on student's perspective. This research is a case study conducted through a survey method using an online questionnaire using google form. The subjects of this research were all students of basic science courses in the Science Education Study Program Faculty of Mathematics and Natural Sciences Universitas Negeri Semarang on odd semester of 2020. The results of this research indicate that the types of virtual classes implemented in basic science courses consist of LMS, LCMS, SLNs, combination of LMS-SLNs and LCMS-SLNs. The virtual classroom model implemented in science learning is in accordance with the objectives that include connectivity, flexibility, interaction, collaboration, development opportunities and motivation. The most expected virtual classroom model in science learning during the Covid-19 pandemic based on student perspectives is a combination of LMS-SLNs of 66.23%, LMS of 23.38%, LCMS-SLNs of 6.49%, and LCMS of 3.90%. The conclusion of this research indicates that the combination Virtual Class model of LMS (Learning Management System) and SLNs (Social Learning Networks) is the most expected according to student perspectives.

1. Introduction

The period of the Covid-19 pandemic forced all activities in educational institutions to maintain distance and all material delivery through media and unusual methods. To get around this unfavorable situation, online methods of learning or e-learning are an alternative solution that is expected to be the most effective. The use of technology in learning today cannot be avoided. Online learning utilizing ICT technology can be utilized to expand the reach of learning, increase learning speed, and increase learning efficiency [1]. This learning environment which accommodates the role of information technology to support the learning process is called e-learning [2,3].

Apart from e-learning, several terms are also used to define the teaching and learning model, namely online learning, virtual learning, and network or web-based learning [4]. In its implementation, online learning needs to be supported by software as a virtual classroom model which can be in the form of Learning Management Systems (LMS), Learning Content Management Systems (LCMS), Social Learning Networks (SLNs).

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LMS is an application that is used to manage learning, deliver content (content delivery system), and track online activities such as ensuring attendance in virtual classes, ensuring assignment submission time, and tracking student achievement results [5,6]. LCMS is an application that is used by content owners to register, store, combine (assembly), manage, and publish learning content for delivery the web, print, or CD. In more detail, LCMS is an application for managing learning content [7]. Social Learning Network (SLN) is a type of social network among students, instructors, and modules of learning. It consists of the dynamics of learning behavior over a variety of graphs representing the relationships among the people and processes involved in learning [8]. Several social media that very familiar among students and lecturers that are WhatsApp, Facebook, Instagram, and Twitter.

The main difference between LMS and LCMS is that LMS is a virtual classroom model equipped with interaction media between students and teachers, while LCMS is a virtual classroom model equipped with media used by content writers and content publishing companies [9]. LMS and LCMS are software that have been widely used and proven reliable in the application of e-learning systems. However, this virtual class model also has several weaknesses. One of the weaknesses is that most of these systems pay less attention to adaptability, flexibility, and social relationships [10].

Even in some cases, the collaboration features and social relationship analysis features are disabled which makes the system manager unable to know what the community is working on. The concepts of social relations and social care have begun to be applied and have a meaningful influence on collaboration and learning [11,12]. Therefore, it is necessary to combine various virtual classroom models that are appropriate in a more comprehensive science learning process. This research aims to analyze the most expected virtual classroom model among LMS, LCMS and SLNs or their combination in science learning during the Covid-19 pandemic based on the perspective of students.

2. Methods

The case study research was conducted through the Cross-sectional Survey method [13]. In this research, data was only collected for a certain time to describe the condition of the sample or population. The stages of this survey research include: (1) determining the research problem; (2) create a survey design; (3) developing survey instruments; (4) determine the sample; (5) collecting data; (6) checking data (editing); (7) data analysis; (8) data interpretation; and (9) make conclusions and recommendations.

The sample was determined using purposive method, by determining specific characteristics in accordance with the research objectives so that it can answer research problems. The subjects or samples of this research are 77 students that is all the attendance of basic science courses in the Science Education Study Program Universitas Negeri Semarang Central Java Indonesia on the odd semester of 2020.

The research instrument was a questionnaire delivered using the google form application consisting of 15 questions have been develop according to the previous research [14] that focused on gathering information about (1) the type of virtual class model for science lectures, (2) The purpose of the virtual class model for science lectures, (3) the types of virtual class model for science lectures. Furthermore, data checking is carried out which includes: (1) sorting the feasibility of data for processing or dropping, for example for incomplete answers; (2) numbering the questionnaire as a control; (3) checking the completeness of the answers; and (4) checking the consistency between answers and their relevance. Student responses to the questionnaire used a score of criteria in 4 scales, namely disagree (score 1), fairly agree (score 2), agree (score 3), and strongly agree (score 4). The results of the questionnaire response scores were analyzed by calculating the average answer based on the score of each answer from the respondents which was calculated using the formula:

$$P = \frac{n}{N} \times 100\%$$

Where: P is percentage of responses, n is total score obtained and N is total criteria score

3. Results and discussion

The case study research was conducted through the Cross-sectional Survey method. Based on the results of the questionnaire responses about the types of virtual classroom models for science lectures, it can be presented in Figure 1.

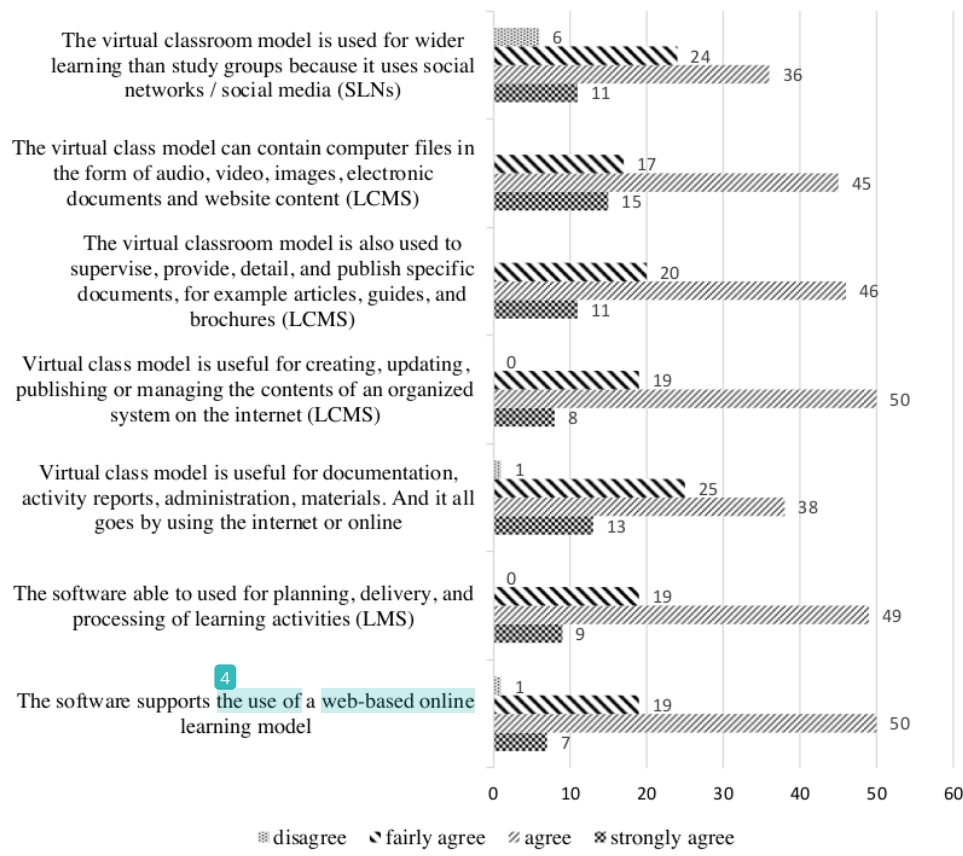


Figure 1. Types of virtual class models that are carried out in basic science lectures.

The types of virtual classes implemented in basic science courses consist of LMS, LCMS, SLNs or a combination of LMS-SLNs and/ or LCMS-SLNs. The existence of this type of virtual classroom has been used as an effort to complement learning to enrich the material [15-17] during the Covid-19 pandemic. A combination of various technology-based learning media and activities can be creating more optimal learning during the Covid-19 pandemic.

Elena based on Moodle web as LMS applied during online learning, content delivery (content delivery system), and tracking online activities such as ensuring attendance in virtual classes, ensuring assignment collection time, and tracking the results of student learning outcomes achievement. LCMS can not only create, manage, and provide learning modules, but also manage and edit all the parts that make up a catalog. Social Learning Networks (SLNs), which aim to encourage users to communicate with each other by exchanging information, comments, messages, pictures, and audio-video so that they have new experiences in learning using social networks that are equipped with concepts social care [18,19].

The results of the responses related to the feasibility of the purpose of the virtual class model for science lectures are presented in Figure 2.

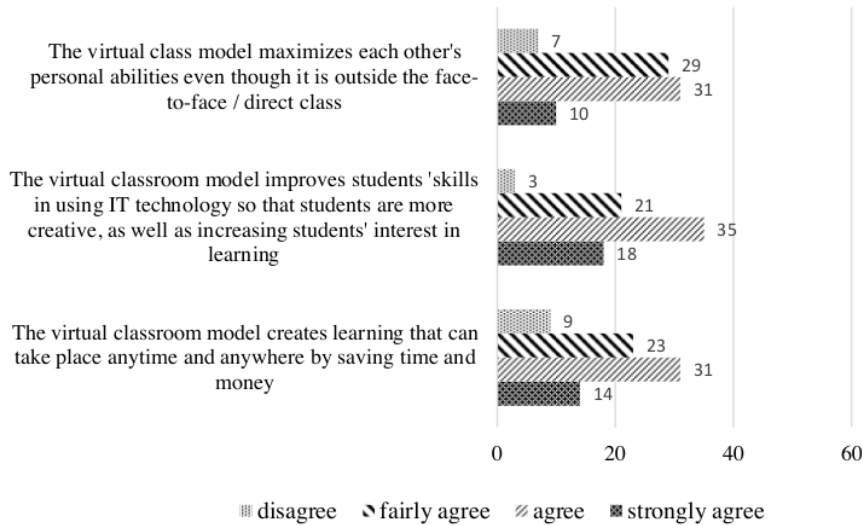


Figure 2. The purpose of the virtual class model for science lectures.

The virtual classroom model is in accordance with the objectives, namely (1) connectivity, namely access to a variety of information 'available' on a global scale, (2) flexibility, namely learning can be carried out anywhere and at any time, (3) interaction, namely learning evaluation can be carried out immediately and independently, (4) collaboration, namely the use of discussion tools to support collaborative learning outside the classroom, (5) development opportunities, namely digital content can be continuously developed so that it can enrich learning in conventional classrooms, and (6) motivation, namely multimedia can make learning more interesting. The carrying capacity of Information Technology (IT) is the ease of obtaining various learning resources [20]. One such learning resource is a video or animation that explains certain science concepts that are being or will be studied. With the help of this media, students get a more real, empirical, and comprehensive illustration or picture that can increase their interest in learning during pandemic of Covid-19.

The use of virtual classrooms provides opportunities to obtain additional or enrichment material that will complement conventional learning [21]. Virtual classes can encourage students to be more active and creative in finding, reading, and understanding material from various digital learning sources, in addition to concluding, creating, and sharing both the knowledge [22] that has been obtained and the work that has been made with their friends and then discuss and cooperate in virtual groups.

The research results related to the virtual class model based on student's perspective are presented in Figure 3. The types of virtual classes implemented in basic science courses consist of LMS, LCMS, SLNs or a combination of LMS-SLNs and/ or LCMS-SLNs. LMS and LCMS are software that have been widely used and proven reliable in the application of e-learning systems. However, this system also has several weaknesses, pay less attention to adaptability, flexibility and social relationships. Even in some cases, the collaboration features and social relationship analysis features are disabled which makes the system manager unable to know what the community is working on. The concepts of social relations and social care be expected by students to be applied in virtual/ online class of science learning, because have a meaningful influence on collaboration and learning [23,24]. By adapting this concept in technology, students able to collaborate, improve their cognitive abilities and social skills during

attending science virtual class. The results of this research indicate that the most expected virtual class model is the combination of LMS-SLNs of 66.23%, LMS of 23.38%, LCMS-SLNs of 6.49%, and LCMS of 3.90%.

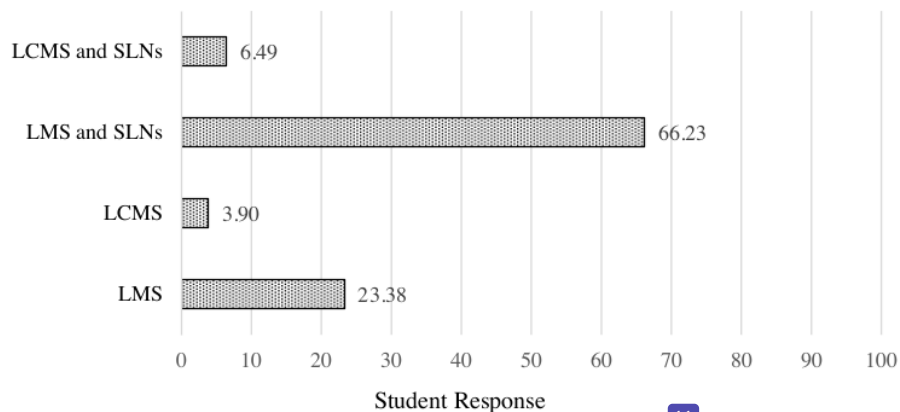


Figure 3. The virtual classroom model that is most expected in science learning during the Covid-19 pandemic is based on student perspectives.

Social Learning Networks (SLNs) for students provide new experiences in learning using social networks and have the concept of social care, although virtually contain social interactions and interpersonal relationships. The combination of the LMS-SLNs virtual classroom model allows students to communicate with others by exchanging information, comments, messages, pictures, and audio-video while studying during the Covid-19 pandemic. Although learning cannot be face to face, it can still carry out interaction, communication, and collaboration. The learning and socialization mechanism through the LMS-SLNs virtual classroom model is more expected in online learning so that it can increase interpersonal relationships and facilitate science learning and allow non-verbal communication through media such as audio-video and images using Elena's LMS and several social media platforms such as WhatsApp, Facebook, Instagram, and Twitter.

4. Conclusion

The types of virtual classes implemented in basic science courses consist of LMS, LCMS, SLNs, combination of LMS-SLNs and LCMS-SLNs. The virtual classroom model implemented in science learning is in accordance with the objectives that include connectivity, flexibility, interaction, collaboration, development opportunities and motivation. The most expected virtual classroom model in science learning during the Covid-19 pandemic based on student perspectives is a combination of LMS-SLNs of 66.23%, LMS of 23.38%, LCMS-SLNs of 6.49%, and LCMS of 3.90%.

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