Indonesian Journal of Sustainability Accounting and Management
ISSN 2597–6214 | e–ISSN 2597–6222
DOI: 10.28992/ijsam.v8i1.786

Examining The Effect of Digital Skills, Computer and Smartphone Usage Hours on The Digital Impact Among Students in A Malaysian Public University

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Abstract: The objective of this study is to examine the digital impact among undergraduate students in a Malaysian public university that focus on how digital skills, computer and smartphone usage hours influence students perceived digital impact. This study involves a quantitative methodology, sampling 204 undergraduate students from a Malaysian public university. The use of an online questionnaire format facilitated widespread distribution, made completion more convenient for respondents, and facilitated the accumulation and management of responses. The results demonstrate a strong sense of digital citizenship among the respondents. Variables such as hours spent on the computer (COMPHOUR), digital skills (DIGSKILL), and hours spent on the smartphone (HPHOUR) have varying degrees of impact on the dependent variable, the perceived digital impact (DIGIMPACT). DIGSKILL appears to have a significant relationship with DIGIMPACT but not the HPHOUR and COMPHOUR. The findings underscore the importance of digital skills and call for the development of comprehensive digital literacy programs to equip students with the necessary skills for responsible and meaningful engagement with digital technology. This study added to the literature by analyzing digital skills, computer and smartphone usage hours on the digital impact among university students in Malaysia.

Keywords: computer, digital impact, digital skills, smartphone, usage hours.

Article info: Received 30 May 2023 | revised 3 June 2023 | accepted 27 July 2023

Recommended citation: Johari, R. J., Rashid, N., Rahman, N. H. A., Ismail, R. F., & Isa, Y. M. (2024). Examining The Effect of Digital Skills, Computer and Smartphone Usage Hours on The Digital Impact Among Students in A Malaysian Public University. *Indonesian Journal of Sustainability Accounting and Management, 8*(1), 203–213. https://doi.org/10.28992/ijsam.v8i1.786

INTRODUCTION

Digitalization has become more than a fad in the 21st century, when technology is increasingly influencing our lives; it is now a crucial aspect of our existence (Horoshko et al., 2021; Yeo et al., 2022; Voronkova et al., 2023). This era of digital revolution is characterized by an increase in the use of digital tools and platforms, resulting in a profound transformation in how people live, work, interact, and learn (Schneider & Kokshagina, 2021;

Singh et al., 2022). This influence is especially notable among the younger generation, who integrate digital elements into their daily lives with relative ease. The constant connection to the digital world, enabled by devices such as computers and smartphones, has resulted in an evolving digital citizenship landscape. This concept, digital citizenship, was coined to describe the responsible and ethical use of technology, and it is quickly becoming a social norm. In addition, advancement in information and communication technology (ICT) has suggested that this sector can play a central and vital role contributing to the achievement of the United Nations Sustainable Development Goals (SDGs) (Jones et al., 2017; Chien et al., 2021; Zhang et al., 2022).

Citizenship in the digital age encompasses a wide range of factors, including digital literacy, online protocol, privacy, and security. In today's digital society, where the responsible use of technology can have significant consequences for individuals and communities, these elements are crucial. Understanding and fostering digital citizenship is particularly essential for educators and universities. They are responsible for preparing students to navigate the digital society and equipping them with the skills necessary to contribute effectively and responsibly. Fundamentally, it is expected that one must have a suitable and adequate level of technological competency (Hernandez-de-Menendez et al., 2020; Thottoli, 2022). Despite the rapid advancement of technology and its resulting impact on profession and society, research in the field of digital citizenship, particularly concerning the factors influencing it and its perceived impact among university students, remains limited. There is a need to investigate specific factors, such as the number of hours students spend on computers and smartphones and their level of digital literacy. These variables may have a substantial effect on the students' perceptions of the digital impact and their behavior in the digital world.

This study seeks to bridge this gap by investigating how digital skills, computer and smartphone usage hours influence undergraduate students' perceptions of the digital impact. This investigation centres on a public university in Malaysia, a country that provides a unique backdrop due to its constant technological advancement and increased digital engagement among youth, especially university students. The main objective of this study is to identify the factors that contribute to the perceived digital impact. By doing so, we hope to equip educators and technology leaders with the necessary knowledge to direct their efforts in fostering digital citizenship. These findings could aid universities in developing strategies to equip their students with the skills and attitudes necessary to navigate the digital world responsibly. It will allow them to maximize the advantages of digital technology while avoiding its potential drawbacks. Long-term, we intend to equip our future leaders to be not only technologically adept, but also conscientious and responsible digital citizens.

Choi & Park, in their 2023 publication, define digital citizenship as "the norms of appropriate, responsible technology use." It emphasizes ethical and social behaviour in the digital realm, requiring conformity with societal norms and respect for the rights of all users. This multidimensional concept encompasses the enormous array of social, ethical, and cognitive implications inherent to a digital society, including digital literacy, online etiquette, privacy, and security. According to Calzada (2023), digital citizenship is more than just access to technology. It necessitates the capacity to utilize digital tools effectively and responsibly, which necessitates critical thinking and digital ethics. This extension emphasizes the importance of user accountability and control, implying that having access to the tools is insufficient; one must also use them responsibly.

Perceived digital impact is a complex concept that pertains to a person's perception of the impact of digital technology on various facets of life. According to research, an individual's perception of the impact of digital technology can considerably impact their behaviour, attitudes, and intentions in the digital realm (Rodzalan & Saat, 2016). This perception can be influenced by digital skills and frequency of technology use, as well as more subjective factors such as an individual's attitudes towards technology (Chavoshi & Hamidi, 2019). While existing

literature provides a wealth of knowledge on digital skills, computer and smartphone usage, and their effects, there is a distinct knowledge gap regarding their collective impact on university students' perceptions of the digital impact. This research seeks to address this deficiency by investigating these factors among Malaysian university students. In our next section below, we hypothesize that increased usage hours of computers and smartphones, as well as a higher level of digital skills, contribute to these students' perception of a greater digital impact.

Skills in the use of digital technology are an essential component of digital citizenship. According to Amhag et al. (2019), digital skills are defined as a comprehensive collection of talents that are required to engage with digital technology in an efficient manner. These skills go beyond only being proficient with technology and include cognitive knowledge as well as the ability to use technology in a responsible and creative manner. It is critical for pupils to acquire digital skills within the context of an educational setting if they are to be prepared to successfully traverse the digital world. As a result of the proliferation of online educational opportunities, proficiency in digital skills is becoming increasingly important. According to research conducted by Instefjord & Munthe (2017), digital abilities have been found to have a favourable link with outcomes such as academic achievement and engagement. This would imply that students who have stronger digital skills can utilise technology for academic objectives in a more effective manner, hence improving their overall academic experience. Given this, our first hypothesis is:

H1: A higher level of digital skills contributes to a higher perceived digital impact among undergraduate students.

The frequency and duration of computer and smartphone use constitute a significant portion of our digital lifestyles. A study by Junco and Cotton (2012) demonstrates a positive correlation between the use of ICTs, such as computers and smartphones, and academic performance, so long as these tools are utilised with intention and efficiency. However, excessive use of these technologies can result in problems such as digital distraction and may have a negative effect on mental health (Twenge, Joiner, Rogers, & Martin, 2017). This suggests that despite the necessity of computer and smartphone use, a balance must be maintained to prevent potential pitfalls. This leads to the second and third hypothesis:

H2: Increased hours of computer usage contribute to a higher perceived digital impact among undergraduate students.

H3: Increased hours of smartphone usage contribute to a higher perceived digital impact among undergraduate students.

METHODS

This study's data collection was meticulously carried out using an online questionnaire directed primarily at accountancy students attending one of the largest public universities in Selangor. According to information obtained from the Academic Affairs Department, the university enrols a total of 1,733 students. The proposal established by Lakens (2022) was consulted when determining an appropriate sample size. Their recommendations suggest a sample size of 313 for a population of approximately 1,700. This study sought to collect a sample of 313 students from the student population.

A pilot test of the questionnaire was conducted prior to the final data collection to assure its validity, readability, and ease of completion. This preliminary phase was essential for identifying and resolving any potential problems with the questionnaire, such as ambiguous questions or an excessively complex structure.

The finalized questionnaire was then distributed to the predetermined sample of 313 accountancy students following the correction of any identified errors. The use of an online format for the questionnaire facilitated widespread distribution, made completion more convenient for respondents, and facilitated the accumulation and management of responses. Out of the 313 questionnaires that were distributed, 204 responses were returned. This study's final sample consisted of these responses, which provided valuable information on the relationship between computer and smartphone usage hours, digital abilities, and the perceived digital impact among undergraduate students at this public Malaysian university.

In this investigation, statistical analysis was conducted using the least squares method and the E-Views program. The least squares method is a standard technique for estimating the unknown parameters of a linear regression model. It operates by minimizing the sum of squares of the differences between the observed dependent variable in each dataset and those predicted by a linear function of a set of independent variables. This technique is preferred when working with large datasets, such as in this study, because it yields robust and trustworthy results. Due to its user-friendly interface and robust computational capabilities, the analysis was conducted using E-Views, a sophisticated and well-known statistical software application.

The variables in this study were measured based on responses gathered through the questionnaire, employing a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This scale was chosen as it is a reliable tool for assessing attitudes, perceptions, and behaviours, providing a nuanced understanding of the respondents' views (Stock et al., 2017). In this survey, the questionnaire items were adapted from established literature, tailoring them to fit the context of this study. The dependent variable, digital impact (DIGIMPACT), was gauged using questions adapted from previous studies by Toader et al. (2021). This variable represents the perceived influence of digital technology on the students' academic and personal lives.

The independent variables in this study include the hours of computer usage (COMPHOUR), the level of digital skills (DIGSKILL), and the hours of smartphone usage (HPHOUR). The measurement items for these variables were derived from study by (Simsek, 2011), ensuring their relevancy and reliability. Data gathered from these measurement items were then processed using E-views software, leveraging the least squares technique to analyse the relationships between the variables. This approach allows for a comprehensive understanding of how computer and smartphone usage hours, and the level of digital skills influence the perceived digital impact among the undergraduate students in a Malaysian public university.

RESULTS AND DISCUSSION

Table 1 provides a detailed summary of the descriptive statistics for the dependent variable 'Digital Impact' (DIGIMPACT) and the independent variables 'Computer Usage Hours' (COMPHOUR), 'Digital Skills' (DIGSKILL), and 'Smartphone Usage Hours' (HPHOUR). For the dependent variable DIGIMPACT, the average score across the 204 observations is approximately 1.36, indicating a moderately high level of perceived digital impact among the participants. The median value is 1.0, and the values range from 0 to 2. The standard deviation of approximately 0.58 suggests moderate variability in the perceived digital impact.

Looking at the independent variable COMPHOUR, we see that the average hours of computer usage is about 4.16, with a median of 4.0 hours. This indicates that on average, students are spending a significant portion of their time on computers. The data range from 0 to 6 hours, and the standard deviation of about 1.68 reveals a considerable spread in the computer usage hours among the students. In terms of DIGSKILL, the mean score is approximately 1.15, reflecting a relatively high level of digital skills among the respondents. The

median score is 1.0, and the scores range from 0 to 2. The standard deviation, at 0.38, suggests a lower degree of variation in digital skills among the students compared to the other variables. Lastly, the variable HPHOUR has an average of 5.68, indicating that students are spending a substantial part of their time on smartphones. The data range from 1 to 6 hours, with a median of 6.0 hours. The standard deviation of 0.78 suggests a moderate variability in the smartphone usage hours among the students.

Table 1 Descriptive Results

	DIGIMPACT	COMPHOUR	DIGSKILL	HPHOUR
Mean	1.362745	4.161765	1.151961	5.686275
Median	1.000000	4.000000	1.000000	6.000000
Maximum	2.000000	6.000000	2.000000	6.000000
Minimum	0.000000	0.000000	0.000000	1.000000
Std. Dev.	0.583673	1.678114	0.386274	0.787593
Skewness	-0.273088	-0.557273	1.411660	-3.266766
Kurtosis	2.295785	2.437143	4.598345	15.74871
Jarque-Bera	6.750936	13.25167	89.46972	1744.341
Probability	0.034202	0.001326	0.000000	0.000000
Sum	278.0000	849.0000	235.0000	1160.000
Sum Sq. Dev.	69.15686	571.6618	30.28922	125.9216
Observations	204	204	204	204

The skewness and kurtosis values provide further insights into the distribution of the data. A negative skewness value, as seen for DIGIMPACT, COMPHOUR, and HPHOUR, indicates a data distribution that is skewed to the left, or negatively skewed. On the other hand, DIGSKILL has a positive skewness value, indicating a right or positively skewed data distribution. The kurtosis values for all variables suggest a relatively flat distribution ('platykurtic'), except for HPHOUR, which has a high kurtosis value, indicating a sharp, leptokurtic distribution. The Jarque-Bera test is used to test the null hypothesis that the data are normally distributed. For all variables, the probabilities are less than 0.05, rejecting the null hypothesis of normal distribution. The 'Sum' and 'Sum Sq. Dev.' values provide the total of the observations and the total sum of squared deviations for each variable, respectively. This further illustrates the dispersion and variability of the data for each variable. Therefore, these descriptive statistics provide essential insights into the properties and distribution of the data, aiding in the understanding of the underlying patterns and informing subsequent statistical analysis.

This study utilized the Least Squares technique for data analysis, a robust statistical method implemented through the E-Views software. Least Squares technique was preferred due to its aptness for large datasets and its robust and reliable results. The E-Views software, known for its powerful computational capabilities, facilitated this statistical analysis. The methodology of the analysis was divided into a two-step approach, as recommended by Mengist et al. (2020). The first step involved the assessment of the measurement model. Here, the validity and reliability of the instruments used were rigorously examined, ensuring the integrity and accuracy of the data collected. This step was vital for ascertaining that the measures for variables such as computer

usage hours (COMPHOUR), digital skills (DIGSKILL), and smartphone usage hours (HPHOUR) were reliable and valid. Following the validation of the measurement model, the second step was to examine the structural model. This process was key in testing the hypothesis developed for the study. Here, the relationships between the independent variables (COMPHOUR, DIGSKILL, HPHOUR) and the dependent variable (DIGIMPACT) were explored.

Using the Least Squares method in E-Views, the coefficient for each variable was calculated, giving an insight into the influence of each factor on the perceived digital impact (DIGIMPACT). The level of significance of these relationships was also assessed. The E-Views software also facilitated the computation of additional metrics such as the R-squared and Adjusted R-squared values, which measure the proportion of the variance for the dependent variable that's explained by the independent variables in the model. Moreover, it allowed for the calculation of the F-statistic, a statistic that's used to assess the significance of the overall regression model. Therefore, using the E-Views software for the Least Squares method offered a comprehensive and powerful toolset for analysing and interpreting the data gathered in this study.

The objective of this research was to investigate the impact of hours spent on computer and smartphone devices, along with the proficiency in digital skills, on the perceived digital impact among undergraduate students at a Malaysian public university. This was assessed using the Least Squares method via the E-Views software. The results in in the Table 2 generated from this investigation have provided us with several critical insights into the various hypotheses posited in this study.

Table 2 Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMPHOUR	0.036402	0.023518	1.547801	0.1233
DIGSKILL	0.560733	0.097985	5.722619	0.0000
HPHOUR	0.067254	0.049659	1.354320	0.1772
C	0.182881	0.292490	0.625256	0.5325
R-squared	0.174803	Mean DV		1.362745
Adjusted R-squared	0.162425	S.D. DV		0.583673
S.E. of regression	0.534172	Akaike info criterion		1.603217
Sum squared residual	57.06802	Schwarz criterion		1.668278
Log likelihood	–159.5281	Hannan-Quinn criterion		1.629535
F-statistic	14.12215	Durbin-Watson stat		1.827629
Prob(F-statistic)	0.000000			

Hypothesis 1: Role of Digital Skills (DIGSKILL)

Our first hypothesis stipulated that a higher degree of digital skills (DIGSKILL) would result in a greater perceived digital impact (DIGIMPACT). The data strongly supported this hypothesis, as indicated by the substantial coefficient of 0.560733 for DIGSKILL, with a near-zero probability (0.0000). This finding underscores that students who possess advanced digital skills perceive a greater digital impact. This result is in line with existing literature, which has consistently emphasized the pivotal role of digital skills in the context of digital engagement and literacy (Zhao et al., 2021; Vodă et al., 2022; Martínez-Peláez et al., 2023). Given the significance

of digital skills in today's tech-driven world, it is crucial that education systems incorporate robust digital literacy programs to equip students with the requisite digital skills. This would help them not only to utilize technology more effectively but also to understand and manage the effects of their digital engagement.

Hypothesis 2: Impact of Computer Usage Hours (COMPHOUR)

Our second hypothesis proposed that the hours dedicated to computer usage (COMPHOUR) would significantly enhance students perceived digital impact (DIGIMPACT). The coefficient derived from our data analysis for COMPHOUR was 0.036402, with a probability of 0.1233, suggesting that it did not reach a level of statistical significance. This finding indicates that the amount of time spent by students using a computer did not have a significant effect on the perceived digital impact. This outcome challenges the prevalent belief that longer computer usage inherently results in a greater digital impact and signals a need to reconsider this assumption. The nature of computer usage may be a relevant factor here; for instance, how much of this time is spent on academic pursuits as compared to leisure activities (Edwards & Larson, 2020; Oswald et al., 2020; Carpenter et al., 2021). Future research should attempt to further delineate these usage types, as they could potentially have distinct impacts on perceived digital impact.

Hypothesis 3: Influence of Smartphone Usage Hours (HPHOUR)

The third hypothesis surmised that increased hours of smartphone usage (HPHOUR) would positively impact the perceived digital impact (DIGIMPACT). Nevertheless, the results yielded a coefficient of 0.067254 for HPHOUR, with a probability of 0.1772, implying that it did not reach statistical significance. Hence, this result refutes the hypothesis, suggesting that merely increasing the duration of smartphone usage does not necessarily enhance the perceived digital impact. This outcome opens avenues for further inquiry into the quality, rather than the quantity, of smartphone usage (Martin et al., 2020; Bitrián et al., 2021; Stocchi et al., 2022). There could be specific smartphone applications or activities that contribute more effectively to the perceived digital impact, warranting further investigation.

Despite the rejection of individual hypotheses, it is essential to observe that the model demonstrated statistical significance. This is indicated by the significant F-statistic of 14.12215 and the probability for the F-statistic being close to zero. Therefore, when observed collectively, the selected variables can partially account for the perceived digital impact, even though not all individual variables were statistically significant. Therefore, this study highlights the significance of digital skills and the qualitative aspects of device usage in moulding university students' perceptions of the digital impact. It indicates the need for strategies that strengthen digital skills and encourage students to use digital devices thoughtfully and productively. In addition, the results indicate that merely increasing the duration of use is not the optimal strategy. Instead, the objective should be to develop a nuanced understanding of how digital tools can be used effectively and responsibly. This would ensure that students are not only proficient users of digital technology, but also develop a deeper comprehension of its impact, allowing them to navigate the digital world with greater confidence and awareness.

One critical aspect of the validity of our research findings hinges on the stability of the model we utilized throughout our investigation. To substantiate the constancy and dependability of the model, we applied the Cumulative Sum of Recursive Residuals (CUSUM) test. The CUSUM test is a prominent tool in the field of econometrics, utilized for verifying the stability of the coefficients in a regression model across a given time, and it is adept at identifying potential structural breaks within the model.

The results of our application of the CUSUM test, as depicted in Figure 1, affirmed the stability of our model. The test indicated that there were no structural breaks surpassing the critical 5% threshold level. This result

supports the contention that the relationships between the variables in our model have remained constant and unaltered during the period of our study. It also underscores the notion that there has been no significant change in the model's parameters during the study's timeframe, thereby reinforcing the robustness and reliability of our results.

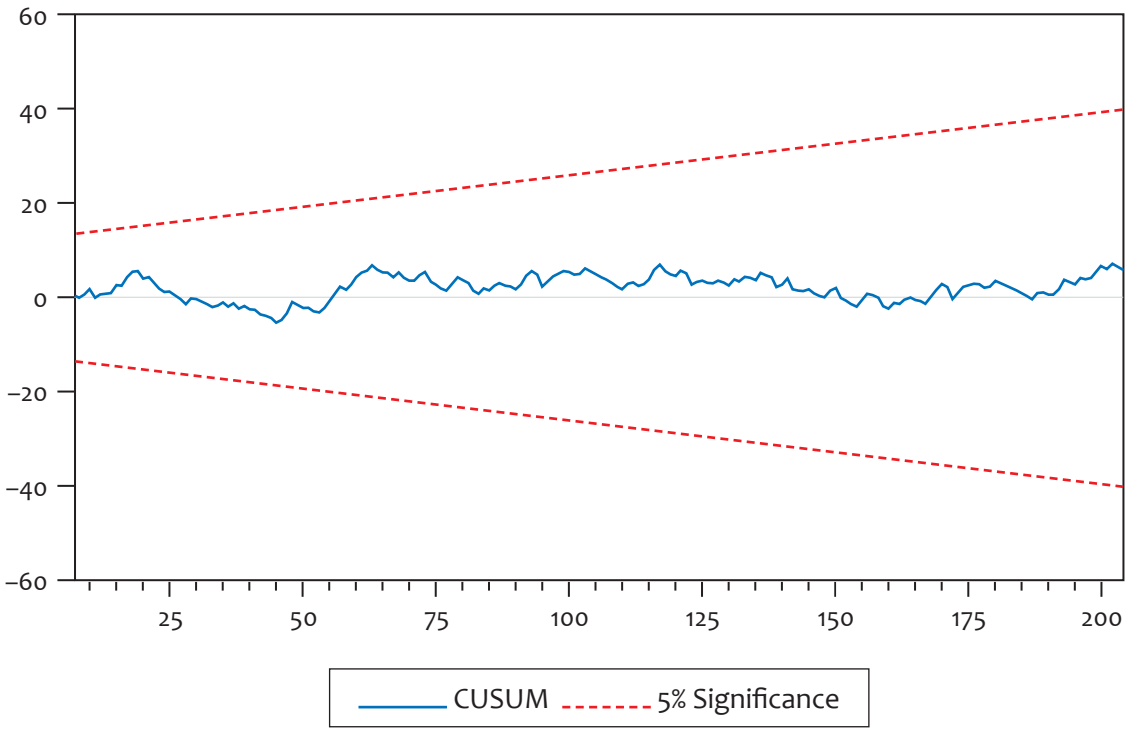

Figure 1 CUSUM (Stability test)

The implications of our model's confirmed stability are manifold. Firstly, it bolsters the credibility of our research findings by demonstrating that the associations explored in our study are likely to be durable and are expected to continue in the same manner if the study were replicated under similar conditions. It also instils confidence that the conclusions derived from our results are dependable, and that they can be applied with a high degree of certainty to inform related policies or interventions. Therefore, the CUSUM test's confirmation of the model's stability underscores the reliability of our research and provides us with a greater degree of confidence in the robustness of our findings. It reinforces the primary conclusions of our study regarding the importance of enhancing digital skills among university students and promoting the judicious and effective use of digital technology (Lilian, 2022; Imjai et al., 2023). Furthermore, it suggests that the results of our study can provide a reliable foundation for future investigations and scholarly discourse in this area.

CONCLUSION

This study investigated the impact of digital skills along with, computer and smartphone usage hours, on the perceived digital impact among undergraduate students in a Malaysian public university. The findings shed light on the relationships between these variables and provide valuable insights for educators, policymakers, and technology leaders. The results revealed that digital skills play a crucial role in influencing the perceived digital impact among university students. Students with higher levels of digital skills had a stronger perception

of the impact of digital technology on their academic and personal lives. This highlights the importance of incorporating comprehensive digital literacy programs that equip students with the necessary skills to navigate the digital landscape effectively. However, the study found that the hours spent on computers or smartphones did not significantly contribute to the perceived digital impact. This suggests that the quality of computer and smartphone usage, rather than the quantity of usage, is a more influential factor. Future research should delve deeper into understanding the specific activities and behaviours associated with computer and smartphone usage that have a greater impact on students' digital experiences. Based on the overall findings, it is recommended that educational institutions and technology leaders prioritize the development of digital skills among students. This can be achieved through comprehensive digital literacy programs that encompass not only technical skills but also critical thinking, responsible use of technology, and ethical considerations. While this study provides valuable insights into the factors affecting the perceived digital impact among undergraduate students, it is essential to acknowledge its limitations and consider avenues for future research. One limitation is the focus on a specific Malaysian public university, which may limit the generalizability of the findings to other contexts. Future research could expand the scope to include multiple universities or different educational settings to gain a more comprehensive understanding of the topic. Additionally, this study relied on self-reported data, which may be subject to bias and recall errors. Future research could also incorporate objective measures, such as behavioural observations or tracking digital usage, to enhance the validity of the findings. Future research could explore additional factors, such as socio-demographic variables, psychological factors, and the influence of educational interventions, to provide a more holistic understanding of digital impact among university students. In conclusion, this study contributes to the growing body of knowledge on digital impact among undergraduate students. The findings underscore the importance of digital skills and call for the development of comprehensive digital literacy programs to equip students with the necessary skills for responsible and meaningful engagement with digital technology.

ACKNOWLEDGEMENT

We appreciate the Universiti Teknologi MARA's support of this study under the MYRA Research Grant 2020 (Ref: 600-RMC/MyRA 5/3/LESTARI (047/2020) program and the Faculty of Accountancy for the given cooperation in completing this study.

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