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Unlocking E-Learning Triumph: Nurturing Support Systems and Student Traits in Secondary School Implementation

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ABSTRACT

The utilisation of e-learning via the Internet provides the benefits of adaptability, extensive accessibility to educational materials, and convenient entry. Nevertheless, the utilisation of the Internet in education presents concerns like the presence of irrelevant content and potential risks to data security. The objective of this study is to obtain precise data by administering questionnaires that assess the availability of e-learning resources such as computer equipment and internet networks, user proficiency, and learner characteristics. Data were gathered via interviews conducted with teachers, observations made of e-learning enabling facilities, and the distribution of questionnaires to high school students in Pariaman City. The findings indicate that educational institutions are prepared to facilitate e-learning. The primary advantage of using E-Learning is the availability of open and widely accessible learning resources. The introduction of the E-learning system encountered issues, notably the presence of irrelevant content. Hence, the objective of this study is to uncover information pertaining to the necessary e-learning resources that facilitate the process of learning. A questionnaire was employed as the data gathering instrument. The primary concept presented in the document explores computer devices and internet networks, user functionalities, and participant and student attributes. The specimen constituted a secondary educational institution. Interviewing was another method employed for data collecting. The interview focused on eliciting information regarding the E-learning infrastructure acquired from both professors and students. The findings indicate that the school is prepared to adopt E-learning. However, the implementation of Intranet-based E-learning is necessary to address the current challenges.

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1. INTRODUCTION

Internet utilization in learning is one of the supporters of e-learning because e-learning is learning that uses various technologies and uses networks (Simonson, Zvacek, & Smaldino, 2019). Specifically, it states that e-learning is the delivery of learning through various electronic equipment such as the internet, intranet. Internet utilization in e-learning provides alternative learning opportunities for learners. To

increase learners' participation, challenge, and success of learning, Project Base Learning-based e-learning can also be implemented. In addition, elearning implementation is also found in e-assessment activities(Lesage, Raîche, Riopel, Fortin, & Sebkhi, 2014). The application of e-learning in secondary education is an important thing to do, at this level of education students are prepared to be ready to enter the higher education level or the world of work. elearning plays a role in increasing learning independence and increasing the ability to solve problems. because elearnig applies the principle of independence, flexibility also supports accelerated student learning.

E-learning has been implemented in the Secondary Schools in Pariaman city through the utilisation of the Internet. All secondary schools in the regions and cities of Pariaman have already implemented school websites to facilitate the E-learning process. According to interviews with teachers and principals from three senior high schools in Pariaman City, the utilisation of the internet in schools exhibits a wide range of activities. Typically, 60% of internet services are currently utilised for educational purposes, particularly in the field of science. Administration accounts for the remaining 40%. The attributes of natural science disciplines are very suitable for the use of E-learning due to its capacity to facilitate many forms of content, including text, animation, video lessons, simulations, and other multimedia materials.

The implementation of E-learning in secondary schools in Kota Pariaman is facilitated by the presence of computer units, internet services, and educational resources for both students and teachers. During the installation of e-learning in these three schools, the teachers saw the necessity of implementing internet content screening. Internet access offers a plethora of information, which can often be unnecessary for pupils. The least pertinent information, such as advertisements for online games, specific products, and explicit photographs. Furthermore, it is imperative to safeguard the security of data that is uploaded to the internet, ensuring that it is not accessed or utilised by unauthorised entities. The teacher lodged a complaint in order to enhance the level of humanization among the children. Consequently, the researchers determined that the implementation of E-learning could be sustained at schools located in Pariaman and Padang Pariaman.

The utilisation of the internet in the educational process is a distinct method for transmitting learning resources, acquiring knowledge, and engaging in interactions. To do this, you can utilise either an internet or intranet network to facilitate debates, evaluations, and interactive learning experiences. The internet in Indonesia is still limited by its speed, which is a limitation. According to the data provided by Marsh in 2017, Indonesia ranks 92nd out of 129 countries. The objective of this study is to uncover precise information regarding the execution of E-learning in secondary education, the challenges encountered by educators and students during the deployment of E-learning, and the preparedness of students to engage in E-learning.

The definition of e-learning is extensive. E-learning encompasses several forms of education that take place online, such as virtual learning, distributed learning, network-based learning, or web-based learning (Secker & Morrison, 2016). E-learning refers to the dissemination of educational or training programmes through electronic means (Chaeruman, 2020). As information technology advances, the comprehension of E-learning becomes more varied. These advancements, such as the utilisation of CD-ROMs, internet, intranet, or mobile devices, facilitate the delivery of computer learning programmes (Clark & Mayer, 2016). This electronic device facilitates learning and creates an engaging learning environment that appeals to kids. E-learning refers to the utilisation of electronic media, such as computers and networks, to establish an optimal learning environment.

E-learning is the use of information technology networks and deliberate communication in the process of learning (Allen, 2016). The purpose of computers and networks in education is not only to transmit knowledge from teachers to pupils. E-learning utilises information and computer technology to construct educational experiences for students (Rosenberg, Greenhalgh, Koehler, Hamilton, & Akcaoglu, 2016). Horton defined learning as the utilisation of information and communication technology (ICT) to establish a conducive educational setting. While traditional learning has proven beneficial for many students, E-learning offers both problems and opportunities for student achievement. This is due to the internet's capacity to facilitate learning development and tailor education to individual students (Piña,

Lowell, & Harris, 2018). This implies that the establishment of the aforementioned environment is one that offers a conducive space for pupils to acquire the anticipated educational experiences necessary for their future.

Convenience, accessibility, and a wealth of learning resources are just a few of the benefits that may be gained from implementing internet optimisation strategies into E-learning programmes. Despite these benefits, there are also some drawbacks to using the Internet for educational purposes, such as the proliferation of irrelevant content, data security concerns, and unfavourable linkages. Learning Management Systems (LMS) are an integral part of e-learning platforms that serve as the primary means of delivering e-learning content. Additionally, the offered learning management system should be structured in this manner (Kanwal, Rehman, Bashir, & Qureshi, 2017). Consequently, the foundation of an LMS is the enabling elements of an e-learning system.

Both the characteristics of high school pupils and issues with networks have a role in determining the success or failure of implementing E-learning. As compared to their counterparts at lower levels of schooling and younger grades, high school pupils exhibit a number of distinguishing characteristics. There are unique traits associated with developmental activities among high school kids. High school pupils exhibit traits that are cognitive, effective, and psychomotor in line with the learning domain. Ages 11 or 12 through maturity are the developmental tasks in the cognitive domain. Adolescents, who are typically enrolled in high school, typically fall into this age range. The majority of high school students have progressed to the official operational level. Students at this level: a) want to know why they're learning and how it will help them succeed; b) need both internal and external motivation to overcome cognitive barriers caused by past academic failure; c) have trouble finding their own learning style; d) want to set personal goals; and f) want to take full responsibility for their own education and growth in relation to these goals.

The study findings about the attributes of high school students in learning activities indicated that students exhibited heightened engagement when they saw the tasks and expectations set by the teacher as challenging (Shernoff et al., 2016). The provided instructions are pertinent to the developmental period and allow for a greater range of motion. To ensure that students receive instructions that align with the curriculum and cater to their individual needs, it is imperative to do an initial analysis that encompasses factors such as locus of control, attitudes towards subjects and e-learning, learning styles, and the equipment and abilities possessed by students.

The concept of locus of control is a determinant of an individual's personality (Heywood, Jirjahn, & Struewing, 2017) and impacts their confidence in their capacity to exert control over various aspects of their life (Cakir, 2017). The internal locus of control, also referred to as the determinant of one's success and failure, is a concept explored by Wang and Lv (2020). In order to ensure the successful deployment of e-learning, it is crucial to ascertain the student's locus of control. Another factor to take into account is the learning style that students possess. Three distinct learning styles exist: visual, aural, and kinesthetic (Simonson et al., 2019). In order to facilitate the learning process for each student, it is necessary to accommodate the three different learning styles. Understanding the attributes of high school students is highly beneficial in optimising the resources and amenities available at school to facilitate their successful education. The previously examined components are seen as contributing to the delivery of impactful and streamlined information on the Learning Management System (LMS).

2. METHODS

This study was conducted using a sequential exploratory design method (Creswell, 2009) in high schools in Kota Pariaman with a sample of SMA 4 Kota Pariaman. This school was chosen because it was representative of the existing population through purposive sampling technique with consideration of time, and the school environment. Therefore, the sample in this study was SMA 4 Kota Pariaman students in Biology subjects. The sampling method used purposive sampling, this was done based on consideration of students' initial ability to use technology and students' schemata in using the LMS.

The step of quantitative research with this design begins with collecting and analyzing qualitative data. To strengthen the results of the study quantitative data were collected. Subsequently, examine the data in its whole to derive conclusions from this investigation. Qualitative data is obtained by conducting interviews with principals and teachers, as well as by watching the learning environment. The qualitative data exposes interconnected issues. The collected data analysed using the Spradley model data analysis includes information on a) the conditions of the school, b) the process of learning Biology, c) the needs of teachers and schools for innovation, d) the support, limits, and obstacles faced in innovating, and e) the facilities available for E-learning assistance.

Quantitative data, however, were obtained by administering questionnaires to high school students in the city of Pariaman. This study presents quantitative data that examines students' perspectives and evaluations about the utilisation of Information and Communication Technology (ICT) in the context of learning, with a specific focus on Biology disciplines. The quantitative item data questions encompass various aspects, namely a) locus control, b) student attitudes towards Biology and E-learning subjects, c) learning methods, and d) equipment and abilities pertaining to E-learning that are possessed by students. Descriptive statistics are used to analyse quantitative data that has been obtained.

3. FINDINGS AND DISCUSSION

The results obtained from the research have to be supported by sufficient data. The research results and the discovery must be the answers, or the research hypothesis stated previously in the introduction part. Based on the results of the identification, four main factors were obtained which supported the success of the e-learning implementation (Rahmi & Syafril, 2017). The four factors can be seen in Table 1. The first factor is traced based on interviews with teachers and observations from relevant documents. The second factor related to learning design is traced from the documents that the teacher has. The third factor is the ability of teachers and students. The ability of the teacher is revealed through interviews and observations, while students fill out the abilities of students through questionnaires. In addition, the fourth factor is E-learning support facilities. The data is collected through interviews with teachers, observations of schools, and related facilities used by students, and it is traced with patient questionnaires to students.

Table 1. E-learning Success Factors

Code	Factor	References
[F1]	Content	(Eremias & Subash, 2013; Rahmi, Mawardi Effendi, & Ansyar, 2017)
[F2]	Learning Design	(Brown & Green, 2015; Masoumi, 2010)
[F3]	Teacher and student abilities	(FitzPatrick, 2012)
[F4]	Device	(FitzPatrick, 2012; Masoumi, 2010)

The results of interviews with teachers and the school related to the success factors of e-learning: [F1] Need to innovate learning in their schools, specifically for science groups in high school. Some content needs to be increased in concreteness and meaningfulness for students. [F2] It is necessary to familiarize students with access to a variety of information from broader sources such as the Internet, but they are often disturbed by negative content and irrelevant links. [F4] Schools have complete computer devices according to the number of study groups, but they are not equipped with internet services. There was internet service, but it was stopped due to financial problems. Problems with internet usage were also constrained due to the speed of the internet itself. Schools have solved this problem by using cellular networks.

The researchers' investigation of school internet replacement services utilising a network of cellular carriers is significantly restricted due to the limited availability of E-learning, which is restrained by the persistently high cost of internet packages. E-learning necessitates a substantial amount of material content, including the presentation of movies, animations, and similar elements.

Based on the findings from interviews, observations, and recording, it is evident that there is a requirement for learning innovations in the scientific group disciplines. The teacher's viewpoint evaluates if the learning environment is capable of facilitating the deployment of E-learning in high school. The implementation of e-learning can be observed through various components, including learning objectives, teachers, students, materials/media/strategies, and evaluation. This demonstrates that E-learning may be implemented in high schools without relying on the internet, but by maximising the utilisation of the intranet network..

Implementation of E-learning is not only seen from the perspective of the teacher but also students as the subject of learning. Data from students obtained is related to locus of control, attitudes toward subjects and e-learning, learning styles, and student equipment and skills. The following data are obtained from high school students in Kota Pariaman. Students are given six statements related to internal locus of control. Table 1 presents the level of locus of control that students have. The data in Table 1 signifies more students responded agreeably and strongly agreed to internal encouragement statements in learning. But the percentages for problem-solving items (30.4%) and having initiative (25.7%) are quite large for agreeing and hesitating.

This can be interpreted that students always try to think effectively and have a relatively high perception of the effort needed to get good results. Students like to work hard, but initiative and problem-solving skills need to be improved. This kind of thing needs to be considered in learning because the locus of control functions as a predictor of student learning success (Effendi, M; Effendi, H; Effendi, 2017) (Becker & Birkelbach, 2018). The three researchers provided recommendations for the implementation of e-learning to improve understanding of students' characteristics.

3.1 Students' attitudes towards subjects and E-learning

The attitude of students toward science-biology subjects and E-learning is needed to reinforce whether students need the implementation of E-learning in Science-Biology subjects. Specifically, data on attitudes toward Science-Biology subjects as a source of information on how the implementation of Science-Biology learning was previously particularly relevant to E-learning. From the data in Table 2, students' attitudes toward science-biology subjects and the implementation of ICT-based learning are very good. This is indicated by the relatively high response to statements related to student attitudes in Biology subjects and the implementation of ICT-based learning.

Table 2. Data on student attitudes towards subject matter and E-learning

Question	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Internal Locus of Control					
Like to work hard	66,9	30,4	2,0	0,7	0,0
Have initiative	20,3	48,6	25,7	5,4	0,0
Try to find solutions toward the problems	14,9	42,6	30,4	11,5	0,7
Collaborate with peers	33,1	45,3	14,9	5,4	1,4
Activities refer to learning objectives	58,1	31,8	8,8	1,4	0,0
Have a perception of results based on effort	56,8	35,8	6,1	1,4	0,0

However, a large enough percentage responded to neither agree nor disagree on the items of encouragement the teacher found material on the internet. Based on data from interviews with teachers, the lack of encouragement from teachers to find material on the internet is caused by less supportive internet networks in schools. However, the teacher's acknowledgement states that the teacher encourages students to find material from various learning sources.

It can be concluded that students need E-learning and anti-learning by using ICT tools. During this time students rely on material from teachers and teachers need to increase encouragement to students to find material in various other sources such as the internet and intranet. If the condition of the school does not allow students to access the internet, the implementation of intranet-based E-learning is one solution. This is a great opportunity because students feel facilitated by learning with network access and ICT-based learning in learning materials (strongly agree 57.4% and agree 34.5%).

Learning style data is needed as a basis for developing the types of learning activities that need to be designed in the implementation of e-learning. Learning styles possessed by students can inform the types and forms of content and media used in e-learning.

Table 3. Students' Learning Style data

Question	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Learning Style					
Visual learning style	49,3	34,5	11,5	4,1	0,7
Auditory learning style	27,7	45,9	21,6	4,7	0,0
kinaesthetic learning style	16,2	32,4	41,2	9,5	0,7

Table 3 presents data on learning styles possessed by students. The data distribution shows that MA 4 students in Pariaman City have all three learning styles. Of the three visual, auditory, and kinesthetic learning styles, it is interpreted that increasing the accommodation of auditory learning styles in Science-Biology learning is necessary. The accommodation of these three learning styles influences student success in E-learning (Effendi, M; Effendi, H; Effendi, 2017). This study was facilitated with learning videos and/or animation. This consideration is done to accommodate the tendency of students' learning style which is a greater visual learning style. because video media facilitates students in seeing a visual display of the content that students need.

3.2 Internet-based Website

Data related to the use of internet-based websites were collected to obtain data supporting the weaknesses of internet use among students.

Table 4. The use of internet-based websites

Question	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Intranet Website					
Anxiety of viruses- affected while searching	36,5	35,1	18,9	7,4	2,0
Disturbed by the appearance of pop ups that are not relevant to the material	61,5	30,4	6,1	1,4	0,0
Negative content interference	79,1	17,6	1,4	1,4	0,7
Concerned about the limitation of internet quota	29,1	27,7	26,4	5,4	11,5
The desire to access website that is free of pop up and negative content	67,6	17,6	6,1	0,0	8,8

Table 4 presents data on internet usage related to aspects of the anxiety of virus-infected users while searching on the Internet, pop-up disturbances that are irrelevant to the material, negative content disruption, limited internet quota, and hope of the opportunity to use a website free of problems revealed. From the data in Table 4, the expectations of students are very high for the opportunity to use websites free of viruses, irrelevant pop-ups, negative content, and internet quota problems. The solution offered to this problem is to design an intranet-based Learning Management System (LMS) specifically for Science-Biology subjects. The expectations, needs, and learning styles of

online students will help instructors better facilitate their journey into the Web-based learning (Bayrak, Aydemir, & Karaman, 2017). the presence of LMS content that is free from pop ups and advertisements is a necessity to maintain student focus in interacting on the LMS. for this reason, the use of Intranet-based LMS filters is an important need to maintain student focus.

3.3 Devices and skills that can be accessed by students

The implementation of E-learning is also supported by tools and skills that can be accessed by students. The choices of equipment and skills most likely to be accessed by students include, a) Personal Computer (PC) / Desktop PC, b) Laptop / Notebook, c) Tablet PC, d) Handphone, and e) Smartphone.

Table 5. Data on devices and skills that can be accessed by students

	tools and skills that can be accessed by students					
places	PC	Laptop	Tablet	Hand-phone	Smart-phone	other
School	56,7	16,7	2,7	22,7	37,3	4,0
Home	4,7	28,7	5,3	40,7	60,7	0,0

Table 5 divides into two places where students access ICT equipment supporting e-learning. Students access computers more at school (56%) than other equipment. The second equipment that is widely accessed by students in schools is smartphones (37%) and mobile phones (22.7%). The remaining laptops (16.7%) and other equipment (4%). While supporting ICT equipment E-learning accessed at home is dominated by smartphones (60.7%) and followed by 40.7% who access the material using mobile phones.

From the questionnaire distributed, 9 students out of 148 students did not use one device either at home or at school, 7 students from 148 students did not have and did not use one of the above devices at home, and 14 students from 148 students did not use the device above while in the school environment. That is, students and supporting devices E-learning has the potential to conduct learning that integrates technology into learning. This means that an E-learning model that can optimize learning resources at school is needed.

Learning design is very important for the successful realization of e-learning. Especially when it is needed to emphasize the implementation of E-learning using the internet or intranet. Therefore, before designing E-learning, instructional designers need to analyze the following three things, namely, Context analysis, User analysis, and Content analysis (Santoso, Batuparan, Isal, & Goodridge, 2018). This has also been done in major cities in Asia, such as Singapore, Hong Kong, Taiwan and Beijing (Kong, Looi, Chan, & Huang, 2017). These countries continue to invest in the development of teachers' about E-learning to empower teachers and school leaders to advance school education in the digital era. The preparation for E-learning can be started by reviewing and discussing the contents of activities, delivery approaches, and methods of improving teacher development and their role in E-learning (Stevens, 2018). In addition, in implementing E-learning it is also important to consider the form of immediate feedback to students (Steele & Holbeck, 2018) because the success of E-learning programs areis supported by attention to student satisfaction (Rahmi & Azrul, 2021; Rios, Elliott, & Mandernach, 2018)(Rahmi & Azrul, 2021).

Distinctive tendencies have been noticed in each of the four primary Asian cities/regions. Singapore prioritises the establishment of professional peer-learning communities to facilitate practice-based teacher development in utilising ICT for effective learning and teaching in the classroom. Hong Kong prioritises the establishment of a community of educators to actively participate in, draw attention to, analyse, and achieve success in school-based electronic learning projects that prioritise student-centered learning. Taiwan prioritises providing university-backed teacher training programmes to effectively integrate E-learning into student learning, with a particular emphasis on acquiring twenty-first-century abilities. Beijing prioritises the advancement of autonomous educators

in integrating information and communication technology (ICT) into classroom instruction, particularly through creative teaching methods supported by ICT for students in kindergarten through 12th grade. The implications of this study serve as a benchmark for other cities/regions to adapt their teacher development programmes for E-learning in the future, namely in the twenty-first century (Kong et al., 2017).

4. CONCLUSION

The investigation of the implementation of E-learning needs to be done to find out and reveal whether E-learning programs that optimize internet networks a) can be continued, b) revised and continued, and c) terminated. Based on the investigation that has been done, E-learning can be continued because students are interested and challenged to learn in an E-learning environment. However, related to the problems of using the internet network and some of its weaknesses, E-learning can be held on a local connection.

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