Abstract. Internet became one of the most important things for many people. The internet usage had been increasing in the last decade. It happened to people with various backgrounds and ages around the world. Internet usage behavior is not only happened to adult but also happened to student at school. Some studies have found that internet usage had negative effects on student’s academic performance. But other studies emphasized that positive internet usage behavior gave significant effects on academic outcome. In this study, we distinguish internet usage behavior into two categories, viz. general and professional domain. General internet usage refers to behavior that focus on communication and entertaining purposes; while professional internet usage refers to productive activities in using internet like searching for information and doing some works that are relevant to assist finishing academic’s tasks. This study aims to examine the influence of internet usage—general and professional—on student’s academic performance in Indonesia. Internet usage behavior measured by 2019 Student’s National Examination Survey from Center for Assessment and Learning Indonesia. The student’s academic performance represented by 2019 Indonesian National Examination Score. In this study, socio-economic status (SES) is used as the control variable. Based on regression analysis, this research found that internet usage significantly contributed; 9.2% variance on academic performance; 90.8% variance was explained by other factors. In the higher SES level, general internet usage gave greater prediction on student’s academic performance. But professional internet usage was greater in lower SES level group.

Keywords: Academic performance, internet usage behavior, national examination, socio-economic status.

INTRODUCTION

In the last few years, the number of internet users has increased dramatically. The United Nations data in 2018 shows that the internet user has already reached 3.9 billion people worldwide (UN News, 2018). That was the first time that internet user numbers have exceeded the half of the world’s population. Meanwhile, in Indonesia the number of internet users has reached 171.17 million by 2018. This figure is increased by 10.12% compared to the previous year (APJII, 2018).

In the 21st century, the internet has been widely used by students and teachers all around the world. To improve the quality of learning, practitioners have been developing some new and innovative ways in educational assessment. Most of them are using the internet as a medium to enhance student’s learning. It is thus important to examine whether using the internet has an influence on academic achievement or not.

There are a lot of activities that students can do on the internet. The most common activities are playing games, exploring social media, communicating, internet surfing for entertainment, accessing online learning videos, reading subject matter, and shopping online. A study shows that most secondary students used the internet as social media and entertaining purpose and finally leads to wasting time, delay on schoolwork submission, and poor academic outcomes (Almasi, Machumu, & Zhu, 2017). Another study also shows that students with excessive internet use lead to a higher...
possibility to get a lower grade while moderate use has a positive impact (Austin & Totaro, 2011).

In contrast, a longitudinal field study conducted by Jackson et. al. (2006) recorded that the actual internet use of 140 children from low-income families for 16 months. The results indicated that greater internet use was associated with higher subsequent GPAs and with better performance on standardized test of reading skills. Another study showed that using the internet helps boost exam scores if students use the internet for searching information or other educational purpose (Camerini, Schulz, & Jeannet, 2018).

In a paper published by OECD, Alfonso Echazarra had interesting findings that socio-economically disadvantaged students and advantaged students have different internet usage intensity and pattern (OECD, 2016). In 2015, disadvantage students reported spending 2 hours longer than advantage students. Because of those interesting findings, it encouraged us to do a replication study that aims to see the influence of internet usage frequency on student’s academic performance in Indonesia.

THEORETICAL FRAMEWORK

Internet Usage

Along with the development of the internet, internet usage has become a common term. Chen et. al. (2014) referred internet usage as a tool or a set of behaviors shown while using the internet in specific environmental settings. Until today, numerous studies have been conducted to investigate what the consequences of this behavior. The results showed this behavior has positive and negative influences.

The impact of using the internet depends on the pattern of internet usage itself. Internet usage frequency has to be considered as well. Poorly controlled internet usage is one of the internet addiction’s characteristics and could be the antecedent of other disorders (Weinstein & Lejoyeux, 2010). Besides having impact on our mental health and social behavior (Diomidous, et. al., 2016), using the internet excessively can also cause physical function disorders such as visual fatigue, neck and shoulder pain, and other physical problems (Dol, 2016; Zheng, et. al., 2016).

In educational field, the new and innovative ways in teachings have been developed. E-learning was one of them. In e-learning environment, teachers usually use the internet, multimedia and interactive learning activities. This method increased student’s learning engagement (Kim, Hong, & Song, 2019; Demir & Akpinar, 2018). When student has a good engagement in learning, their academic performance significantly increased (Firat, et. al., 2019).

On the other hand, internet usage in students also leads to poorer exam performance (Chen & Fu, 2009). This happened because students spent more time playing games, exploring social media, watching movies, or other entertainment purpose things. Alamasi et. al. (2017) reported that students claimed that using the internet prevents creative thinking because they used to search on the internet rather than thinking creatively. So, we can say that the consequences of using internet related to its frequency, pattern, and how they retrieve information.

To assess internet usage on students, we adopted Joiner’s method in measuring internet usage behavior (Joiner, 2007, in Chen, et. al., 2014). Joiner used three measures in order to assess internet usage. First, how many hours did the student spent online per week. Second, public internet use that is time spent online for general purpose (e.g. chatting, surfing, exploring social media) and third is professional internet use that is time spent online for educational purpose. In this paper, we distinguished internet usage behavior into two dimensions such as general usage and professional usage. Whereas, the number of hours that students spent online was directly included in both general and professional dimension.

Academic Performance

In this paper, academic performance is represented by the National Examination results. The National examination is a standardized test developed by Ministry of Education and Culture Republic of Indonesia in order to assess student’s achievement against a national standard. As a standardized test, the results can be compared across the country. Gap performance among the regions can be identified, and subsequently efforts to narrow the gap and to increase the quality of education can be made.

Based on Walberg’s theory, academic outcomes or academic performance is influenced by student’s psychological characteristics and their psychological environment. It can be measured from three aspects: cognitive, behavioral and attitude (Reynolds & Walberg, 1992). The cognitive refers to the ability to use their cognitive or thinking, the behavioral aspect shows how the student behaves, and the attitude indicate how to perceive or to have well attitude.

SES and Internet Usage

In analyzing demographic data, socio-economic status variable should be included in the study. Particularly in the discussion regarding internet usage, the relationship between socio-economic status and internet usage is evident. According to Aerschot & Rodousakis’s study, age, educational level, and main activities were relevant factors to examine internet familiarity. The survey reported that 39% of people stated that PCs and internet access are expensive, while 65% stated that...
they don’t need the internet (Aerschot & Rodousakis, 2008).

Furthermore, the influence of socio-economic status to internet usage has been studied in Pakistan. The parameters used to assess socio-economic status were age, income, and a job gotten online. The results showed that young people had higher internet usage frequency compared to any other age group. The people that had higher income and had more job gotten online were found to be more frequent in using internet (Khan, Rahman, & Qazi, 2016). This means that socio-economic status influences internet usage.

Another study related to socio-economic status and internet usage is a study conducted by Lai & Kwan (2016) that showed socio-economic status background plays a role in giving an antecedent impact and being moderate variable to internet usage and severity in internet addiction. A study by Kayri & Gunuc (2016) showed there were differences between socio-economic statuses and severity levels on internet dependency. As many as 26% of students from higher socio-economic status experiencing internet dependency, but on lower social economic status it is only 9.1% who experiencing internet dependency (Kayri & Gunuc, 2016). OECD (2016) reported that the quality of internet usage is related to socio-economic status. It is reported that in 21 out of 42 countries, students with low socio-economic level spent more time online than the student with high socio-economic level but what differs both groups’ online activity is that the high socio-economic student their online time for reading and searching information.

In summary, the studies showed that socio-economic status has a role in predicting internet usage. Therefore, socio-economic variable is controlled in this study. Besides finding the effect of internet usage on academic performance as a holistic information in both socio-economic status (high and low), we also like to elaborate them into two different groups partially. Based on this study, we hypothesize that internet usage behavior gives significant effect on student’s academic performance in higher SES group. In contrast, its effect in lower SES group is not significant.

Research Model

The aim of this study is to examine the effects of general and professional internet usage on student’s academic performance in Indonesia. As an archipelago country, Indonesia has large number of students. In this study the population is senior high school students in Indonesia. The subject of this study were 70,690 senior high school students (28,258 males and 42,432 females) from 34 provinces in Indonesia. We used secondary data sourced from the Center for Assessment and Learning (Pusmenjar) Survey of National Examination 2019.

Measurement

Internet usage

Based on the Pusmenjar survey, we determined four items that measure general internet usage dimension and five items indicated professional dimension. The items consist of 4 points Likert scale about the frequency of internet usage based on student’s self-report. Data were analyzed using Rasch Model Rasch model is a tool that measures the unidimensionality of interval-level scale in ordinal relationships between person ability and item difficulty that are preserved in response probability (Bond & Fox, 2015). In the Rasch model, items were considered good when they are fitted into the model. The fit index—in this case—was the estimation of infit mean square (infit mnsq) index. In addition, point measure correlation (ptmea corr) is used as a criterion of items validity. This property was obtained by correlating each single item score with its dimension score. Items considered satisfactory if they have a mean square score between 0,5 to 1,5 (Boone, Staver, and Yale, 2014) and have positive point measure correlation. We ignored the estimation of standardized outfit scores because

RESEARCH METHOD

Population and Sample

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some studies found that it was sensitive to data with large number (Sumintono & Widhiarso, 2015). We analyzed the data using Winstep Rasch Measurement version 3.65.0 (Linacre, 2006). The following tables are the item analysis information of general and professional internet usage:

**Table 1. Item Information of General User**

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Infit Mnsq</th>
<th>PtMea Corr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Playing online games</td>
<td>1.23</td>
<td>0.52</td>
</tr>
<tr>
<td>2</td>
<td>Using social media</td>
<td>0.81</td>
<td>0.70</td>
</tr>
<tr>
<td>3</td>
<td>Surfing internet for fun</td>
<td>0.78</td>
<td>0.73</td>
</tr>
<tr>
<td>4</td>
<td>Finding instant information (using maps, online shopping, etc.)</td>
<td>1.16</td>
<td>0.51</td>
</tr>
<tr>
<td>5</td>
<td>Communicating and share digital content</td>
<td>0.98</td>
<td>0.64</td>
</tr>
</tbody>
</table>

**Table 2. Item Information of Professional User**

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Infit Mnsq</th>
<th>PtMea Corr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Using internet for gaining general knowledge and news</td>
<td>1.08</td>
<td>0.49</td>
</tr>
<tr>
<td>2</td>
<td>Using digital learning content for studying</td>
<td>0.97</td>
<td>0.54</td>
</tr>
<tr>
<td>3</td>
<td>Reading or listening information to learn something new</td>
<td>0.88</td>
<td>0.58</td>
</tr>
<tr>
<td>4</td>
<td>Creating or editing their own digital content (music, movie, etc)</td>
<td>1.08</td>
<td>0.47</td>
</tr>
</tbody>
</table>

The tables show that both general and professional items obtain the estimation of infit mean square index within the range of 0.5 to 1.5. It means all items are fitted into Rasch model that measure unidimension trait with continuum items. All items had positive point measure correlation index. It means they have positive direction into the dimension that wanted to be measured.

**Academic performance**

Academic performance was represented by the 2019 national examination score. We utilize the national examination average score in subjects: Indonesian, English, and mathematics. The reason is that these subjects were taken by all of social science, natural science, and language students in high school. This provides sample representativeness in each program study.

**Socio-Economic Status (SES)**

Students’ socio-economic status was indicated by parents' educational level and socio-economic status. The indicator of socio-economic status was the ownership of luxury items such as four-wheeled and two-wheeled vehicles, private rooms, air conditioners, computers/laptops, smartphones, televisions, and private rooms. After being analyzed using the Rasch Model, there are two items that are not fit, namely the number of bathrooms inside the private room and the number of art stuffs in the house.

**RESULT**

**National Examination’s Score**

The National Examination data represents student’s academic performance in 34 provinces. The following graph shows the average score of national examination score:
According to figure 2, we got the information that the national examination average score of students in 34 provinces was 50.32. Three provinces with highest national examination score are DKI Jakarta, Yogyakarta, and Jawa Tengah. Those provinces located in Java Island. The provinces that got lowest average score were Maluku Utara, Maluku, and Aceh. Interesting thing shown in Figure 12 that there were 13 provinces had reached score above the national average score. Yet, there were 21 provinces had average score lower than national average score.

Internet Usage Effect on Student’s Academic Performance

To get the information about effect of internet usage toward student’s academic performance, we analyzed the variables by simple regression analysis. We took internet usage (general and professional) as independent variables and student’s academic performance as dependent variable. Then, we use IBS SPSS ver.21 as a tool for analyzing our data. The following table will show you the result of the analysis:

<table>
<thead>
<tr>
<th>Table 3. Model Summary of Regression Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

According to table 3, the estimation of adjusted R Square was 0.092. It means that internet usage variable (general and professional) contributed 9.2% variance on academic performance; 90.8% variance was explained by other factors. In spite of the variance was only 9.2%, the model was significant at 0.000 p-value point (p<0.05).

Since we separated internet usage into general and professional dimension. We also found that each dimension has different coefficients in describing its correlation with national examination score. The following table will show you the coefficient of each dimension:

<table>
<thead>
<tr>
<th>Table 4. Coefficient of General and Professional Internet Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>PRO</td>
</tr>
<tr>
<td>GEN</td>
</tr>
</tbody>
</table>

The standardized coefficients in Table 4 shows that professional internet usage had slightly greater effect (b=0.177) on academic performance variance than general internet usage (b=0.158). Based on the regression equation, standardized coefficients will represent the multiplication of each digit of internet usage on academic performance prediction. For example, when the professional internet usage index increase by 1 point, it is followed by addition of prediction score of academic performance 0.177.

Differences Among Higher and Lower SES

In order to examine differences effect of internet usage on academic performance among Socio-Economic Status (SES), we separated the subject into two groups which is a group of samples with higher SES level and other in lower SES level. The following table shows the effects of internet usage on student’s academic performance among different group of SES level:
According to the table above, the effect of internet usage on student's academic performance are both significant among higher and lower SES group. However, there is interesting finding that the coefficient of each variable was differ among the SES group. In the higher SES level group, general internet usage gave greater prediction on academic performance than professional internet usage (B std. 0.157 than 0.093). In the other hand, in lower SES level group, the prediction coefficient of professional internet usage was greater (0.138 than 0.099). This would be interesting information to be studied in the further research.

DISCUSSION

From this research, we found that there is a difference effect of internet usage on student’s academic performance among high socio-economic level and low socio-economic level. In higher SES group, general internet usage gave greater prediction on academic performance. But, in lower SES group, professional usage gave greater prediction than general usage. This result might be supported by the indicator of socio-economic status assessment, which is involving parents’ educational background. Davis-Kean (2005) found that SES indirectly affects children’s academic achievement through their parents’ behavior and belief and parents’ educational level itself influenced children’s academic achievement by amount of 53%.

Another study also found that socio-economic status influences students’ academic achievement. Xuan, et. al. (2019) suggest that socio-economic influence students’ academic achievement through the perception of teacher-student relationships. It makes the variable of social-economic has an influence on students’ academic achievements and in this study socio-economic is the mediating variable of internet usage and students’ academic achievement.

The last thing that might explain this finding is that merely because higher socio-economic students have more facilities and access on the internet, thus they can be more frequent to access it (Khan, et. al., 2016). In assessing student’s socio-economic status, we asked how many smartphones, laptops, or computers they have. And this could be the reason why general internet usage have greater effect among students with higher socio-economic status. It merely because they have more access to the internet.

In this research, we found that in lower SES group, professional internet usage has greater coefficient in predicting student’s academic performance than the general internet usage. The finding in lower SES group was in line with previous study which suggested that using internet for entertainment purpose in a large amount of time can cause poorer academic performance (Camerini, et. al., 2017). But among higher SES group, this result doesn’t seem apply the same way.

In the other hand, the finding in higher SES group is not in line with other studies which suggest that activities related to professional use such as searching information, reading school subject material, and online learning have a higher impact on student’s academic performance than general use (Leung L., & Lee P. S. N., 2012; Ritzhaupt, et. al., 2013; Harris C., et. al., 2017). There are several things that might cause this anomaly. One of them is inappropriate item categorizing. There are some items that we think might be the cause of this anomaly. An item that ask about how often students use social media was categorized into the general internet user. This might be the problem, considering how varies information in social media flow. Some useful information that’s found on social media probably may playing role in increasing student’s academic performance. Then in measuring professional internet users we ask about how often students communicate online, this doesn’t rule out the

**Table 5a. Coefficient of General and Professional Internet Usage in Higher SES Level**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>PRO</td>
<td>0.114</td>
<td>0.009</td>
<td>0.093</td>
<td>12.867</td>
</tr>
<tr>
<td>GEN</td>
<td>0.157</td>
<td>0.009</td>
<td>0.157</td>
<td>21.714</td>
</tr>
</tbody>
</table>

**Table 5b. Coefficient of General and Professional Internet Usage in Lower SES Level**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>PRO</td>
<td>0.107</td>
<td>0.005</td>
<td>0.139</td>
<td>22.914</td>
</tr>
<tr>
<td>GEN</td>
<td>0.006</td>
<td>0.004</td>
<td>0.099</td>
<td>13.386</td>
</tr>
</tbody>
</table>

DOES INTERNET USAGE FREQUENCY GIVE IMPACT TO STUDENT’S ACADEMIC PERFORMANCE?
Septian Dwi Cahyo, Arif Budiman Al Fariz & Citra Ayu Lestari
posibility that communication can be part of transfer of knowledge and even increases student learning achievement. Another item that may be problematic is the item that asks how many times student read the news. That item was categorized to general internet user. These items potentially have a cause in shifting the value of the influence of each variable on student academic achievement.

Though the use of the internet has a significant positive effect on student learning outcomes, we should use the internet wisely. Even if we use the internet in professional way, there still be a limitation in using the internet. Excessive use of the internet, more than 6 hours a day, will adversely affect student academic achievement (Muralidharan L., & Gaur S., 2018). Therefore, the role of parents is also very important in dealing with this. Because when someone turns to a compulsive internet user-both in higher and lower SES-will adversely affect academic achievement and might leads to low life satisfaction or other problems related to cellphone use (Dhir A., Chen S., & Nieminen M., 2015).

Limitations for future researches

The limitation of this study is insufficiency data in the instrument for assessing student’s socio-economic level that we used. It only consists of items questioning how many luxury items they have in their house and their parents' educational background. Therefore, it is necessary to make a more detailed measurement of student’s socio-economic level. Adding indicators such as parents’ income, job, or other is considered helpful.

From the results of this study, we provide several suggestions that might be considered by various parties to improve student achievement. First, as explained above, we know that using internet can affect student learning outcomes. But with a note that students' online activity is the most crucial thing to determine the result. Therefore, it is recommended for parents to monitor their children's internet usage at home and to guide their children to increase internet professional use.

Secondly, we expected the school to be able to make learning programs to increase the use of the internet in a professional way and restrict the general use, so students can engage more in professional internet use. For teachers, we suggest applying the use of the internet more creatively and innovatively to maximize the benefit of internet use. Third, is for the government. We suggest the government to improve the quality of the existing digital learning portal (eg. https://belajar.kemdikbud.go.id/).

CONCLUSION

This research found that internet usage has significant effect on student’s academic performance. This effect was found higher on the group of students with higher SES. It also showed that in general, professional internet user has a higher effect on student’s academic performance than the general user does. But in the group of higher SES this result doesn’t seem apply the same way.

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