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# Digital Inequality: E-learning Outcomes among Youth in Indonesia

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## Abstract

The Covid-19 pandemic reinforces digital inequality in education ecosystem. The purpose of this study is to determine the digital inequality of E-learning Outcomes among Youth in Indonesia. This study takes a digital inequality theory and analyzes its impact on e-learning outcomes. A quantitative research approach with a set of questionnaires was used. Data for this study was collected from 407 respondents, whose ages ranged from 15 to 23 years, all residing in Jakarta and surrounding areas (Jabodetabek), the capital of Indonesia. The results show that digital literacy ( $\Delta R^2 = 3\%$ ,  $\beta = 0.202$ ) and academic-related usage ( $\Delta R^2 = 27.2\%$ ,  $\beta = 0.425$ ) are a positive contribution to the e-learning outcomes. The results suggest that lecturers and policy makers must increase e-learning outcomes through academic-related usage and digital literacy.

**keywords:** Digital Inequality, Digital Literacy, Academic-Related Usage, E-Learning Outcomes, Access to ICT

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## INTRODUCTION

Digital inequality still exists in the education sectors (Inan Karagul et al., 2021; Jena, 2020). Not only in developing countries, but it also occurs in developed countries. In the United States (Katz et al., 2021), found internet connectivity and digital device as a challenge for students during remote learning. Meanwhile, Pakistan is experiencing problems with the lack of internet technology, connections and infrastructure (Park et al., 2021). Likewise in India, Jena (2020) found that the gap was still due to limited internet access and ownership of laptop/computer/gadget devices in their homes. In Indonesia, problems related to unequal access and poor bandwidth have an impact on inequality in the digital education landscape (Unicef, 2021).

However, the material or physical factor is not enough to solve the problem of inequality in education. The digital inequality theory emphasizes that even though everyone already has internet access, inequality between them will still exist due to the digital skills or literacy and usage

(Hargittai et al., 2019). Van Deursen & Helsper, (2018) confirmed that what users do online, and their skills will affect the outcome of internet use. In line with Nash, (2020) which found that the main concern in the academic field is developing digital literacy so that users (lecturers and students) can use online platforms.

Martínez-Cantos, (2017) said that competences and digital literacy become an important thing for the development of information society. Jang et al. (2021) argue that digital literacy influences individuals' intention to use digital technology for learning among young people in Korea and Finland. Among Thai students, Techataweewan & Prasertsin (2018) found that digital literacy has a positive effect on learning performance.

Students need to have digital literacy to balance technological developments, because technology is dynamic and constantly changing (Zilian & Zilian, 2020) (Purnama et al., 2021). In general, the skills to manage multifunctional technology will also help individuals in continuously upgrading their knowledge and competencies (Martínez-Cantos, 2017), as well as engaging in social life (Büchi & Vogler, 2017).

In addition to digital skills, various uses of the internet are also important contributors to reap benefits (Van Deursen, 2020) (Van Dijk, 2017). Students in Bangladesh feel that internet use positively improved academic performance and improved their quality of life (Fatema et al., 2020). Unfortunately, there are still few studies that examine simultaneously the influence of digital literacy factors and usage in an educational context on improving e-learning outcomes. These two factors are an illustration of the second level of digital divide (Van Deursen, 2020), or also known as digital inequality (Katz et al., 2021).

This study aims to examine the impact of digital inequality theory on e-learning outcomes. Both variables from digital inequality, digital literacy and usage were tested simultaneously on e-learning outcomes, so that it was known whether they had an impact and which variable contributed more to improving e-learning outcomes. This study also analyzes the extent to which access to ICT has a positive impact on e-learning outcomes.

### **METHODS**

This study used a quantitative method through an online survey to 407 adolescents aged 15-23 years, all residing in Jakarta and surrounding areas (Jabodetabek), the capital of Indonesia. A set of questionnaires has been distributed during November 2021 to respondents through purposive sampling technique. Questions in the questionnaire to determine demographics, access to digital technology, digital literacy, academic-related usage and e-learning outcomes with closed questions. Data were analyzed using regression test to see the contribution of digital literacy and academic-related usage variables to e-learning outcomes.

### **Measures**

Digital Literacy

The digital literacy is defined as the individual's ability to find and produce all forms of information that can solve problems for themselves and others. This study measured the digital literacy variable with 10 items (Table 1). Exploratory factor analysis was conducted to explore the latent factor structure. For Digital Literacy, the Kaiser-Meyer-Olkin (KMO) measure was .909 and Bartlett's test of sphericity was significant ( $X^2 = 3270.896$ ,  $p < 0.001$ ), indicating adequacy of the sample. As such, two factors emerged with eigenvalues greater than 1.00. The two-component solution explained a total of 74.8% of the variance, with Component 1 contributing 63.5% and Component 2 contributing 11.3%.

**Table 1 Rotated Component Matrix of Digital Literacy**

| Item                   | Consuming   | Prosuming   |
|------------------------|-------------|-------------|
| To access              | <b>.872</b> | .278        |
| To select              | <b>.834</b> | .305        |
| To understand          | <b>.832</b> | .224        |
| To analyze             | <b>.818</b> | .333        |
| To verify              | <b>.741</b> | .431        |
| To evaluate            | <b>.726</b> | .467        |
| To distribute          | .260        | <b>.863</b> |
| To produce             | .277        | <b>.830</b> |
| To participate         | .299        | <b>.734</b> |
| To collaborate         | .381        | <b>.734</b> |
| <b>Cronbach' Alpha</b> | <b>.933</b> | <b>.866</b> |

Based on the test results in table 1, the first factor is identified as the consuming dimension and the second as prosuming. The consuming dimension (CA= .937, M= 3.53) was measured to identify the respondent's ability to use the internet to obtain the data/information needed, while the prosuming dimension (CA=.866, M=3.20) measured the respondent's ability to use the internet to produce content and participation. The respondents were given the answers with 5 scales ("Very Low = 1" to "Very High = 5"). The consuming literacy is measured by statement items such as "the ability to choose the information needed" and prosuming literacy is measured by the item "the ability to create information content that is shared through WhatsApp Group, blogs or websites." Overall, the digital literacy has a Cronbach' Alpha value of .933 with a mean value of 3.39, and a standard deviation of .715.

Academic-Related Usage

The academic-related usage is defined as the use of the internet to meet the needs of the learning process. A total of 12 items have been tested for factor analysis (Table 2). For academic-related usage, the Kaiser-Meyer-Olkin (KMO) measure was .915 and Bartlett’s test of sphericity was significant ( $X^2 = 3498.949$ ,  $p < 0.001$ ), indicating adequacy of the sample. As such, three factors emerged with eigenvalues greater than 1.00. The three-component solution explained a total of 71.6% of the variance, with Component 1 contributing 53.4%, Component 2 contributing 9.8% and Component 3 contributing 8.4%.

**Table 2 Rotated Component Matrix of Academic-Related Usage**

| Item   | Communication | Source of Information | Information Digging |
|--|---------------|-----------------------|---------------------|
| Discussing with friend about assignment              | <b>.872</b>   | .198                  | .192                |
| Discussing with friend about lecturer material       | <b>.846</b>   | .200                  | .275                |
| Sharing references about course material with friend | <b>.732</b>   | .242                  | .334                |
| Asking a friend for course material                  | <b>.741</b>   | .158                  | .228                |
| Seeking information to complete assignment           | <b>.667</b>   | .435                  | -.037               |
| Seeking materials to do assignment                   | <b>.644</b>   | .619                  | .028                |
| Downloading e-book for course material               | .266          | <b>.789</b>           | .144                |
| Seeking references in YouTube for course material    | .200          | <b>.718</b>           | .326                |
| Downloading articles for assignment                  | .497          | <b>.717</b>           | .061                |
| Seeking video tutorial for use Ms.Office             | .037          | <b>.652</b>           | .509                |
| Asking a lecturer for course material                | .146          | .140                  | <b>.856</b>         |
| Asking the campus staff for class schedules          | .412          | .202                  | <b>.704</b>         |
| <b>Cronbach’ Alpha</b>                               | <b>.912</b>   | <b>.827</b>           | <b>.745</b>         |

Based on the Rotated Component Matrix table, academic-related usage is divided into three factors: communication (Cronbach Alpha= .912, M=3.18), sources of information (Cronbach Alpha= .827, M=3.47) and information digging (Cronbach Alpha). = .745, M=2.74). The Communication reviewed the extent to which the internet was used as a communication tool in the learning process. An example of the item being measured was "asking school materials to a

friend". The dimension of the information source means that the internet was used as a source of information/knowledge related to the learning process. An example of the item being measured was "looking for reading sources to do school/college assignments." Information Digging related to communication with internal school/university parties. Overall, this variable got a Cronbach Alpha value of .916 and a Mean value = 3.52 (not in the table).

**E-Learning Outcomes**

The e-learning outcomes variable in this study is defined as the academic benefits obtained from using the internet. This variable is measured by eight items and a factor analysis test was performed (Table 3). For e-learning outcomes, the Kaiser-Meyer-Olkin (KMO) measure is .932 and Bartlett’s test of sphericity was significant ( $X^2 = 2582.599$ ,  $p < 0.001$ ), indicating adequacy of the sample. As such, one factor emerged with eigenvalues greater than 1.00, explaining 69.9% of the variance respectively. The Cronbach’ Alpha value for this factor is .938 and the Mean value is 4.27. Examples of question items such as "the internet makes it easier for me to discuss with a group of friends" and "the internet makes it easier for me to get sources/references that are relevant to school assignments." Respondents were given five answers (5 points scale: "Strongly Disagree" to "Strongly Agree").

**Table 3 Component Matrix of E-Learning Outcomes**

| Item  | Component |
|---|-----------|
| The internet makes it easier for me to discuss with friends                                   | .786      |
| Internet help me to find lecturer material  | .819      |
| Internet help me to explain course material for my friend                                     | .819      |
| Internet help me to join course at any where  | .842      |
| The internet makes it easy to complete task   | .890      |
| The internet makes it easy to get resources   | .876      |
| Platform available on the internet help me to complete my college assignments on time         | .844      |
| The reading resources Which I Get from the internet help me better understand school material | .809      |

| Item            | Component   |
|-----------------|-------------|
| Cronbach' Alpha | <b>.938</b> |

## RESULTS AND DISCUSSION

The purpose of this study is to examine the factors that influence e-learning outcomes. In addition, to identify the effect of Access to ICT on e-learning outcomes. Table 4 describes the categories of respondents. The data obtained showed that most of the respondents were women (58%) compared to men. The age category is dominated by respondents aged 18 -24 years (61.3%) and the education category is more of respondents who are studying at the University level (60%) than students at Senior High School. Regarding the economy of parents, the average student's parents earn 3 - 5 million rupiah / US 200 to US 350 (34.2%) and 9.3% of respondents' parents earn less than 1 million rupiah / US 66. Relating to the time to access the internet most of the respondents spent an average of 4 to 7.59 hours per day (34.9%).

**Table 4 Respondent Categories**

|                         | N   | %    |
|-------------------------|-----|------|
| <b>Gender</b>           |     |      |
| Male                    | 171 | 42   |
| Female                  | 236 | 58   |
| <b>Age</b>              |     |      |
| 15 – 17                 | 154 | 38.7 |
| 18 – 24                 | 253 | 61.3 |
| <b>Education</b>        |     |      |
| Senior High School      | 163 | 40   |
| University              | 244 | 60   |
| <b>Parent's Income</b>  |     |      |
| Less than Rp. 1 million | 38  | 9.3  |
| 1 - 2.9 million         | 86  | 21.1 |
| 3 - 5 million           | 139 | 34.2 |
| 5.1 - 8 million         | 59  | 14.5 |
| 8 million more          | 85  | 20.9 |

| <b>Time for Internet Access</b> |     |      |
|---------------------------------|-----|------|
| < 4 hours                       | 22  | 5.4  |
| 4 - 7.59 hours                  | 142 | 34.9 |
| 8 - 11.59 hours                 | 122 | 30   |
| > 12 hours                      | 121 | 29.7 |

Table 5 shows that to access digital technology, most respondents use smartphones (M = 3.63) compared to personal computers (M = 1.49). Likewise, for the purposes of the learning process, respondents use smartphones more (M = 3.55) than other devices. Another result shown is that respondents spend more time using chat applications (M= 3.96), social media (M= 3.94) and watching movies (M=3.66).

**Table 5 Access to ICT**

|                                     | Mean | SD    |
|-------------------------------------|------|-------|
| <b>Access to ICT</b>                |      |       |
| Smartphone                          | 3.63 | .513  |
| Laptop                              | 2.89 | .950  |
| Tablet                              | 1.37 | .760  |
| Personal Computer                   | 1.49 | .888  |
| <b>Access to ICT for E-Learning</b> |      |       |
| Smartphone                          | 3.55 | .625  |
| Laptop                              | 3.06 | 1.020 |
| Tablet                              | 1.27 | .688  |
| Personal Computer                   | 1.38 | .781  |
| <b>Access to Platform</b>           |      |       |
| Search Engine                       | 2.8  | 1.341 |
| Email                               | 3.21 | .916  |
| Social Media                        | 3.94 | .729  |
| Chatting Applications               | 3.96 | .816  |
| Online Media                        | 2.68 | 1.023 |

|                |      |       |
|----------------|------|-------|
| e-Shopping     | 2.97 | 1.063 |
| Game Online    | 2.57 | 1.271 |
| Watching Movie | 3.66 | .918  |

For the hypothesis, multiple regression analysis was used to analyze the contribution of digital literacy and academic-related usage to e-learning outcome (table 6). The test results show that digital literacy and academic-related usage have a positive and significant impact on e-learning outcomes, *H1 is supported*. Academic-related usage variables accounted for 27.2% and digital literacy by 3%. The overall contribution is 30.2%. The results of the regression test also show that an increase in every 1 unit of digital literacy will contribute 0.202 units of improvement in e-learning outcomes ( $\beta=0.202$   $p<0.05$ ), while 1 unit increase in academic-related usage ( $\beta=0.425$   $p<0.05$ ) contributes 0.425 e-learning outcome units.

**Table 6 Multiple Regression of Academic-related usage and digital literacy to E-Learning Outcomes**

| Factor                 | R <sup>2</sup> adjusted | Beta  | sig   |
|------------------------|-------------------------|-------|-------|
| Academic-Related Usage | 0.272                   | 0.425 | 0.001 |
| Digital Literacy       | 0.030                   | 0.202 | 0.001 |

In other testing, regression analysis was used to identify the contribution ICT Infrastructure to e-learning outcomes (Table 7). The results of the regression test show that Access to ICT positively contributes to E-Learning outcomes, *H2 is supported*. An increase in 1 unit of Access to ICT will contribute as many as 0.272 units of e-learning outcomes. Other test results from each device of ICT found that smartphone and laptop use positively and significantly contributed to E-Learning outcomes. The results of the regression test showed that the largest contribution was the use of laptops ( $\beta=0.252$   $p<0.05$ ) compared to smartphones ( $\beta=0.140$   $p<0.05$ ).

**Table 7 Regression Analysis between Access to ICT and E-Learning Outcomes**

|                      | Beta ( $\beta$ ) | Sig  |
|----------------------|------------------|------|
| <b>Access to ICT</b> | 0.272            | .001 |
| Smartphone           | 0.140            | .004 |
| Laptop               | 0.252            | .001 |
| Tablet               | 0.041            | .452 |
| Personal Computer    | 0.001            | .987 |

The digital inequality perspective has been used to review e-learning outcomes. This study explains that the disparity of digital literacy and academic use determines the benefits of online learning. This finding reinforces the study of scholars that the benefits of the internet depend on



the level of digital literacy and usage (Hargittai et al., 2019). This study found that the contribution of academic-related usage was greater in encouraging the improvement of e-learning outcomes. The academic-related usage likes to increase information seeking for assignment and course material needs to be encouraged to teenagers. In addition, getting used to communication in the form of online discussions about academics in the teaching and learning process is important. Teachers and academic staff also need to open communication spaces for students so that they get solutions to the academic problems they face.

However, digital literacy is important even though the contribution to e-learning outcomes is not large, especially related to how to validate and evaluate the information obtained. Both items will help teenagers get correct and useful information for academic purposes. The dimension of prosuming among adolescents needs to be increased through participation and collaboration activities. Educational institutions need to encourage lecturers to design academic assignments that can involve students in groups and increase student activity.

Another result of the four types of media that were asked, adolescents more often use smartphones in their learning activities. However, it was found that it was laptops that had more impact on the e-learning outcome variant. This needs attention to policy makers to improve infrastructure by providing adequate laptops in educational institutions.

## **CONCLUSION**

Based on the results of research and data processing, it was concluded that of the four types of media that were asked, adolescents more often use smartphones in their learning activities. However, it was found that it was laptops that had more impact on the e-learning outcome variant. This needs attention to policy makers to improve infrastructure by providing adequate laptops in educational institutions.

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