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Evaluation of Learning in Civil Engineering Study Program Groups in the Field of Science and Environment in the 21st Century Learning System

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ABSTRACT

This article aims to evaluate group learning in the field of Civil Engineering and environmental science in the 21st-century learning system. The 21st-century learning system is designed for the 21st-century generation to keep up with the latest technological developments. Survey and mapping learning systems in pandemic conditions have adopted and implemented 21st-century learning systems, but detailed and precise information has not been studied. The research method used is the descriptive quantitative method. The participants of this study are Civil Engineering students. The pretest and posttest questions were used to collect data related to the comprehension test by giving a test via the google form link. The results showed an increase in understanding of the 21st-century learning system. The value of Civil Engineering students' knowledge about the 21st-century learning system increased. This illustrates that delivering material about the 21st-century learning system is quite successful. Thus, there is a need for advanced research on 21st-century learning related to personnel, equipment, and funding.

Keywords: *21st-century learning, literacy skills, technological progress*

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INTRODUCTION

Education is a necessity that all humans around the world need. Education in Indonesia has advantages compared to other developed countries, with the basic education of Pancasila and the 1945 Constitution rooted in the nation's culture by prioritising characters that are indispensable in facing the challenges of the 21st Century (Teo, 2019; Ayala, 2021). 21st Century Learning is learning that integrates literacy skills, knowledge skills, skills and attitudes, and mastery of technology (Aldowah et al., 2019). The 21st-century learning system is designed for the 21st-century generation to keep up with the latest technological developments (Rustad et al., 2022). 21st-century learning is associated with the development of revolution 4.0, which can broadly influence character formation and moral habituation (Chairunnisa, 2020; Ifenthaler et al., 2018). The rapid changes in the 21st century require students to master theoretical knowledge, higher-order thinking, and communicative or debating skills (Pappas, 2019). Problem-based learning can be a good

alternative to improving 21st-century skills (Qian & Clark, 2016; Shenasa, 2018). The 21st-century learning system has four learning characteristics (Chairunnisa, 2020), namely: (i) collaboration, (ii) communication, (iii) critical thinking and problem solving, and (iv) creativity and innovation, as shown in Figure 1.

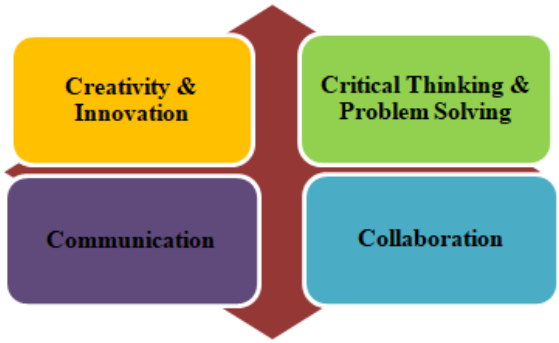

Figure 1. Characteristics of 21st-Century Learning

The survey and mapping learning system in pandemic conditions has adopted a 21st-century learning system, but detailed and precise information has not been studied. The study that needs to be done covers the components of the 21st-century learning system, which includes learning capacity, namely personnel, equipment and funding. The components of the 21st-century learning system have several levels for each component. There are 27 levels for each component. Levels with indicators that meet six components are at six levels. If six levels of 27 levels in 6 components are met, the learning system has fulfilled 100% of the 21st-century learning system. The CE 201 Study of Soil Surveying in the even semester of 2020-2021 has been carried out. Still, some gaps and deviations related to the 21st-century learning system have not been understood by teaching staff, assistants and students. Most of the equipment owned by lecturers, assistants and students still do not meet the minimum technical specifications. The COVID-19 pandemic condition also has funding obstacles to the learning system. Universities experienced a significant reduction in funding from the government and UKT annual tuition fees from students at the respective universities. Most assistants and students still do not meet the minimum technical specifications. The COVID-19 pandemic condition also has funding obstacles to the learning system. Universities experienced a significant reduction in funding from the government and UKT annual tuition fees from students at the respective universities. Most assistants and students still do not meet the minimum technical specifications. The COVID-19 pandemic condition also has funding obstacles to the learning system. Universities experienced a significant reduction in funding from the government and UKT annual tuition fees from students at the respective universities.

The skills needed in the 21st Century are Higher Order Thinking Skills that are indispensable in preparing students to face global challenges (Ifenthaler et al., 2018; Taar and Palojoki, 2022). The 21st-century learning system is a learning transition where the currently developed curriculum requires schools to change from a teacher-centred learning approach to a student-centred learning approach (Lavi et al., 2021). This is to the demands of the future world where students must have the skills to think and learn. These skills include problem-solving, critical thinking, collaboration, and communication (Rustad et al., 2022). All of these skills can be possessed by students if educators can develop lesson plans that contain

activities that challenge students to think critically in solving problems. Activities that encourage students to work together and communicate must appear in every lesson plan they make (Lavi et al., 2021). The 21st-century learning strategy emphasises the ability of students to think critically, connect knowledge with the real world, master information communication technology and collaborate. These skills can be achieved by applying appropriate learning methods in terms of mastery of materials and skills. In the millennial era, contextual learning is needed, where knowledge material is related to the real world and can be applied in everyday life.

RESEARCH METHOD

This study aims to evaluate the learning of Civil Engineering in the field of Civil Engineering and environmental science in the 21st-century learning system. The research method used is the descriptive quantitative method. The participants of this study are Civil Engineering students. The pretest and posttest questions are used to collect data related to understanding testing by providing a test via the Google form link. The instrument used in this study is an understanding test instrument about the basics of the 21st-century learning system. Before being given material about the 21st-century learning system, students were given pretest questions via the google form link that had been distributed. Then the material is given through a PowerPoint presentation of an understanding of the 21st-century learning system. After being given the material, students were given post-test questions via the google form link provided with the same form and number of questions.

RESULTS AND DISCUSSION

The results of research that have been carried out through data collection distributed through the Google Form link to measure the understanding of Civil Engineering students towards the 21st-century learning system. Twenty multiple-choice questions are given, covering the understanding of the 21st-century learning system. The presentation of the results of the pretest and posttest calculations that have been carried out and the table of material indicators that have been carried out is shown in Figure 2. Figure 2 explains that there are differences in the Pretest and PostTest scores. There is an increasing understanding of the 21st-century learning system. The value of Civil Engineering students' knowledge about the 21st-century learning system increased from a percentage value of 65% (medium) to 70% (high).

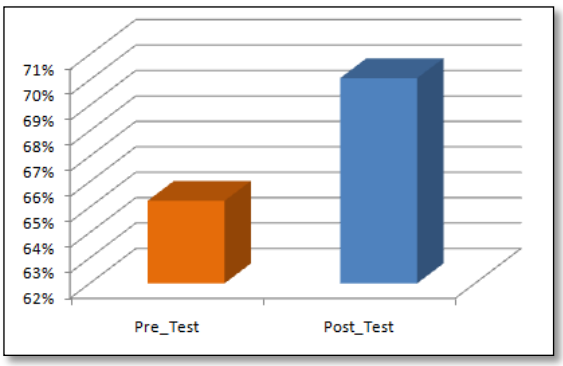

Figure 2. Results of Pretest and PostTest scores

Understanding Level

The level of understanding of Civil Engineering students towards the 21st-century learning system is depicted in Figure 3. Figure 3

illustrates the different levels of understanding of Civil Engineering students about the 21st-century learning system. On average, the pretest score of Civil Engineering students' understanding of the 21st-century learning system is quite familiar, with a percentage of 30%. After being given material about the 21st-century learning system and holding a posttest, the student's level of understanding increased by an average of 59%. This illustrates that delivering material about the 21st-century learning system is quite successful. Data on increasing understanding of the 21st-century learning system is used to determine students' understanding of the 21st-century learning system after being given treatment.

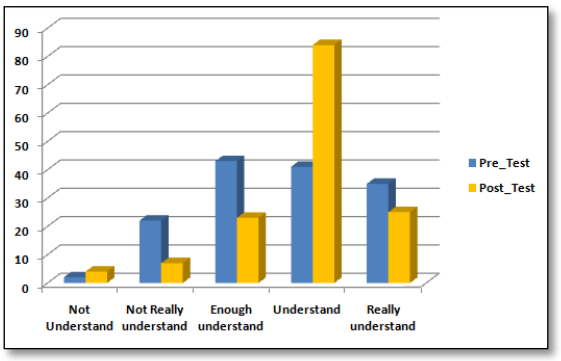

Figure 3. Students' Level of Understanding of 21st-Century Learning Systems

The average value of understanding of Civil Engineering students KBK Science and the environment on the 21st-century learning system can be seen in table 1.

Table 1. Interpreting Understanding Categories of Civil Engineering Students KBK Science and Environment Against 21st Century Learning Systems.

N	PreTest	PostTest	Gain	NGain	Category
143	0.65	0.70	0.05	0.00049	Low

Comparison of Pretest and Posttest Results by Using Paired Sample T-Test

The descriptive value of each variable in the paired sample is described in table 2. Pre Test has an average value (mean) of 13.04 from 143 data. The distribution of data (Std. Deviation) obtained is 3.938 with a standard error of 0.328. Post Test has an average value (mean) of 13.97 from 143 data. The distribution of data (Std. Deviation) obtained is 3,382 with a standard error of 0.282. This shows that the Post Test on the data is lower than the Pre Test. However, the Post Test data distribution range is also getting smaller, with a smaller standard error.

Table 2. Paired Samples Statistics

		mean	N	Std. Deviation	Std. Error Mean
Pairs 1	Pre_Test	13.04	143	3.938	.328
	Post_Test	13.97	143	3.382	.282

Table 3, Paired Samples Correlations, describes the correlation values that show the relationship between the two variables in the paired sample. This is obtained from the bivariate Pearson correlation coefficient (with a two-tailed significance test) for each pair of variables included.

Table 3. Paired Samples Correlations

		N	Correlation	Sig.
Pairs 1	Pre_Test&Post_Test	143	.306	.000

Table 4. The paired Samples Test is the main output table showing the results of the tests.

This can be seen from the significance value (2-tailed) in the table. The significance value (2-tailed) was 0.011 ($p < 0.05$). So the pre-test and post-test results experienced a significant (meaningful) change. Based on descriptive statistics, the pre-test and post-test scores proved higher post-test scores.

Table 4. Paired Samples Test

		t	df	Sig. (2-tailed)
Pairs 1	Pre_Test - Post_Test	-2.575	143	.011

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the analysis results, there is an increase in understanding of the 21st-century learning system. The value of Civil Engineering students' knowledge about the 21st-century learning system increases. On average, the pretest score of Civil Engineering students' understanding of the 21st-century learning system is quite understandable. After being given material about the 21st century learning system and holding a posttest, the student's level of understanding increased on average to understand. This illustrates that delivering material about the 21st century learning system is quite successful. Data on increasing understanding of the 21st century learning system is used to determine students' understanding of the 21st century learning system after being given treatment.

Recommendations

The value of Civil Engineering students' knowledge about the 21st century learning system increased. This illustrates that delivering material about the 21st century learning system is quite successful. Thus, there is a need for advanced research on 21st-century learning related to personnel, equipment and funding.

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