



The Effectiveness of e-Learning, Learning Styles, Prior Knowledge, and Internet Self-Efficacy in Business Mathematics Courses

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Abstract

The purpose of this study is to analyze the effectiveness of e-learning associated with learning style variables, prior knowledge, and internet self-efficacy (ISE) in the Business Mathematics course. The research method uses descriptive statistics and correlations, where the learning styles studied are visual, auditory, reading, and kinesthetic. The results and conclusions of this study are (1) the majority of respondents have a visual learning style, (2) simultaneously learning styles, prior knowledge, and internet self-efficacy affect learning outcomes in e-learning strategies, (3) partially initial knowledge and internet self-efficacy does not affect learning outcomes, and (4) The effectiveness of e-learning Business Mathematics is achieved in respondents with visual learning styles, because respondents with this learning style tend to have high internet self-efficacy, even though respondents have low prior knowledge of Mathematics

Abstrak

Tujuan dari penelitian ini adalah untuk menganalisis efektivitas e-learning dikaitkan dengan variabel gaya belajar, pengetahuan awal, dan internet self efficacy (ISE) pada mata kuliah Matematika Bisnis. Metode penelitian menggunakan statistika deskriptif dan korelasi, dimana gaya belajar yang diteliti adalah visual, auditory, reading, dan kinestetik. Hasil dan kesimpulan penelitian ini adalah (1) mayoritas responden mempunyai gaya belajar visual, (2) secara simultan gaya belajar, pengetahuan awal, dan internet self efficacy mempengaruhi hasil belajar dalam strategi e-learning, (3) secara parsial pengetahuan awal dan internet self efficacy tidak mempengaruhi hasil belajar, dan (4) Efektivitas e-learning Matematika Bisnis tercapai pada responden dengan gaya belajar visual, karena responden dengan gaya belajar tersebut cenderung mempunyai internet self efficacy yang tinggi, walaupun responden memiliki pengetahuan awal Matematika yang rendah.

Keywords: Learning Style; Prerequisite Material; Internet Self Efficacy

INTRODUCTION

During the COVID-19 pandemic, campuses are considered high-risk places for virus transmission due to their diversity, activity, and population density, making social distancing measures difficult to implement. Therefore, to mitigate the negative impact and ensure the continuity of learning, the learning process is carried out by e-learning.

Shifting traditional learning to e-learning is a complex means because it has many challenges including (1) sudden transition to online learning is hampered due to technological obstacles, (2) poor connectivity, (3) less tech-savvy teachers feel overwhelmed and slow to adapt to change. Most of them do not know how to deliver lectures effectively. They simply upload materials and assignments, check their presence, and some of them do video conferences despite a lot of technical issues. This method makes it difficult for the teacher to know the students' situation, attitudes, and responses whether they understand the lesson delivered or not. This becomes more complicated for some subjects such as mathematics, and statistics that require hands-on learning.

Based on the observations of researchers before the pandemic, student competence and participation, especially in the Business Mathematics course, was still low when learning was carried out in class and became even lower after the pandemic. Referring to 3 aspects of the Minimum Completeness Criteria (KKM), such as the characteristics of students, the complexity of the courses, and the conditions of learning support capacity. And by comparing the learning outcomes of Business Mathematics before and during the pandemic using a KKM of 70, data obtained that the average learning outcome of 150 students before the pan-

demic was 45% and became 67% below the KKM during the pandemic. If this continues, the learning process can be completely disrupted, therefore the best teaching strategy model is needed to trigger student involvement in e-learning. For students, the learning process that changes suddenly becomes a burden, such as internet packages, internet networks, boredom with studying alone, learning, and assignments are given online. In addition, in online learning, the success of learning is strongly influenced by the ability of students to manage resources on the internet.

E-learning requires adequate preparation in terms of mental, physical, and financial both from students and education managers. Although students' motivation increased by 90% in English remedial classes, experienced an increase in technology understanding by 10%, but students also experienced difficulties with poor internet connections, spent money on credit (Muslimin & Harintama, 2020). E-learning, learning media, and motivation have a direct effect on physical education learning outcomes during the Covid-19 pandemic (Septiadi et al., 2021). Interviews and assignments to students showed that students viewed e-learning negatively. Students express the reasons why they are less motivated in learning by e-learning, such as dissatisfaction with the content of the material, lack of discipline in attending lectures, lack of communication with teachers and colleagues. (Meşe et al., 2021).

Other research on e-learning related to content and tool design, learning satisfaction, learning styles, prior knowledge had also been carried out by some researchers. Among the research that had been done by the author had concluded (a) there is a significant difference between students who have high and low initial knowledge in the concept

of understanding linear function material. (Azis, 2013), (b) there is an influence between learning strategies and learning styles, especially individual and group learning styles (Azis & Susanti, 2014). Next (Azis et al., 2020), (Azis et al., 2019) explained that (a) the ability of students to use the internet and prior knowledge has an effect of 79.3% on student learning achievement, (b) there is a strong correlation between self-efficacy and student strategies in finding information online, and (c) students' e-learning experience is significantly correlated with the learning process, and has an indirect effect on the perception of learning outcomes. Furthermore (Mulyani et al., 2019) concluded that (a) prior knowledge of internet mastery in e-learning represented by the score of the Aplikom course had no significant effect on learning outcomes in Mathematics, (b) respondents with low initial abilities were more active in asking and answering questions than respondents with high initial abilities, (c) the learning design provided in e-learning is given later than face-to-face learning with the aim that respondents have time to read, understand and finally understand the material by their efforts (Azis & Fatimah, 2020).

The problems that arise in the implementation of e-learning are certainly not the expected conditions and a solution needs to be found immediately so that the objectives of the e-learning strategy to create an equitable learning process throughout Indonesia can be achieved. Through research, it is hoped that solutions can be found so that the effectiveness of e-learning can improve student learning outcomes, one of them is by connecting e-learning with learning styles, prior knowledge, and internet self-efficacy.

Internet self-efficacy initially starts from self-efficacy, the general definition

of self-efficacy is one's self-perception of measuring how much one's abilities can be used in certain situations, this is closely related to one's confidence in overcoming problems. According to (Kinichi & Fugate, 2011) self-efficacy is divided into 2 parts, namely high and low self-efficacy with behavioral differences as follows.

A **high self-efficacy** student has characteristics: Active in choosing the best opportunities; Be able to manage situations, avoid, and solve problems; Be able to set goals and standards of achievement; Be able to plan, prepare and practice; Be able to work hard to achieve the goals; Creative in solving problems; Learn from failure; Visualize success; and Limit stress.

Whereas **Low Self-Efficacy** student has characteristics: Passive; Avoid difficult tasks; Weak aspirations and low commitment; Focus on personal flaws; Not making any effort; Be discouraged by failure; Assuming failure is due to lack of ability or bad luck; Easy to worry, stress, and become depressed; Thinking of reasons to fail.

Internet self-efficacy or some call computer self-efficacy is one's belief in himself in the use of computer/internet technology. High self-efficacy will be able to overcome problems and discomfort in the use of technology for students and teachers. In e-learning, student learning success can be increased through the internet, which has high self-efficacy from a teacher. As expressed by (Santosa & Sarwanta, 2021) that there is an effect of teacher's age (X_1), teaching experience (X_2), and internet self-efficacy (X_3) together on the level of computer mastery in online learning.

These three variables are very interesting to study considering that learning style is a behavior that is consistently carried out by a person when absorbing, organizing, and managing the information so that it is easier to receive, think, and remember. While initial

knowledge needs to be considered not only in e-learning strategies but in every teaching and learning process of any strategy, considering that by detecting the initial knowledge of students, a teacher will be able to determine the pattern of teaching. The development of the internet is one of the supporting factors for successful learning in the technological era so that one's ability to use and manage the internet becomes an important thing in e-learning.

METHODS

This research was survey research with a cross-sectional approach. The respondents of this research are students who were taking a Business Mathematics course with an e-learning strategy. The learning style measurement tool uses the VARK questionnaire developed by Flemming which had been validated with a nominal scale (1 = visual, 2 = auditory, 3 = read/writer, 4 = kinesthetic).

The pretest is used to separate the sample with high initial knowledge and low initial knowledge, while the posttest is used to measure learning outcomes so that the effectiveness of e-learning can be analyzed. The score given for each question is 0 to 4. The nominal scale is used for pretest and posttest scores with an interval range (1 = very unsatisfactory = 0.0 – 0.9; 2 = unsatisfactory = 1.0 – 1.9; 3 = satisfactory = 2.0 – 2.9, and 4 = very satisfactory = 3.0 – 4.0).

ISE measurement is used by giving questionnaires related to awareness and management in using the internet for e-learning. The questions were divided into 2 groups, namely (1) assessment of the ability to use the internet for e-learning, and (2) awareness of e-learning. All research instruments were given to respondents through an online system, and out of 100 respondents who were con-

tacted via email, 83 of them were complete, and the rest did not respond. Therefore, the data analyzed is data from 83 respondents.

The measurement of the assessment of the ability to use the internet for e-learning is carried out to dig up information on the respondent's ability to use the internet for e-learning purposes. The assessment used a Likert scale (1 – 6), which is divided into 3 categories, namely (1) low for respondents with an average score of 1.00 – 2.70; (2) medium for respondents with an average score of 2.71 – 4.40; and high with an average score of 4.41 – 6.00. The statement submitted in the questionnaire consists of 10 items, namely the ability to open the web, the ability to open sites other than those given by the teacher by using keywords, access the site by using a URL, download and save the material in a file, copy part/all the material obtained in the form of a document. word/PDF), read the material, open e-mail, send e-mail messages to individuals or large groups of people, reply to e-mails, and save e-mailed attached files in folders.

Data analysis used descriptive statistical analysis and correlation. Descriptive analysis was used to find out the description of the respondents' initial knowledge learning styles and ISE levels. To test the hypothesis of the relationship of learning style, prior knowledge, and ISE correlation technique was used.

RESULT AND DISCUSSION

Research results

Respondent Descriptions

Respondents consisted of 55 women and 28 men; all respondents were students with an age range of 17-21 years. The educational background of most respond-

ents is senior high school graduates located in West Java and Ambon. It is hoped that the selection of respondents in the two regions can represent the characteristics of students from West and East Indonesia.

Learning Styles

The questionnaire to measure learning styles consists of 16 question items, which consist of several answers where each selected answer represents each learning style. Respondents are allowed to choose more than one answer for one question. The following are examples of some of the statements that the respondent must answer question below.

What will you do when you want to learn to cook food that you have never tried to cook?

- A. I will cook as little as I can
- B. I will ask a friend
- C. I will browse the internet for recipes and how to cook them
- D. I will use the correct recipe

When you feel very angry, your feelings will be seen in,

- A. Face
- B. Voice
- C. Gestures
- D. The sentence that is written

Among the 4 activities below, which one do you do most often?

- A. Writing
- B. Dancing
- C. Singing
- D. Watching

Figure 1. Question list

From the answer percentage calculations for all respondents, the following results are obtained,

Table 1. Answer Percentages of Learning Style

| Answers | Learning Style | | | | | Co |
|---------|----------------|----|----|----|-----|----|
| | V | A | R | K | com | |
| 1 | 52 | 15 | 25 | 5 | 3 | V |
| 2 | 44 | 25 | 15 | 16 | 0 | V |
| 3 | 22 | 29 | 35 | 11 | 3 | A |
| 4 | 32 | 29 | 20 | 15 | 4 | V |

| | | | | | | |
|----|----|----|----|----|----|---|
| 5 | 14 | 17 | 21 | 35 | 13 | K |
| 6 | 22 | 15 | 12 | 30 | 21 | K |
| 7 | 65 | 11 | 8 | 15 | 1 | V |
| 8 | 48 | 12 | 16 | 24 | 0 | V |
| 9 | 36 | 20 | 26 | 6 | 12 | V |
| 10 | 26 | 6 | 45 | 19 | 4 | R |
| 11 | 42 | 32 | 15 | 5 | 6 | V |
| 12 | 66 | 26 | 7 | 1 | 0 | V |
| 13 | 12 | 47 | 16 | 23 | 2 | A |
| 14 | 55 | 13 | 24 | 6 | 2 | V |
| 15 | 8 | 15 | 25 | 41 | 11 | K |
| 16 | 15 | 27 | 22 | 20 | 16 | A |

The conclusion of the question items answered by the respondent,

Visual = 9 items = 56.25%

Auditory = 3 items = 18.75%

Read/write = 1 item = 6.25%

Kinesthetic = 3 items = 18.75%

Based on these data, it was found that out of 83 respondents, the majority had a visual learning style.

Initial Knowledge

A person will find it easier to learn mathematics if that person has understood the prerequisite material to understand the material he is learning. Weaknesses in mastering the prerequisite material will make it difficult to learn the next material.

The material being tested on respondents is about the application of linear equations in the economy, such as subsidies, taxes, break-even points. The prerequisite of this material is that the respondent must understand the arithmetic material related to variables, equations, and graphs. To find out the initial knowledge of the prerequisite material, respondents were given 10 questions (See Figure 2 for the example).

| |
|---|
| <p>Determine the solution set of a system of linear equations in two variables below by substitution and elimination, and make a graph!</p> $3x + 4y = 24$ $2x + 5y = 23$ <p>The solution set of the following system of linear equation,</p> $x - 2y + z = 4$ $3x + y - 2z = 0$ <p>is $\{(x,y,z)\}$. The value of "xyz" is</p> <p>Determine the intersection point of the pair of lines $y = 2 + 2x$ and $y = 10 - 2x$, and make a graph!</p> |
|---|

Figure 2. Question of Prerequisite material

Based on the score, the respondents were divided into two groups, such as the group with high prior knowledge and the group with low prior knowledge. Respondents who have a total score greater than or equal to the median are grouped into respondents who have high prior knowledge, while respondents who have a total score less than the median are grouped into respondents who have low prior knowledge. The distribution of initial knowledge scores based on learning styles can be seen at Table 2.

| Learning Styles | Prior Knowledge | | Total |
|-----------------|-----------------|-----|-------|
| | High | Low | |
| Visual | 22 | 25 | 47 |
| Auditory | 7 | 9 | 16 |
| Read/Write | 1 | 3 | 4 |
| Kinesthetic | 12 | 4 | 16 |
| Total | 42 | 41 | 83 |

The average value of respondents based on learning styles can be seen at Table 3.

Table 3. Average Value of Respondent's Initial Knowledge

| Statistics | | | Statistics | | |
|----------------|---------|-------|------------------|---------|-------|
| SKOR PA Visual | | | SKOR PA Auditory | | |
| N | Valid | 47 | N | Valid | 16 |
| | Missing | 0 | | Missing | 0 |
| Mean | | 3,23 | Mean | | 2,88 |
| Median | | 2,87 | Median | | 2,43 |
| Std. Deviation | | 0,706 | Std. Deviation | | 0,877 |

| Statistics | | | Statistics | | |
|--------------------|---------|-------|---------------------|---------|-------|
| SKOR PA Read/Write | | | SKOR PA Kinesthetic | | |
| N | Valid | 4 | N | Valid | 16 |
| | Missing | 0 | | Missing | 0 |
| Mean | | 3,51 | Mean | | 2,41 |
| Median | | 3,07 | Median | | 1,98 |
| Std. Deviation | | 0,904 | Std. Deviation | | 0,777 |

Internet Sel-Efficacy

Nine statements were given to respondents to see awareness of the e-learning strategy, and the percentage of results obtained were as follows,

Table 4. Awareness percentage of e-learning

| Statements | Relative Frequency (%) |
|----------------------------------|------------------------|
| Already familiar with e-learning | 100 |
| Already to use e-learning | 100 |
| Comfortable with e-learning | 35 |
| Want to continue e-learning | 15 |
| Lazy to use e-learning | 67 |
| Want to learn face-to-face | 80 |
| Actively involved in e-learning | 27 |
| Tired of e-learning | 88 |
| Difficult to discuss | 79 |

All respondents are familiar with and use e-learning, but only 35% stated that they are comfortable learning using e-learning, and when asked further, it turns out that only 15% want to continue learning using e-learning. It is suspected that although respondents feel comfortable with e-learning, the saturation factor (88%) and the desire to gather to study together and discuss with their colleagues feel more important (79%). All of

that seems to have an impact to feel lazy to learn with e-learning strategies (67%) and want to learn face-to-face (80%), and not be actively involved when learning (27%). From this data, it can be interpreted that e-learning that is carried out continuously is less attractive to respondents, this can be understood considering that one of the human instincts is to socialize and interact. In addition, mastery of new technology requires a short time, while the teaching and learning process takes place quickly. In addition, face-to-face learning habits from kindergarten to university also contributed greatly to the way respondents learn.

The ability to use the internet for e-learning used 9 statements and the following results were obtained,

Table 5. Assessment of Ability to Use the Internet for e-learning

| Ability to Use the Internet for e-learning | Average scores |
|---|----------------|
| Ability to open the web | 4,33 |
| Ability to open sites other than those given by the teacher using keywords | 3,65 |
| Access the sites by using URLs | 3,47 |
| Download and save material in files | 3,80 |
| Copy the part/all of the material obtained in the form of a document (word/PDF) | 3,97 |
| Read and understand material on the web | 2,98 |
| Open email | 5,25 |
| Send messages via email to individuals or large groups of people | 5,85 |
| Reply email | 5,90 |
| Save files attached to the email in a folder | 4,85 |

The average score in table 2 explains that 4 statements have an average score below 4, such as for statements of the ability to open sites other than those given by the teacher by using keywords,

access the sites by using URLs, download and save materials in files, and copy the part/ all the material obtained in the form of a document (word/PDF).

The respondents have medium/sufficient ability in using the internet for e-learning. Although it has not yet entered the high category ISE stage, this data shows that the initial ability that respondents must have for e-learning is sufficient.

Although the ability to open the web, open the email, send messages via email to individuals or many people, reply to emails, and save files attached to the email in folders has a high rating, it is still important to note that respondents still have difficulty to read and understand the material on the web (2,98), although this is a determining factor in the success of learning. Respondents' low assessment of the ability to read the material indicates that respondents have not been able to take advantage of the available information. Relating to the mathematics pretest scores, it can be found the reasons why the respondents' ability to read mathematics material via the web is low.

Simultaneous Effectiveness of e-Learning Strategy

Data analysis used the multiple linear regression method, with a significance level of (α) 5%. Output data regarding the effect of the three independent variables on the dependent variable using the F test and the results obtained (see Figure 3).

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|--------------|-------|-------------------|
| 1 | Regression | 146864241,832 | 3 | 48954747,277 | 4,718 | ,005 ^a |
| | Residual | 581096760,351 | 56 | 10376727,863 | | |
| | Total | 727961002,183 | 59 | | | |

Figure 3. F-Test Analysis

The significance value is 0.005

which means $\text{sig} < \alpha$, concluded that the three independent variables simultaneously affect learning outcomes. The results of this study are in line with research which concludes that there is a positive and significant relationship between self-efficacy and students' abilities, there is a positive and significant effect between prior knowledge on students' abilities, there is a positive and significant relationship between self-efficacy and students' initial abilities (Permana et al., 2016). A systematic review study (Peechapol et al., 2018) stated that many studies have proven that self-efficacy affects online learning.

Partial Effectiveness of e-Learning Strategy

Partial testing was carried out using the t-test, and the results were obtained (see Figure 3).

| Model | Coefficients ^a | | | | | | |
|------------|-----------------------------|------------|-----------------------------------|--------|------|-------------------------|-------|
| | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. | Collinearity Statistics | |
| | B | Std. Error | | | | Tolerance | VIF |
| (Constant) | -36625,610 | 10881,246 | | -3,366 | ,001 | | |
| 1 | | | | | | | |
| GB (X1) | 2,835 | ,790 | ,437 | 3,588 | ,001 | ,961 | 1,041 |
| PA (X2) | -126,408 | 119,327 | -,131 | -1,059 | ,294 | ,939 | 1,065 |
| ISE (X3) | -105,542 | 302,623 | -,043 | -,349 | ,729 | ,918 | 1,090 |

Descriptions: GB = learning style; PA = prior knowledge; ISE = internet self-efficacy

Figure 3. T Test Result

Based on the test results obtained sig learning style of $0,001 < \alpha$, initial knowledge of $0,294 > \alpha$, and internet self-efficacy of $0,729 > \alpha$. These results indicate that separately learning styles affect learning outcomes using e-learning strategies. While initial knowledge and internet self-efficacy with e-learning strategies do not affect learning outcomes (Izzettin et al., 2019).

Research literature review proposed by (Alqurashi, 2016) stated that the role of self-efficacy did not always

have a significant impact on one's satisfaction in online learning, some of the literature he reviewed provides 2 possible hypotheses, as (1) self-efficacy had an important role in online learning, and (2) self-efficacy did not have an important role in online learning.

Effectiveness of Learning Style, Prior Knowledge, and ISE in e-Learning Strategy

Most the respondents' learning styles are visual (56.25%), and overall, the respondents' internet self-efficacy is in the sufficient category. The presentation of Business Mathematics e-learning is mostly in the form of graphs, pictures, and diagrams which are very effectively used by respondents with a visual learning style where this is shown in the activeness of respondents during e-learning. However, for respondents with auditory, reading, and kinesthetic learning styles, Business Mathematics e-learning is rather difficult to understand, this can be seen from the inactivity of respondents during e-learning and even respondents often ask the teacher to repeat back to explain the material that has been delivered.

Based on the average score of the assessment of the ability to use the internet for e-learning, information was obtained that respondents still had difficulties in reading and understanding the material on the web (table 5). This is directly proportional to the results of the Business Mathematics initial knowledge test, where 49.4% of respondents had low mathematical prior knowledge. The low initial knowledge of mathematics affects the ability of respondents to open mathematical material sites using different keywords from those given by the teacher.

The effectiveness of Business Mathematics e-learning will be achieved in respondents who have a visual learning

style because respondents with this learning style tend to have high internet self-efficacy, even though respondents have low prior knowledge of Mathematics.

Discussions

When Business Mathematics e-learning was applied, the respondents' responses were very diverse. Regardless of their initial knowledge, interest in Business Mathematics e-learning is seen in respondents who have a visual learning style, this is shown from the activeness of asking and answering questions. Meanwhile, respondents with auditory, reading and kinesthetic learning styles tend to ask for the explanation of the material to be repeated, with a slower duration of explanation, especially in the section describing graphs and tables. This is certainly not surprising because in previous research it was revealed that, for respondents to be able to read and understand the material in e-learning Mathematics, learning was given slower than face-to-face learning. (Azis & Fatimah, 2020).

Based on data analysis, it was found that simultaneously learning style, prior knowledge, and internet self-efficacy affected learning outcomes. In line with this research, other studies also conclude that overall learning styles can be used as a milestone in improving learning outcomes using online learning.

Bajaj and Sharma (2018) explained that in the learning process, a student can learn in various ways and different styles. Some students are more likely to be interested in facts, data, and real experiments, while other students may be more interested in theories and principles. Some students may be interested in reading written material and others may be more interested in solving cases. The

education system so far has been developed with the philosophy of "One size includes all", so that students often experience disorientation and get too much information which results in decreased learning efficiency.

Based on these conditions, the teacher can find out the learning style of each student to apply the most appropriate learning method, so it is hoped that later students will be helped to achieve the desired learning outcomes of a subject (Pasina et al., 2019). This is reinforced by other research on learning styles which states that an understanding of learning styles will make students more able to adapt to the given learning method. Therefore, an educator needs to be more sensitive to different ways of communicating the same or similar content (Maric et al., 2015).

On the other hand, some tools such as online modules can provide valuable information in understanding learning styles and applying materials to the process of completing coursework (Solvie & Sungur, 2012). Examples of supporting tools for other learning materials can also be in the form of further modules such as a collection of summaries, practice questions, and quizzes (Maric et al., 2015). Concerning learning that is carried out through e-Learning, improving the quality of student learning can be accommodated by making additional teaching modules in the form of plugins, packages, or modules on digital learning media that suit the student's learning style. (Sucheta et al., 2018).

Furthermore, the application of additional modules on digital learning media in the form of e-learning can be adapted to students' learning styles. For example, in this study, it was found that most of the student respondents had visual learning styles (56.25%) based on the VARK-based learning style theory, so the

modules made on the e-learning media could be equipped with more objects such as maps, diagrams, graphs, charts and symbols used to represent information of business mathematics in the form of pictures, instead of presenting information in the form of sentences (Richa dan Vidushi, 2018).

One of the causes of the lack of accuracy in detecting learning styles is not taking into account the prior knowledge of each student, even though initial knowledge is expected to be an indicator to determine learning styles (Hasibuan et al., 2018). In research conducted by (Kalyuga, 2013), The level of prior knowledge of a student should be considered as an important factor influencing the outcome of learning activities, with the emphasis on the results of the study that the format of the material that is easily understood by students with low prior knowledge can provide a sharper understanding of the material for students with high prior knowledge.

Lee *et al* (Lee et al., 2019) in his research on the effect of prior knowledge on students' ability to solve problems in virtual medical simulations stated that there are treatments that can be applied to form an appropriate learning framework for students with low levels of prior knowledge, such as focusing on aspects that are more mastered by students first, then change its learning framework to gradually improve other aspects.

The internet self-efficacy aspect that is part of this study focuses on students' self-confidence in participating in learning activities, with the result that most students have low internet self-efficacy responses to the e-learning process. Likewise with the results of statistical tests show that partially internet self-efficacy does not affect student learning outcomes.

Internet self-efficacy in this study is

an important thing that needs to be considered as the key to success for sustainable learning in the information era. Educational institutions are responsible for educating students that society needs in the future and are expected to grow students who are equipped with information literacy intelligence and adaptability to be able to use technology for various purposes (Kaya & Durmu, 2010).

This is reinforced by the statement (Karaseva, 2016) which states that someone who finds the internet difficult to use and has low confidence in using information sources from the internet, usually has a low level of internet self-efficacy.

Several things that can be taken to encourage Internet self-efficacy are varied, as stated by (Sirakaya et al., 2015) that more intensive use of internet media will increase internet self-efficacy, and not only applies to students but can also apply to the internet self-efficacy of the teachers themselves.

Although simultaneously the three independent variables in the e-learning strategy influence learning outcomes, partially prior knowledge and internet self-efficacy do not affect learning outcomes in e-learning strategies. Internet network constraints are one of the main factors that affect internet self-efficacy. In line with the statement above, the results of other studies state that the main supporting factors for the effectiveness of online learning are the carrying capacity of network access and the ability of devices to access the internet (Hamid et al., 2020). Online lectures are often constrained by internet networks that are difficult to reach. Online learning activities are not smooth. As a result, students cannot understand the material well (Kusumaningrum, Betty; Wijanto, 2020). Similar research conducted (Suana et al., 2019) reinforces the above statements, with the results showing that although

most students have learning devices such as computers or laptops at home, less than half of them have a good internet connection to support their learning activities with e-learning. This condition ultimately has an impact on the level of self-efficacy of respondents in similar studies.

CONCLUSIONS

From the data of 83 respondents who were used as research samples and based on data analysis, it was concluded that (1) the majority of respondents had a visual learning style, (2) simultaneously learning styles, prior knowledge, and internet self-efficacy affected learning outcomes in e-learning strategies, and (3) partially initial knowledge and internet self-efficacy did not affect learning outcomes, (4) the effectiveness of Business Mathematics e-learning was achieved in respondents with visual learning styles because respondents with this learning style tend to have high internet self-efficacy, even though respondents have low Mathematics prior knowledge.

The success of learning using e-learning strategies is determined by many factors, including the three variables that the authors examine. This study has not analyzed more deeply the relationship between visual, auditory, read, and kinesthetic learning styles on high and low prior knowledge, as well as on students' internet self-efficacy. In addition, this study did not categorize respondents based on gender, which when this research was conducted, there were some contradictions regarding the impact of gender on internet self-efficacy. In the study (Suana, 2018), male and female respondents had slightly different levels of internet self-efficacy, although not significant, as found in the study (Izzettin et al., 2019), which alludes to the

possibility of differences in the level of internet self-efficacy because men tend to have a higher internet technology orientation. Therefore, if a more in-depth study is carried out on the demographics and backgrounds of respondents with similar aspects or variables, it is hoped that it will produce a more reliable picture of the relationship between e-learning variables, learning styles, prior knowledge, and internet self-efficacy that is more representative.

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