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21st Century Learning and Smartphone Preference as a Learning Media

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ABSTRACT

Smartphones are a technological device that is very close to students nowadays, but there are still many negative views regarding their use. 21st century education demands a transformation in learning methods to accommodate developments in information technology in the learning process. One tool that is increasingly dominant in everyday life is the smartphone. This article discusses the integration of 21st century learning with the preference for using smartphones as a learning medium in the school environment. This research explores the impact of smartphone use on student learning, involving factors such as technology availability and student responses to smartphone-based learning. The research was conducted at Indraprasta University, PGRI Jakarta. The research method used was a descriptive-qualitative approach. Qualitative research aims to understand, explain, and describe phenomena or problems from a more in-depth perspective. This research aims to prepare students to maximize the use of smartphones as a support for 21st century learning. This research shows that using smartphones as a learning medium can improve the quality of learning and develop 21st-century skills such as critical, creative, collaborative, and communicative.

Keywords: *21st Century Learning, Smartphone Preferences, Learning Media*

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INTRODUCTION

The goal of 21st century learning in a campus environment is to prepare students to be successful in the world of work and real life. This goal can be achieved by developing the skills and knowledge needed to face the challenges of the 21st century. (Varas et al., 2023). To achieve 21st-century learning goals, the campus environment needs to be designed to support active and meaningful learning. The campus environment must encourage students to think critically, solve problems, communicate, collaborate, and develop other skills needed for success in the 21st century (Andersen & Rustad, 2022). Technology can be used to support active and interactive learning. By designing a campus environment that supports 21st century learning, universities can prepare students to be successful in the world of work and real life (Hilliker & Loranc, 2022).

21st century learning in the campus environment aims to create an environment that stimulates critical thinking, creativity, and entrepreneurship, as well as increasing students' readiness to face global change and the complexity of modern society (Santos-Meneses & Drugova, 2023). Improve students' digital literacy and technology skills, including the use of software and online learning platforms to enrich the learning process. Develop students' ability to make changes and adapt to the

challenges they face through a positive attitude and lifelong learning (Benvenuti et al., 2023). 21st century learning and the Independent Curriculum are two concepts that are closely related and have the same goal, namely preparing the young generation to face the challenges and opportunities in an era of increasingly rapid globalization and technology. Emphasizes the development of 21st century skills such as critical thinking, creativity, communication, collaboration, and digital literacy (Dilekçi & Karatay, 2023). By combining the 21st century learning approach with the independent curriculum, education can become more relevant, inclusive, and accommodating to the rapid development of society and technology. The Merdeka Curriculum is a forum for implementing 21st-century learning. A flexible curriculum allows lecturers to design active learning. These two concepts both encourage students to learn independence and responsibility. Students become more active, creative, and responsible for their own learning process (McGarry et al., 2015).

The independent curriculum is a breakthrough that changes learning patterns from teacher-centered to student-centered learning. One of the lessons in the independent curriculum is 21st century learning (Bayley, 2022). learning that integrates the use of technological devices. Technology will cover the whole and cannot be separated if it is simplified. Currently, a smartphone or laptop is one package with the internet network.(Brown et al., 2022). Limited internet networks are still one of the obstacles to preparing technology-based learning, which is the learning platform for the 21st century (Osman & Marimuthu, 2010)

The learning process is carried out using a combination of online and offline, where, if you look at the proportion, it is mostly online. 60% of learning is done online, and 40% is done offline. Smartphones are a technological tool that is often used by Indraprasta University students for learning. The flexibility of smartphones makes this tool more widely used by students for learning. Integrating learning with a learning management system (LMS) is an increasingly important approach to optimizing the learning process in the digital era (Strakos et al., 2023). Effective integration between learning and LMS can create learning conditions that are more responsive, efficient, and adaptable to 21st century learning (Laal et al., 2012). Negative views towards the use of smartphones in learning can change with the development of 21st-century learning, which maximizes the use of technology. Several articles state that the negative impacts only occur at the age of children, while students have entered the teenage phase and have the ability to maximize their use (X. Yang et al., 2023). However, there are other reasons why Indraprasta PGRI University students prefer to use smartphones for technology-related learning. Cheap, affordable, and readily available are the main reasons (Nurseto et al., 2020)

The use of smartphones can increase inclusivity by providing access to students with special needs or certain health conditions. Smartphones can be used to access information from various sources, such as the internet, electronic books, and social media (Manimaran et al., 2022 ;Putra, 2024; Safitri et al., 2024). This will create independent learning so that they can increase their knowledge. The use of technology in the learning process will run more dynamically, meaning that students will have no excuse for not attending lectures. Wide coverage with technological devices makes learning easier in all situations and conditions (Berrocal et al., 2020).

Indraprasta PGRI University's student segmentation targets the lower middle class. The campus is committed to providing affordable educational facilities so that they can be accessed by lower economic groups, so it is not uncommon for students to come from working groups who earn minimal income in the city of Jakarta. This

commitment does not necessarily affect the quality of education provided to students. The campus is serious about providing quality education that is equivalent to expensive education. 21st century learning that prioritizes technology presents learning facilities and infrastructure that are also technology-based in the campus environment. Based on this background, most students use smartphones as a learning medium.

Various media are also available, such as audio, video, and various applications in learning, which can improve understanding of concepts. Students can easily share notes, materials, or learning resources with fellow students via their smartphones. The preference for using smartphones for learning is reflected in their integration with daily activities (Herbert et al., 2021). This makes it very easy for students to study anywhere. Learning patterns become broader when learning is no longer only done in the classroom. This is very different from using a laptop or computer, which still requires special places to operate it. Laptops or computers are still synonymous as devices used for work or study; their less flexible use makes students use smartphones as a learning medium (Cassidy et al., 2014).

In some cases learning using conventional methods is often hampered because it is not flexible, and the fact is that learning must develop according to current conditions (D. B. Firmansyah et al., 2022). Today's technology has become a necessity for most of society, especially among students, and its potential must be maximized for learning purposes (Gui et al., 2023). In other societal stratifications, many people still don't have smart trees with minimum standards that can be used as learning media. Smartphone specifications are almost the same as laptops, and the price is still quite expensive. It can even be said to be more expensive than the price of a laptop, according to student use standards. Based on research conducted by the National Center for Education Statistics (NCES) in 2021, 86% of students use smartphones to study. Students use smartphones for various learning purposes (Webster & Paquette, 2023; Wimbawa & Lemy, 2023; Zahratunnisa et al., 2024; Putri et al., 2024). Smartphones can be used to access learning materials, do assignments, and communicate with lecturers or classmates. This can be done directly with integrated communication tools and learning media (Sumuer & Kaşıkcı, 2022).

Students in study programs related to information technology tend to be more accustomed to using smartphones for learning, especially since this research was conducted on students in the informatics engineering study program. In this research, we will change the paradigm that learning media is not only laptops; now we can use smartphones, which are much more flexible, simple, and complete with learning applications (Nayak et al., 2023).

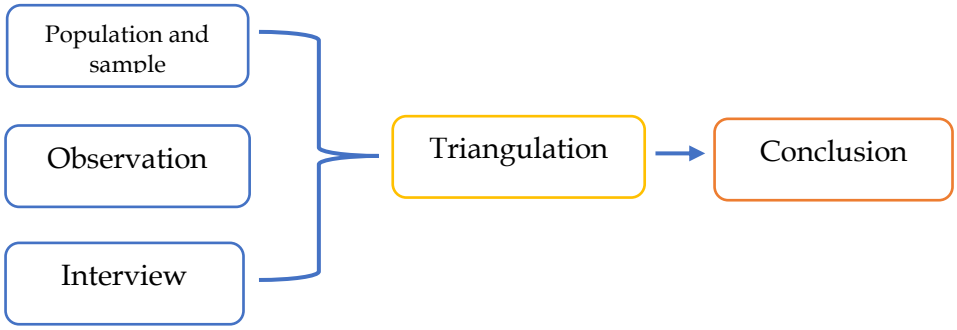
Using a smartphone is more flexible than a laptop, making it easier to carry anywhere. This makes it easier for students to study anytime and anywhere. Smartphones have become items that are commonly owned by people, including students. This makes smartphones more accessible than laptops (Green, 2019). In terms of price, it is generally more affordable than laptops. This makes smartphones more realistic for students who have a limited budget, so they can adapt to 21st-century learning. Even though 21st century learning is synonymous with the use of technology, and in general, the technology in question is a laptop or computer, not all students can provide these devices (Wijaya & Santiko, 2019). Laptops or computers do support learning activities, but these devices are still relatively large and heavy, making most students less interested. If you look at the features offered by smartphones and laptops, there are many similarities; it's just that the operating systems used are different.

(Chien et al., 2014). Smartphones with Android display many applications that are needed as learning media, have a smaller form than a laptop, and have a longer battery life. Smartphones are very supportive of implementing technology-based 21st-century learning (Y. Yang et al., 2023).

METHOD

In research using a descriptive qualitative method approach, this method focuses on collecting descriptive data, namely data that can describe the characteristics of an event or research object without measuring it quantitatively (Gray et al., 2023). This approach emphasizes an in-depth and comprehensive description of the phenomenon being studied. The data collected in this research is in the form of words, images, or behavior and is not expressed in the form of numbers or statistical figures, but rather by providing an explanation or description of the situation or conditions studied in the form of a narrative description (Hammersley, 2022). Data collection techniques in the descriptive qualitative method approach can be carried out in various ways. Here are the steps for the data collection technique.

Figure 1. Data Collection Techniques



1. **Population and sample**

2. The population and sample in this research form a single object to be studied in relation to research needs. This research was conducted on students of the information engineering program at Indraprasta PGRI University, with samples taken from a total of 10 classes. from a total of 43 study groups. Samples were taken from first-semester students. This research took place over a period of six months, or one semester. The following is class data, along with the number of students in each class (D. Firmansyah & Dede, 2022).

Table 1 Number of classes used as research objects, class A is a religion subject, class B is an introductory information technology subject

Class A	Number of students
R1A	36
R1B	40
R1C	38
S1C	32
S1D	33

Class B	Number of students
R1D	38
R1E	38
R1F	40
S1E	36
S1F	33

3. **Observation**

Observations are carried out through observation activities where each student activity is recorded as primary and secondary data. By conducting

systematic observations, researchers can identify patterns and themes in behavior or interactions that can become the basis for further understanding of the phenomenon under study. Observations can help researchers to understand the meaning and interpretations given by the people involved in the phenomenon under study (Parker et al., 2017). The learning activities carried out are a means of observing preferences for using smartphones as a learning medium (Delmas & Giles, 2022).

4. **Interview**

The purpose of the interview was to find similarities in the data from the observations that had been made. Apart from that, interviews are used to dig up data directly from the source so that the data obtained from observations has accuracy in line with the research objectives (Singarimbun, 2018). Interviews can provide a complete picture of a phenomenon, starting from the experiences, opinions, and perceptions of students involved in the phenomenon being studied. By using interviews in qualitative research, researchers can gain direct access to subjects' points of view, obtain in-depth information, and develop a more complex understanding of the phenomenon being studied. Interviews were conducted randomly with 10 students in each class (Rosaliza, 2015).

5. **Triangulation**

Triangulation is a method that combines various data sources, data collection methods, or theories to obtain more valid and reliable results. combining data from various sources, such as interviews, observations, documents, and so on. Increase data validity, by ensuring that the data obtained is accurate. Increasing the depth and breadth of understanding, that is, getting a more complete and in-depth picture of the phenomenon being studied. Combining the data obtained then making it into one conclusion of the research results found (Susanto et al., 2023).

RESULTS AND DISCUSSION

1. **Smartphone Preferences in Populations and Samples**

In terms of smartphone preferences used by students as a learning medium, Of the 43 classes in the informatics engineering study program that were sampled, there were 10 with a student number ranging from at least 30 to a maximum of 40. In the informatics engineering study program, learning is synonymous with the use of technology, so it can be ensured that students will have no problems preparing media. learning. The sample was divided into 10 classes because the research team supervised it directly.

From the results of interviews conducted with students, there were 10 students in each class who were taken together and stated that the use of smartphones in learning is very helpful and can improve the quality of learning. There are many conveniences available today that are not available with conventional learning methods. Learning applications are easy to access, and learning media can become one unit.

Interestingly, not all students who enter the informatics engineering study program have a vocational high school (SMK) background majoring in computer and network engineering. Of the average number of students, only around 7 to 10 have a vocational school background majoring in computer and network engineering. The rest are spread outside vocational schools. In principle, when

students decide to choose an information engineering study program, they will be familiar with the use of technology in learning.

From an economic perspective, the majority of the sample is from the lower middle class. According to communications made by several students, Indraprasta University provides opportunities for them to continue to the next level of education. The choice of an informatics engineering study program is not an obstacle, even though students know very well that learning is very close to the use of technology, which is identical to laptops. The presence of laptops in the lecture process is not an obstacle for students. Almost all web-based applications are available in the form of Android applications, which can be easily accessed via smartphone.(Zhang & Zhang, 2022)

There are many applications and features that can be used to study on cellphones, such as e-learning applications, note applications, simulation applications, and so on. These applications and features can help students study more effectively and efficiently. Many students are used to using cellphones for various activities, including studying. This makes it more comfortable and easier for them to use cellphones as a learning medium. Students can access various information needed for studying via cellphone, such as lecture materials, articles, videos, and so on. (Hossain, 2023)

Smartphones are generally lighter and easier to carry compared to laptops. Students who often move between rooms or study locations can be more comfortable using cellphones because they are easier to carry. Smartphones allow quick access to the internet without needing to look for a power outlet or Wi-Fi. This allows students to study in places that may be difficult to reach with a laptop. The complete smartphone package provides convenience in the learning process. (Aru & Rozgonjuk, 2022)

Smartphones also function as social communication tools, allowing students to stay connected with their friends and exchange learning-related information. Smartphones have more affordable and realistic prices compared to laptops. Students with limited budgets, where Indraprasta University facilitates students from limited economic circles to be able to continue their higher education, may prefer smartphones as a more economical alternative learning medium. (Yadav et al., 2022)

Learning patterns with a combination of online and offline, with a greater proportion of online, make smartphones the main choice for students. Of the total number of classes sampled, 5 classes had introductory information technology courses which were identical to technological devices and religion which tended to be textual in relation to norms, the two courses had different backgrounds.

Figure 2 of attendance is easier to share via the WhatsApp group

This image confirms that smartphone preferences are very high. Student attendance prefers to use applications that can be distributed quickly to other students who will automatically recap. Meanwhile, in learning, you can find out all the activities available in the LMS learning management system, which can be easily accessed via smartphone. Whether in introductory learning about information technology, which is synonymous with technology, or religion, smartphone preferences are very high.

2. Observations on Smartphone Preferences among Students

Observations were carried out for 6 months or 1 semester in lectures, and the team was divided into 2 groups for observation. The first group is in information technology engineering courses, which are very close to the use of technology, and religious courses, whose teaching modules still use books. Observation aims to obtain deeper data by making observations. By observing directly, researchers can identify patterns, trends, or findings that may not emerge as clearly through other research methods. (Ardiansyah et al., 2023)

Interviews conducted randomly with 10 students each also validated the observation results that the use of smartphones makes learning easier and can increase understanding. The application is easily accessible as a supporting medium and provides many variations of open materials. completion when conventional learning is missed.

Observation results from class groups with introductory information technology courses show that most students prefer to use smartphones rather than laptops. When the lecturer gives an explanation, almost all students do not take out books for notes, as is the case in the classic learning pattern, where in every lesson the stationery is a book and a pen. become the main learning tool. To ascertain whether students were learning to study using their smartphones, the researcher asked for help or involved observers who were unknown to the other students, namely students who sat at the back to be directly involved in observing the patterns that occurred when the lecturer gave a lecture. Data was found, so it can be ascertained that students with their smartphones are opening applications related to learning; even though their applications are different, the application function is the same. (Ng et al., 2023)

Meanwhile, the results of observations using religion courses showed that the pattern used was still the same, involving shadow observers taken from students who were used to sitting at the back without the knowledge of the others. When a group of students presented the material to be studied via the monitor screen in PowerPoint format, other students asked to share the material with the class WhatsApp group, and then the students opened it via the smartphone in their hands. Only students at the front are listening to the material via the display screen in front; the rest are using smartphones as a learning medium. (Sari et al., 2019)

Laptops are only used when students present material in class, and even then only 1 or 2 students bring them. Through observations, it was found that lecture materials were also stored on their smartphones, which were then sent to the class WhatsApp group, which was then opened via WhatsApp web to download the material to be delivered. This pattern always repeats itself in offline learning.

Various conveniences can be accessed easily with one hand. Observations were carried out repeatedly during 1 semester with 14 lecture meetings. During online lectures, students also give presentations using smartphones.(O'Connor & Andrews, 2018). The integration of technological components makes smartphones easier and more flexible to use as a learning medium. Its form is easy to fit in your pocket and multi-functional, making it the main choice as a learning medium for the 21st century, where learning has adopted technological devices. (Wulan et al., 2019)

Many notes were obtained through observation activities carried out. The same pattern always occurs, even though observations are made on different subjects. Introductory information technology courses are very synonymous with the use of technological devices, and religious courses whose learning still uses teaching modules. An interesting phenomenon is that every student gets the module at the start of the lecture, but in lectures under observation, only a maximum of 3–5 students take out the teaching module during the lecture; the rest prefer to use smartphones to open the learning material and listen to the lesson.

The data obtained from the notes provides an initial conclusion that the preference for smartphones as a learning medium is very high. This data will be strengthened by the results of the interview, and then the data will enter the triangulation stage. Triangulation aims to collect previous data to see whether what was obtained at the beginning and subsequent data have the same results so that the data collected can provide the same conclusions regarding smartphone preferences as a learning medium for 21st century learning at Indraprasta University PGRI Jakarta.

Figure 3 Google Meet using a smartphone

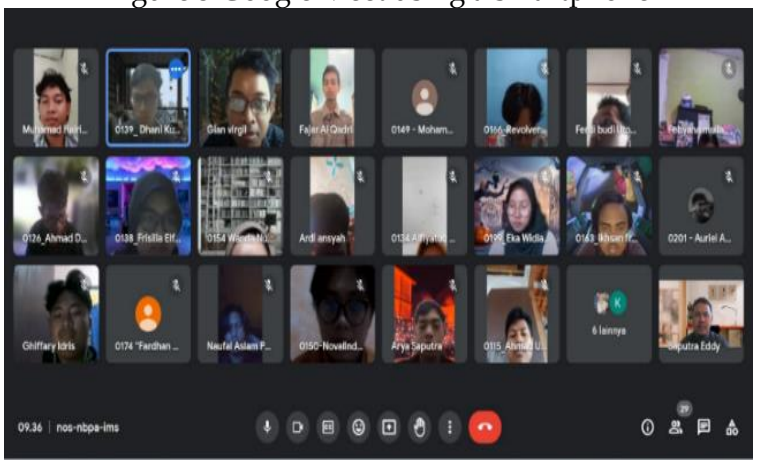
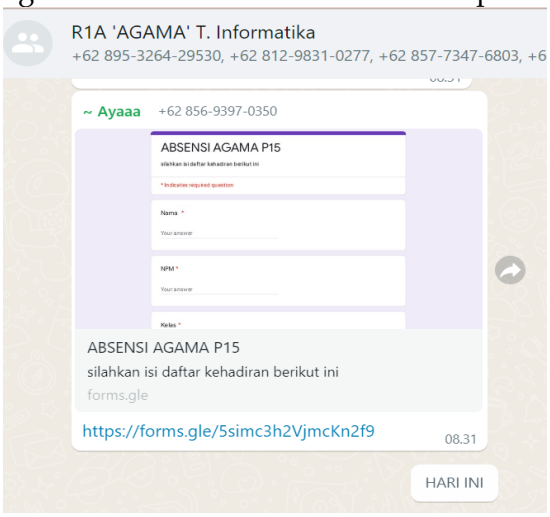


Figure 4 Lecture attendance on smartphone



3. Interview And Triangulation Of Smartphone Preferences In Learning

The interview process was carried out directly and indirectly. Through the results of observations, questions were asked spontaneously to students about the reasons why they prefer to use smartphones as a learning medium. from the results of observing smartphone preferences. From the results of interviews conducted with students, there were 10 students in each class who were taken together and stated that the use of smartphones in learning is very helpful and can improve the quality of learning. There are many conveniences available today that are not available with conventional learning methods. The following is the overall data in the class.

Table 2 results of interviews in religion subject classes

Class	Number of students	Preferensi Samrtphone	No Samrtphone	Persentase
R1A	36	34	2	94,4%
R1B	40	37	3	92,5%
R1C	38	34	4	89.4%
S1C	32	31	1	96,8%
S1D	33	30	3	91%

From the results of interviews conducted in religion courses, smartphone preferences were dominant; the lowest percentage was 89.4% and the highest was 96.8%, if the average for religion courses was 92.8%. These results show that the preference for smartphones as a learning medium is very high. The reason for not using a smartphone is because a laptop is needed as a medium to display material in PowerPoint form in offline classes; however, if learning is done online, it can reach 98% for the reason that it requires 1 laptop to display the material.

Table 3 interview results in the introductory information technology class

Class	Number of students	Preferensi Samrtphone	No Samrtphone	Persentase
R1D	38	37	1	97,3%
R1E	38	36	2	94,7%
R1F	40	38	2	95%
S1E	36	34	2	94,4%
S1F	33	32	1	96,9%

There is a slight difference in the results achieved in the introductory information technology course, where learning is synonymous with technological devices. Smartphone preference with the lowest percentage is 94.4% and the highest is 97.3%, so the average achievement is 95.6%. The results show that smartphone preferences are dominant. The reason for using smartphones as a learning medium is that many smartphones provide a large RAM (random access memory) capacity, so they can be used to store learning applications. From the interview results, the average RAM on student smartphones is the smallest, with a memory capacity of 8 gigabytes; some even have 12 gigabytes (Guo et al., 2023).

The capacity available on smartphones is very helpful for students to use as a learning medium. When compared to the price of a laptop with the same RAM capacity, a much larger budget is required, which can reach three times the price of a smartphone. Affordable prices, multi-functional benefits, and flexibility are in line with the economic conditions of students at Indraprasta PGRI University so that they can continue to utilize technology as a medium for learning in the 21st century (Fawaid et al., 2023). For the use of laptops themselves, apart from the high price, laptops provide less flexibility, so they are less efficient. When used, laptops still need an internet network to connect, so they need another Wi-Fi network. If used simultaneously, a large capacity is needed; if the capacity is small, it will hinder learning (FAWZIAH & Irwansyah, 2020).

Things that were still separate on laptops are now integrated into smartphones. Multi-functional use makes the preference for smartphones so high; in fact, it is certain that everyone will have a smartphone, even though the specifications will be tailored to their needs. Among students, the specifications that are often chosen are a minimum RAM capacity of 8 gigabytes and 128 gigabytes of ROM; cameras and other things are just standard capacity (Mao et al., 2023).

From the observations and interview results collected, the preference for smartphones for learning is very dominant. Several arguments from students have been presented above, and there are even several smartphone procedures that provide Android applications similar to WEB. So in the future, it is possible that the function of laptops will be replaced by smartphones with the Android operating system. The results obtained are unified in that smartphone preferences are very dominant as learning media in 21st century learning.

DISCUSSION

The use of smartphones as a learning medium changes the negative stigma that has previously existed. The principle is that technology was created not to bring negative things, but rather to show how to think about using technology. 21st century learning is a learning model that involves technology in the learning process. When it comes to technology, it is a unit that cannot be separated. Technology in learning is a package between a laptop and its internet network. In fact, internet networks are not yet widely available in educational institutions, even though the quota is very limited, so this is also an obstacle when talking about technology-based learning (Cevallos M. et al., 2023).

The findings in this research have changed the negative stigma towards using smartphones, which is still very much embedded in the way of thinking in society. By using a smartphone, learning media can be integrated into one unit that is more flexible to use as learning media. There is an increasing positive trend in the use of smartphones in the educational environment. Creativity emerges among Indraprasta PGRI University students in responding to the challenges of 21st-century technology-based learning. In the midst of limited tuition fees, students utilize communication tools that are already at their fingertips. The preference for smartphones is dominant as a learning medium. Technology that initially seemed expensive, with the creativity of technology-based learning students, becomes cheap. The integration of the internet with smartphones makes learning easier using technology (Sapci et al., 2021). With so many data package options that can suit students' finances, smartphones have become the dominant device used as a learning medium. Smartphones can be used to develop students' creativity and innovation in learning. For example, students can use smartphones to create learning videos, educational games, or learning applications. (Hs & Hidayat, 2021).

Apart from creativity, the communication process also went very well. The large choice of applications with the Android operating system allows students to exchange information regarding what applications are relevant and can be used in learning. The communication process continues in a discussion to determine what application is appropriate and will be used. Even when deciding on the use of different learning applications, students try to customize them with the aim of making their use easier. It is a simple application that many students choose as a learning medium (Amoran et al., 2021).

Collaborative preference for smartphones as a learning medium refers to the use of smartphones in an educational context that involves cooperation and interaction between smartphone users. (Murni et al., 2023). There are several ways in which smartphones can be used collaboratively as a learning medium. Take advantage of digital learning platforms that can be accessed via smartphone, such as a learning management system (LMS). (Toring et al., 2023). The LMS at Indraprasta University PGRI can facilitate online discussions, assignments, and collaboration. Examples of some collaborative applications such as Google Docs, Google Slides, or Microsoft Office on smartphones for working together on projects or presentations. Lecture assignments can be completed using smartphone features, such as taking photos, recording videos, or creating a blog (Akbari et al., 2024 Buaja et al., 2024).

Smartphones can be used to give students the opportunity to explore learning material independently. This can help students develop their' critical thinking skills. Students can use video conferencing applications or instant messaging applications to have online discussions with teachers or other students. Online discussions can help

students develop their critical thinking skills, such as the ability to analyze information, evaluate arguments, and collaborate with others. The equipment on a smartphone can be used as a storage tool to collect data and information for lecture assignments without having to carry stationery and other files (Muafa & Puspita, 2019).

21st century learning emphasizes the development of 21st century skills such as creativity, critical thinking, communication, collaboration, and digital literacy. Smartphones can be an effective tool in supporting this learning strategy because they have many features that facilitate the development of these skills. Smartphone preferences allow access to multiple sources of information in seconds. The integration of the internet network with smartphones means students can use smartphones to search for information in real-time, developing information literacy. The large selection of collaborative applications and social media platforms on smartphones allows students to communicate, share ideas, and work together to complete assignments together (Emileva et al., 2023).

Smartphone preferences can be utilized to integrate learning in real-life contexts. Students can use smartphone sensors and features to collect data, conduct exploration in the field, and make connections between theory and practice. The use of smartphones helps students develop digital literacy, which is important in the information age. With easy and fast access to a variety of online learning resources via smartphone, students can develop lifelong learning habits, expand their knowledge, and continue to grow outside the classroom.

This research contributes to the preference for smartphones as a learning medium at Indraprasta PGRI University, Jakarta. The results of this research can be used as a reference for changing the learning paradigm using smartphones, where there is a stigma that says smartphones make users only busy with themselves. This research proves that the preference for smartphones as a learning medium changes this view. Smartphone preferences and the use of technological devices in 21st-century learning can also improve students' creativity, collaboration, communication, and critical thinking.

This research is limited to the informatics engineering study program, with testing on two courses that are identical to technology and those that are not. It is hoped that in the future, the reach can be expanded to other subjects so that smartphone preferences can provide convenience in learning that maximizes technology at more affordable costs. Smartphone preferences are becoming dominant because they provide many learning applications. Devices and the internet have become one unit, so when used as a learning medium, it is more flexible than a laptop or computer.

In the future, this research can be developed into other study programs in an effort to provide learning experiences, and can be expanded to other fields of study. This research also provides insight into the use of technology which is a necessity in the world of education.

CONCLUSION

Changing the learning paradigm towards a 21st century model that emphasizes the development of 21st century skills, including creativity, critical thinking, communication, and collaboration, Technology, especially smartphones, is recognized as a tool that has great potential for supporting 21st-century learning approaches. The existence of smartphones provides fast access to information, supports collaboration,

and facilitates technology-based learning. Smartphones can be integrated into learning strategies to develop 21st century skills, including digital literacy, problem solving, creativity, and adaptability. The preference for using smartphones in learning includes students' ability to collaborate and communicate online. Collaborative applications and social media platforms are the main means to support this interaction. With easy access to online learning resources, smartphones support the concept of lifelong learning. Students are invited to develop independent learning habits outside the classroom. By utilizing smartphone technology with 21st century learning principles, this approach can help create learning experiences that are relevant, dynamic, and in line with students' development needs in the modern era.

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