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Interpretation of Student Data in Web-based 21st Century Learning in Junior High School

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Abstract

Background of Study: Education is an important component in sustaining a nation or state. Preparing superior human resources is one of the country's ideals, including Indonesia, especially with the development of the current era of the Industrial Revolution 4.0 in the 21st century. Education, especially learning, is a fundamental thing that must be strengthened to achieve the desired goals.
Aims and Scope of Paper: This study aims to see the extent of student data interpretation related to web-based online learning (web-learning). The prepared data includes students in State Junior High Schools in Garut from grade 7 to grade 9.
Methods: The sample in this data is as many as 500 students from various junior high school classes. The results collected by the researcher are data obtained from several questionnaire questions related to online learning (web learning).
Result: The findings from the data taken show that approximately of students agree or even strongly agree with online learning. The response of students to learning using web-learning was very positive, with around 52.80% stating that they strongly agreed and agreed. Web learning can increase students towards improving their learning, as shown by the survey results, which is 55.4% of students who answered yes and strongly agree. The response of students to teachers who use web learning is very good, which can be seen from the results of survey number 15 around 61.4%.
Conclusion: In conclusion, web-based online learning receives positive responses from students and supports the learning process. The use of web learning helps students adapt to technology-based learning and supports competence development in the 21st century.

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INTRODUCTION

The growth and development of technology in the current era have had a significant impact on the components of a country, including the education component. Technology is very important in the learning process so that learning is more effective, efficient, and interesting and gives meaning to students. Along with the advancement of information technology, which has shown a positive impact, one of which is in the field of education, educational units should begin to integrate and introduce information technology into learning (Njenga et al., 2018; Darmawan, 2019). In today's digital era, there are a lot of digital-based learning media, the researcher will research, namely online-based learning (*E-learning*). Online learning was more popular in 2019 when the whole world was shaken by *Covid-19*. Now, along with the advancement of technology, online learning has become one of the alternatives in improving student competence, because the learning that is taking place now is student-centered. This is in line with the mandate of the independent curriculum that teachers and educational units must implement student-centered learning to achieve 21st-century skills (Pertiwi et al., 2022; Kemendikbud Ristek, 2024).

Web-based *online* learning in the context of education in the 21st century is relevant and important because of the presence of the demands of the digital era that require learning to facilitate the skills needed in the 21st century. The integration of digital technology (LMS) such as online learning is an appropriate approach to be implemented at the secondary school level in 21st century learning (Azhar et al., 2024; Suryanti & Utari, 2025). Online learning is linked to the fulfillment of students' 21st-century skills (Kaya et al., 202; Wandri & Jalinus, 2022). This type of learning provides greater flexibility and accessibility for students so that the learning that takes place is not limited by space and time.

The familiarity of using *online* learning is an interesting phenomenon to study, especially at the junior high school education level which still needs further research because in the field there are unique challenges in the process of its implementation. Students' basic skills as part of their characteristics need to be identified so that teachers can establish appropriate learning programs (Estari, 2020). Students at this level are at a critical stage of cognitive and social-emotional development. Critical and creative thinking skills are essential for elementary and junior high school students as part of 21st-century skills . With these conditions, the role of teachers in directing direct interaction and providing guidance is still very much needed. Therefore, this study aims to utilize the interpretation of student data at the junior high school level in the context of *online learning* to measure user readiness, effectiveness, impact, and potential that can be used for the development of this online learning method.

Through efforts to understand how students at the junior high school level interact, learn, and develop in an online learning environment, teachers can design more effective learning strategies so that the potential of online learning can be maximized and the challenges that arise experienced by students during the implementation process can be overcome. Needs analysis is a step that teachers must take before designing and establishing learning programs (Nasrulloh et al., 2023). By conducting an in-depth analysis of the data obtained from students, the research we conducted is expected to provide knowledge for teachers who are directly involved with students in the learning process, curriculum developers, and education policy makers in intensifying the use of web technology for learning. This research produces a foundation that can be used for the development of an online learning model that is more adaptive and responsive to the needs of students and resources at the junior high school level in the context of 21st century learning.

In this study, the researcher tried to collect data with the aim of (1) how students respond to learning using web-learning, (2) how students respond to increasing creativity in learning with web learning, (3) how students respond to teachers in learning if using web learning media.

METHOD

The research I conducted used a research design with a survey and the method used was quantitative descriptive. According to (Sugiyono, 2020) "a research survey is a study conducted on large or small populations, but the data studied is data from samples taken from the population, so that an event or relationship between variables will be found". The research methods are a scientific way to obtain data with certain uses and purposes, according to him this research method must be rational, empirical and systematic. In this study, the subjects studied were students at Junior High Schools in Garut. The method used in this study is a descriptive research method through a quantitative approach. According to (Sugiyono, 2020), the quantitative descriptive research method aims to describe a phenomenon, event, symptom and occurrence that occurs in a factual, systematic and accurate manner. Phenomena can be in the form of forms, activities, relationships, characteristics, as well as similarities and differences between phenomena.

Samples were taken with the Slovin formula, namely:

n	= $N/(1+N\alpha^2)$
N	= Total Population
n	= Number of samples
Alpha (α)	= 10%

Descriptive statistics provide a description of a data seen from the number of samples (n) minimum, maximum, sum, mean, standard deviation and variance. The formula for processing data is based on the number of samples. With the formula:

$$P = \frac{f}{N} x100\%$$

Where:
P = Percentage
f = Frequency Respondent
N = Number of data/sample

The material in this study is data collected through a survey of students in the Junior High School (Malangbong, Kersamanah, Limbangan and Selaawi). The method used in this study is a descriptive survey method with an efficient approach in collecting data interpreted from population samples.

Population

Population is a generalization area consisting of objects/subjects that have certain qualities and characteristics that are determined by the researcher to be studied and then draw conclusions. The population in this study is all students at Junior High Schoolin the 2023/2024 school year.

Sample

The sample taken is a random sample of the population studied and ensures the representativeness of each class. Researchers used an online questionnaire with *a Google form* to collect data for this survey. Researchers use online questionnaires because, in addition to being cost-effective, they also collect information or data faster and easier in the process of collecting and tabulation data. In the first stage, the researcher conducted a test on several teacher friends (excluding the research sample) to ensure that there were no problems in the use of online questionnaires. The second is Verification and Validation, which is crosschecking population data directly to the operators of their respective schools in the Garut area. Third, the researcher matched teacher data received from school operators with data entered through online questionnaires. Respondents in this study were given time to fill out the questionnaire for 3 days from March 25, 2024, to March 27, 2024, and the researcher will take the data for analysis.

RESULTS AND DISCUSSION

The data we took was survey data for students at Junior High School. A total of 500 participants or respondents consisting of 192 (38.4%) males and 308 (61.6%) females (Figure 1), spread across 14 public schools (Figure 2) and different classes (Figure 3).

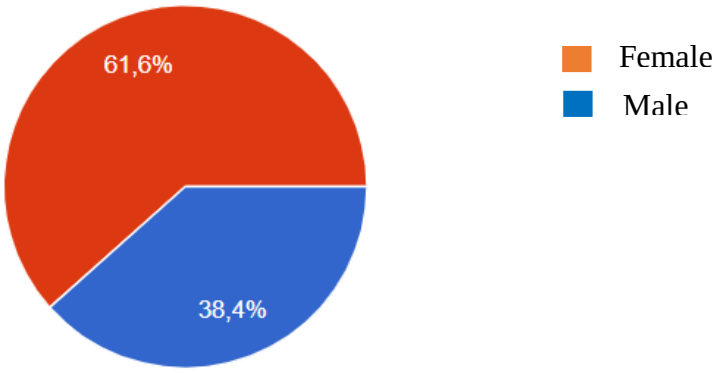


Figure 1. Percentage of Respondents' Gender

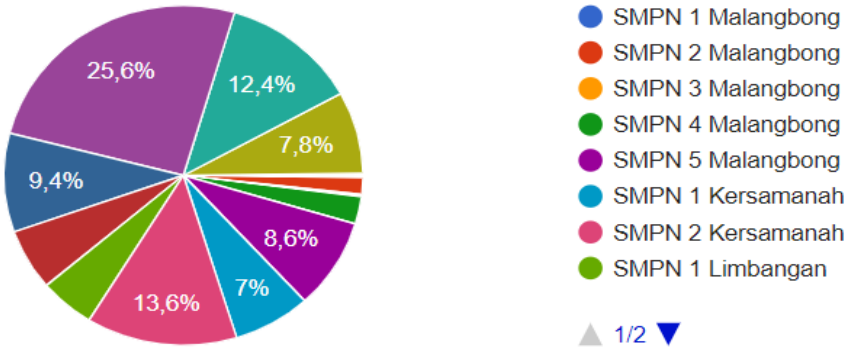


Figure 2. Percentage of Students per School

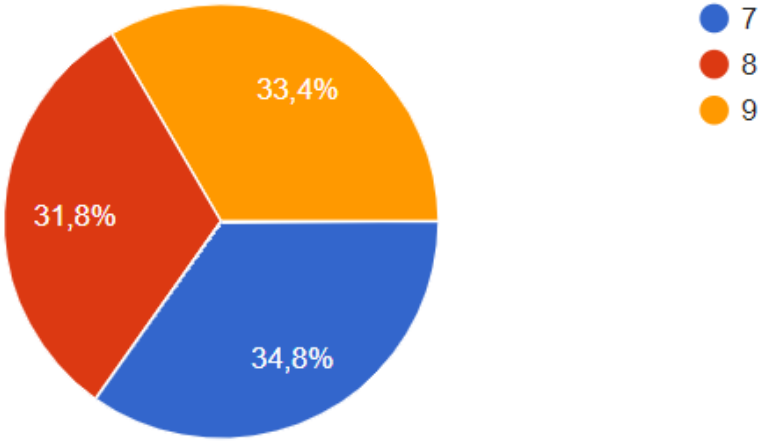


Figure 3. Percentage of Students per Class

The initial data we collected was how long respondents used the internet by giving 5 choices, namely (1) 1 year, (2) 2 years, (3) 3 years, (4) 4 years, and (5) more than 5 years. From the data collected, there are 126 respondents or 25.3% who have used the internet for more than 5 years (Figure 4). This data is in line with the survey statement "Do you agree that ICT can increase creativity in Learning?". A total of 325 respondents or 65% agreed and strongly agreed with the statement. This means that it can be concluded that the students in Garut sub-district are using the internet for a longer time, so they agree with the increase in ICT skills in improving learning (Graph 1). The internet usage survey aims to reveal students' experiences using the internet. Students' basic internet skills are an important aspect that needs to be considered in order to support online learning (Dabbagh & Ritland, 2005; Nasrulloh & Ismail, 2017).

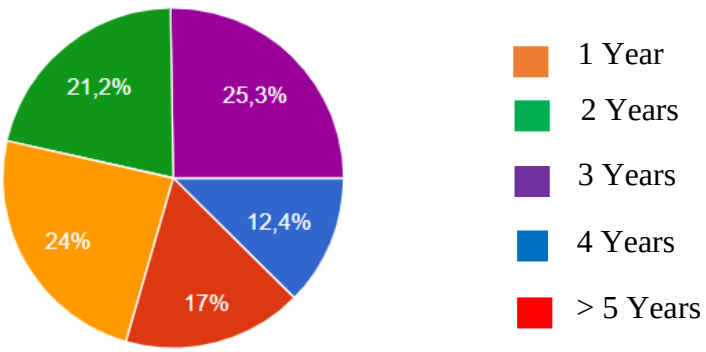
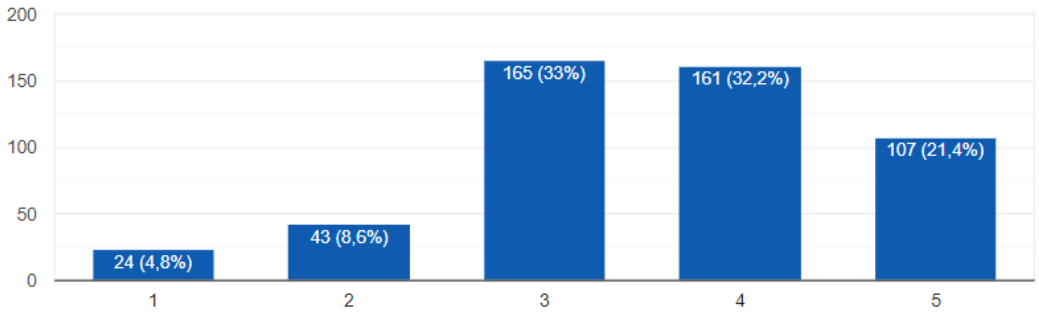
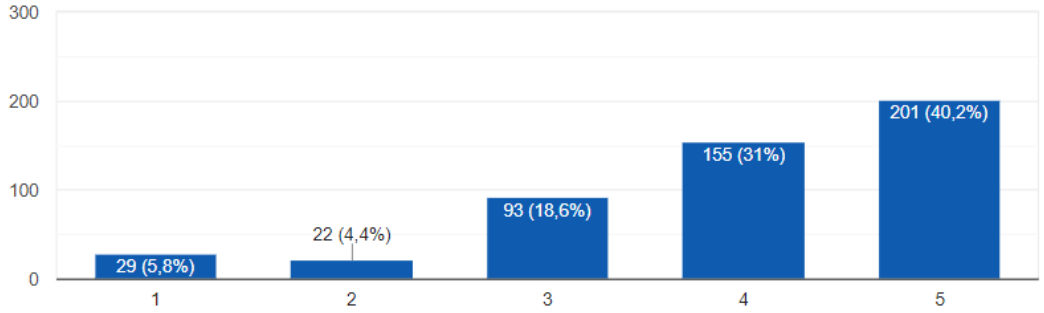


Figure 4. Percentage of respondents in using the internet



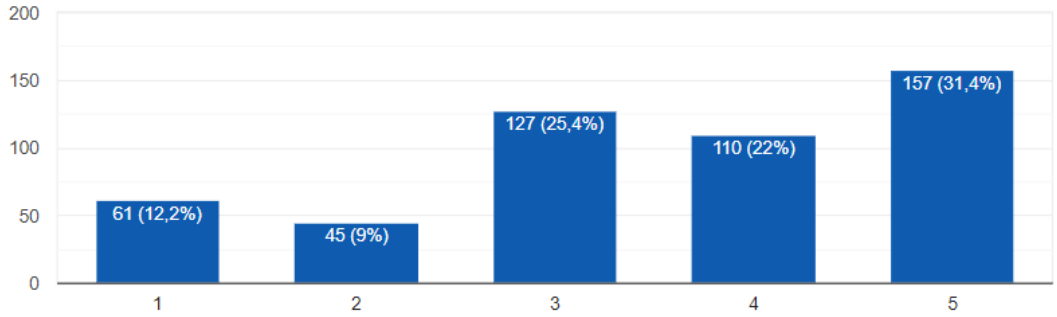
Graph 1. ICT can Improve Learning

Information and Communication Technology (ICT) is currently very important in learning in schools. From the data we collected, it turns out that the statement is linear with the results of the respondents' answers at Junior High School. As many as 155 people (31%) agreed, and even as many as 201 people (40.2%) strongly agreed with ICT-based learning (Graph 2).



Graph 2. ICT-Based Learning

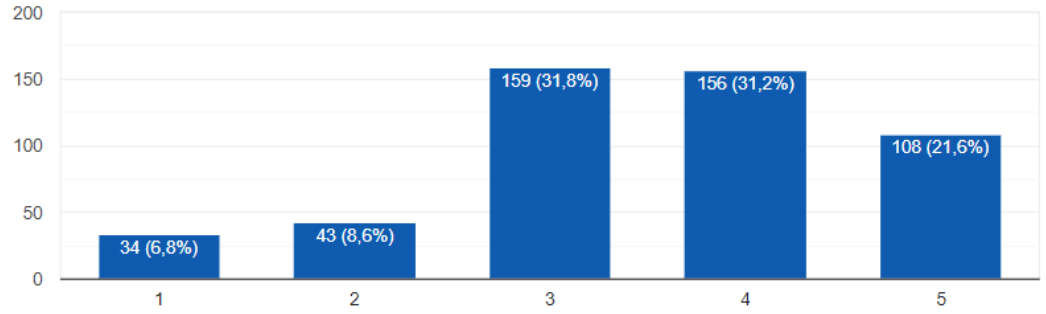
The next data we took was about online learning. The benefits of online learning can build very efficient communication and discussion between teachers and students, both students interact with each other and discuss between each other without going through the teacher. Third, it can facilitate interaction between teacher students, and parents. A survey conducted on 179 students showed that students who were satisfied with online learning could improve interaction between teachers and students (Sudarjo & Sany, 2024). The results of a study (Amin & Lestari, 2021) conducted through a survey of 128 students indicate that online learning can create a learning environment that supports interaction between students and teachers and other students. Fourth, the right means for exams and quizzes, fifth, teachers can easily provide materials to students in the form of pictures and videos, besides that students can also Downloading the teaching materials, sixth, can make it easier for teachers to make questions anywhere and anytime without time limit (p. 7). The benefits of online learning are felt by students. Based on the results of research (Suwastini et al., 2023; Ghaffar et al., 2024), online learning is a means of providing materials and enabling students to learn without time and place restrictions. From the data collected, it can be concluded that most of the respondents agree and strongly agree with the existence of online learning. We can see from the data that as many as 61 people (12.2%) strongly disagree, 45 people (9%) disagree, 127 people (25.4%) disagree, 110 people (22%) and 157 people or 31.4% strongly agree (Graph 3). This indicates that more than 50% of students at Junior High Schoolwant online learning in addition to offline learning.



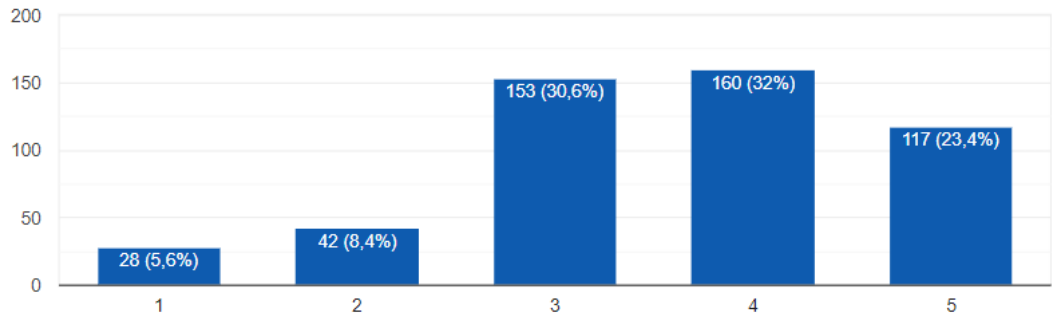
Graph 3. Online Learning

One of the ways in online learning is learning using Web-Learning. Web-Learning is an information and communication technology that is used so that students are more active in learning anytime and anywhere. With this learning, it is hoped that students can learn easily and efficiently, students can find out all learning materials easily and according to what students want, students can keep up with the development of technology that is increasingly developing, and students become active in learning activities. From the data collected, it can be concluded that students at Junior High School are more than 50% agree and strongly agree with Web-Learning (Graph 4). From the number of percentages, it can be concluded in general that the students' answers are in accordance with the concept of web-learning learning towards the learning objectives. And we can see from the students' answers that in addition to agreeing to improve learning, it can also increase their interest in learning. Online learning has an impact on students' understanding and interest in learning (Pakanda et al., 2024; Kustiyandari et al., 2023; Arlavinda & Pujiastuti, 2021).

The data collected from the survey responses was 55.4% agree and strongly agree with web-learning on learning interests (Graph 5).

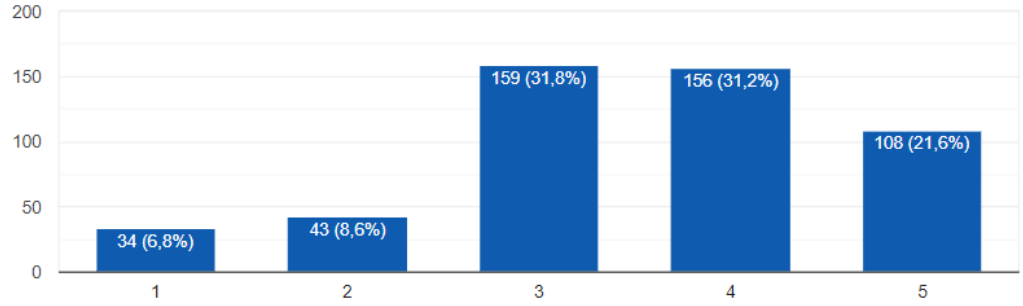


Graph 4. Online learning with Web-Learning



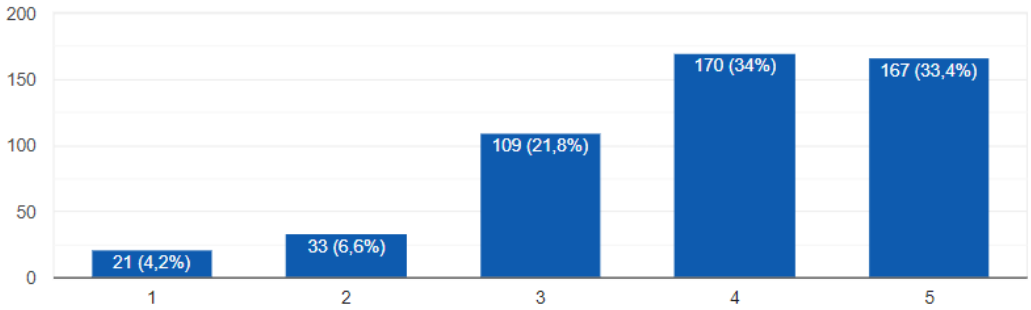
Graph 5. Web-Learnig on Learning Interest

The above conclusion can also be strengthened by the answers of 264 students (52.8%) regarding their interest in using Web-Learning in learning. Web-Learning provides one's own interest in learning (Graph 6).

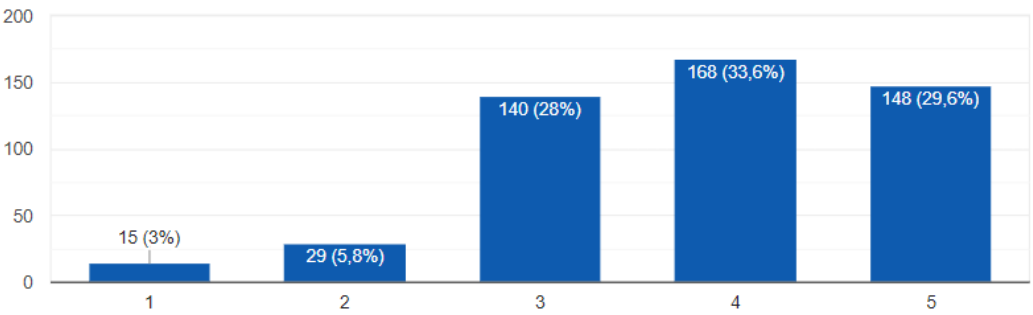


Graph 6. Students' Interest in Web-Learning

Judging from the need for ICT as a source or learning medium, students at Junior High Schoolagree and strongly agree. We can see this from the results of the existing survey, namely as many as 167 people (33.4%) strongly agree, 170 people (34%) agree, 109 people (21.8%) disagree, 33 people (6.6%) disagree and 21 people (4.2%) strongly disagree that ICT can be used as a media or learning tool (Graph 7), while in ICT as a learning resource the following results are obtained 15 people (3%) strongly disagree, 29 people (5.8%) disagreed, 140 people (28%) disapproved, 168 people (33.6%) agreed and 148 people (29.6%) strongly agreed (Graph 8). There are students who answer very disagree, disagree and disagree, because they do not know the importance of ICT in 21st century learning. The 21st century is the century of knowledge, with the spread of information and technological developments (Daryanto & Karim 2019). In the 21st century, education has become increasingly important to ensure that students have learning and innovation skills, information technology and media skills, as well as life skills to work and survive (Kollo & Nubatonis, 2025).

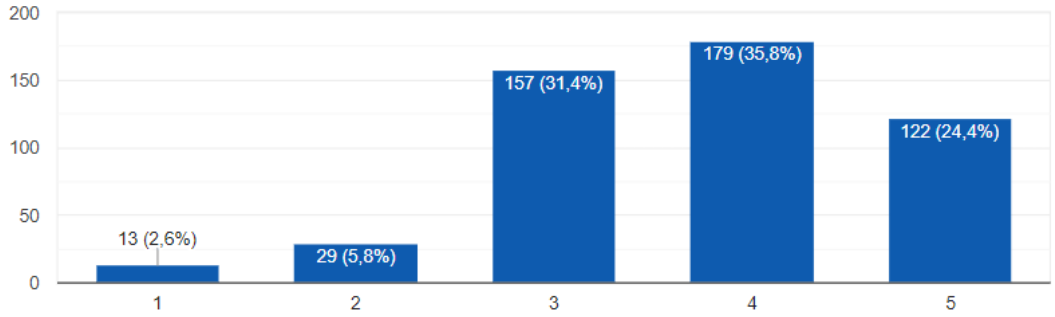


Graph 7. ICT as a Learning Media/ Tool

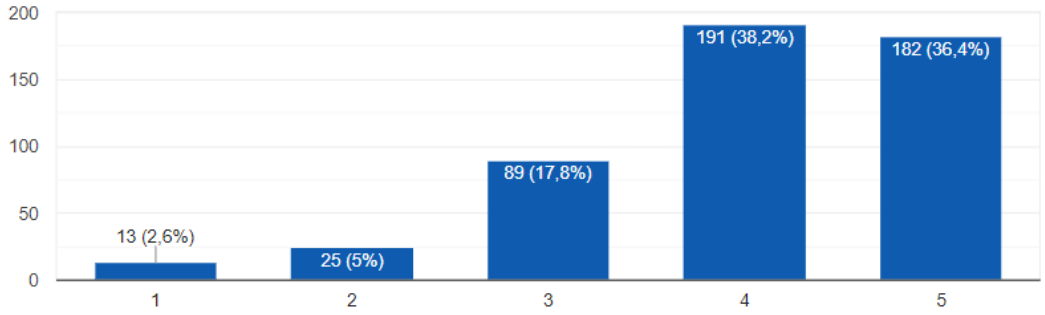


Graph 8. ICT as a Learning Resource

Based on Graph 9, there are 301 people (60.2%) who agree that Information and Technology (IT) is very important in learning. And this is also answered in Graph 10 where ICT can accelerate access to information. This is evidenced by 191 people (38.2%) agreeing and 182 people (36.4%) strongly agreeing. This is in line with the opinion of Muhammad Anas, that information will be received quickly if we master ICT.



Graph 9. It is Essential in Learning



Graph 10. ICT can Accelerate Information Access

Finally, the researcher collected data related to students' assessment of teachers as facilitators in learning using web-Learning media (Graph 11). Of the 500 students as a sample, 134 people (26.8%) strongly agreed. 173 people (34.6%) agreed, 141 people (28.2%) disapproved, 38 people (7.6%) disagreed, and 14 people (2.8%) voted strongly disagreed. From this data, it can be concluded that in general, students at Junior High Schoolagree with teachers to use Web-Learning learning, because they understand the importance of this media in 21st Century learning. Those who do not agree with this learning media, because there are several factors, namely technical obstacles and personnel constraints. Overall survey results can be seen in the following table.

Table 1. Recap of Web-Learning Survey Results at junior High School

Survey Questions	Number of respondents per category					Number of Respondents Per Category (%)				
	SS	S	KS	TS	STS	SS	S	KS	TS	STS
Do You Agree with the current Information and Communication Technology (ICT)-Based Learning?	201	155	93	22	29	40,20	31,00	18,60	4,40	5,80
Do You Agree with Online Learning?	157	110	127	45	61	31,40	22,00	25,40	9,00	12,20
Do You Agree with the existence of Web-Learning Learning?	108	156	159	43	34	21,60	31,20	31,80	8,60	6,80

Survey Questions	Number of respondents per category					Number of Respondents Per Category (%)				
	SS	S	KS	TS	STS	SS	S	KS	TS	STS
Do you agree that using Web-Learning allows your learning to improve?	93	152	176	45	34	18,60	30,40	35,20	9,00	6,80
Do you agree that web-learning using technology (ICT) will make your learning easier?	133	161	146	34	26	26,60	32,20	29,20	6,80	5,20
Are you interested in learning using Web-Learning?	127	151	144	48	30	25,40	30,20	28,80	9,60	6,00
Do you agree that learning using Web-Learning will increase interest in learning?	117	160	153	42	28	23,40	32,00	30,60	8,40	5,60
Do you agree that ICT is used as a learning medium/language?	167	170	109	33	21	33,40	34,00	21,80	6,60	4,20
Do You Agree that ICT is used as a Learning Source?	148	168	140	29	15	29,60	33,60	28,00	5,80	3,00
Do you agree learning will be fun by using Web-Learning-based ICT	120	169	141	49	21	24,00	33,80	28,20	9,80	4,20
Do You Agree that ICT can increase creativity in Learning?	144	181	118	42	15	28,80	36,20	23,60	8,40	3,00
Do you agree that learning using ICT is becoming more real?	107	161	165	43	24	21,40	32,20	33,00	8,60	4,80
Do you agree that IT is essential in learning?	122	179	157	29	13	24,40	35,80	31,40	5,80	2,60
Do you agree that ICT can speed up access to information?	182	191	89	25	13	36,40	38,20	17,80	5,00	2,60
Do you agree if teachers as facilitators in learning use Web-Learning media?	134	173	141	38	14	26,80	34,60	28,20	7,60	2,80

Based on table 1, we can average in general that students (±60%) agree and strongly agree, this illustrates that the use of web media (*Web-Learning*) can improve learning, especially in 21st Century learning. Web-based learning is an alternative to online learning where web-based learning/online learning supports learning today, namely 21st Century learning. Online learning is the right approach to improve 21st century skills (Kaya et al., 2023) (Watson & Johnson, 2011). However, in its implementation, this learning is not entirely online, but can be collaborated with learning in each school or often referred to as *blended learning*. The blended learning model as a 21st-century approach has the advantage of increasing student engagement in both conventional teaching and online learning (Dakhi et al., 2020).

From the survey data that we collected, of course, not all teachers agree with *web-based online* learning, but we can conclude that this learning can be applied in schools by paying attention to the situation of students and their respective schools, both in terms of physical, financial and infrastructure that supports the implementation of web-based online learning. Therefore,

policymakers in both schools and the government must make policies about web-based online learning.

CONCLUSION

From the results of data processing and data discussion, it can be concluded that:

(1) The response of students to learning using web-learning was very positive, with around 52.80% stating that they strongly agreed and agreed. This can be proven from the results of student respondents in survey number 2. This is strengthened by the results of the students' response in survey number 4 as many as 49% stated that they agreed and strongly agreed, and the results obtained from survey number 6 related to interest in using web learning, which was around 55.6% stated that they strongly agreed and agreed.
(2) Web learning can increase students towards improving their learning. This can be shown by the results of their survey, which is 55.4% of students who answered yes and strongly agree. This is also evidenced by the results of students in survey number 10, which is around 57.8% can be fun, and 65% can increase students' creativity.
(3) The response of students to teachers who use web learning is very good, which can be seen from the results of survey number 15 around 61.4%.

The recommendation that the researcher hopes that the government through education units should make online/web-based learning a learning model in junior high schools.

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