

Youth Digital Technology Attitudes

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ABSTRACT

Today's digital technologies have become essential tools in daily living. The young generation nowadays is very savvy in using digital technologies. It is essential to instill digital citizenship skills in preparing those who are also technology users for a digital society today. However, not all of them have undergone formal training to survive in a challenging environment in a digital world. Thus, this study aims to examine students' attitudes and digital behaviour, particularly in rural schools, including how youth self-evaluate their perceptions of digital technologies, digital competencies, and attitudes towards digital technologies. Data were collected using survey questionnaires, with 210 valid responses. The study results revealed a statistically significant association between attitude toward digital use and digital competence dimensions, including technological, communication, and cognitive. Accessibility dimension in cyber-ethics was also statistically significantly associated with attitudes toward digital use among male students. To summarize, specific concerns and emphasis on youth digital technology usage and education must ensure that they are not left behind and vulnerable to cybercrime while fostering a responsible e-society with excellent digital citizenship characteristics.

Keywords: Attitudes, digital technologies, digital competence, cyber-ethics, school students

INTRODUCTION

In today's world, digital technologies have a significant influence on many facets of our life. They have influenced how people work, study, communicate, analyse information, share papers, and even engage in leisure activities. Today's youth are exceptionally skilled at using modern technologies. As a result, it is critical to teach digital citizenship skills to people who actively participate in today's digital society. However, not everyone has obtained the necessary formal training to effectively handle the problems of the digital world. Due to the rise of unethical digital issues, educators must be equipped with the expertise to teach students about their digital duties and create a solid ethical basis. Furthermore, those who remain disengaged from modern technology miss out on their benefits and fall behind. As a result, students must be proficient in the use of these technologies. The digital competency of students in higher education has been examined as a predictor of academic achievement [1]. The concept of digital wellness has developed as a significant topic, including the appropriate and healthy use of digital technologies. Therefore, the main objective of this study is to examine attitudes towards the use of digital technologies.

LITERATURE REVIEW

Digital Technologies

Digital technology has penetrated every area of students' life, including how they play, engage, communicate, and learn. It is apparent that children are exposed to and connected with technology from an early age, and parents have an important role in not only enabling but also facilitating its use. They've grown up with digital devices, and they're on the point of expecting technology to be smoothly integrated into most parts of their personal, professional, and social lives [2]. Several researchers have highlighted the benefits of using digital technology, such as social media, which allows people to better understand the limitations of their emotional well-being [3]. Furthermore, online gaming has the potential to promote self-understanding and emotional well-being by allowing players to engage in many narrative forms of self-expression through their in-game avatars [4], [5]. However, excessive, or incorrect use of contemporary technology has the potential to harm our lives and society. A study conducted by [6] discovered that more than half of parents claimed that their children were "very likely" to use technology mainly Internet and social media with a family member at home. However, it has been observed that 75% of young children use the Internet without the supervision of an adult. A previous study emphasizes over the past two decades reveals that the Internet has changed our perspectives of what is and is not morally acceptable [7]. Ethicists, moral philosophers, and social scientists are increasingly focusing on behavioural issues relating to digital technology research. These theorists argue that only by understanding digital well-being as a freshly emergent set of issues that affect human character will we be able to address the serious ethical challenges that rising technologies impose [6].

Attitudes Towards Digital Technologies

Attitude toward behaviour refers to an individual's behavioral tendency with positive or negative feelings, attitude to technology use is an important personal factor when investigating the adoption of digital technology in e-learning process, mobile learning, and online learning [8][9][10]. A study published in ERIC found that attitudes towards technology can depend on the frequency of interactions with technological devices at home or at school [11]. This suggests that students who have more exposure to digital technologies may have more positive attitudes towards them. In the informal learning context, the process of learning does not need to be pre-

established, as students have the chance to find and even set up environments according to their individual needs and premises. Attitudes towards digital technologies can also be influenced by their expectations and experiences, as well as their academic achievement [12]. Thus, attitude to digital technology plays an important role for acceptance and success.

METHODOLOGY

Design and Participants

This research employed a quantitative research approach. Using a cross-sectional survey design, study variables were evaluated. The population of the study consisted of rural secondary school students, which consisted of lower secondary (Form 1–3) and upper secondary (Form 4–5) students ranging in age from 13 to 17 years old. The selection of the school was based on the Ministry of Education's school list. At least three schools were selected at random from each region, and an application for the ethical data collection procedure was submitted to the Ministry of Education and the District Department of Education. After approval, only three schools were permitted to have their students participate in the study. Then, sample selection involved identifying potential respondents among the learners. As there are regulations regarding the participation of students in any research activities, the school administration made the decision. According to the technique of purposive sampling, 210 samples were collected from the identified schools and valid responses. To collect the data, the sample was divided into smaller groups. Then, they were instructed on how to respond, and guidelines for answering each question were provided. To ensure that every respondent had a crystal-clear understanding of the meaning of each item, careful assistance was provided.

Data Collection and Analysis

The survey method was used to gather data, and the survey question was divided into five sections, including the demographics and pattern of digital usage sought in Section A (14 items). Section B examined attitudes toward the use of information technology (15 items) and Section D measures cybersecurity, along with intellectual property, privacy, precision, and accessibility (18 items). These survey questions were evaluated on a 5-point Likert scale (from 1 – strongly disagree to 5 – strongly agree). Section C measures digital competencies, which are a second-order model with the constructs of technology, cognitive, ethical knowledge, and communication (28 items). The technological dimension was further measured as visual literacy, troubleshooting, and understanding technical concepts. Cognitive abilities were assessed by organizing and structuring data as well as conducting information research. Keeping safety in mind and respecting others via online constructs were used to measure ethical knowledge. These survey questions of digital competencies used a 5-point Likert scale (from 1—very unskilful to 5—very skilful). The final section examines digital behaviour (33 items). The measurement of these items was based on their frequency in nature (from 1 – never to 5 – always) and beliefs in digital behavioural issues (from 1 – totally unacceptable to 5 – totally acceptable). All items of the survey questions were adapted from previous research [13][18][19][20]. These items were selected based on past research and then modified to address cyber-ethical issues, and digital behaviour, beliefs, and attitudes. The statistical package for social science software (IBM SPSS version 23.0) was used to analyse all the obtained data. A descriptive quantitative methodology was employed. Simple frequencies were performed to study characteristics of the respondents. Correlation and regression analysis were used to examine the relationship between variables.

RESULTS AND FINDINGS

This study results are presented into three sections: demographic background, descriptive analysis and correlation and regression analysis.

Demographic Profile

The respondents' demographic characteristics include gender, school levels and digital usage. In total, 210 were valid for data analysis; including female students represent 54% of the respondents (n=113) and male students represent 46% (n=97). The findings indicated that 60.5% of students were from the lower level (n=127); i.e., between Form 1 to Form 3, in which the age range 13 to 15 years old and upper level represent 39.5% (n=83); i.e., between Form 4 to Form 6, in which age range 16 to 18 years old. Approximately 40% of students started using computers since last 2 to 5 years ago. More than half of the learners (58.6%; n=140) have internet access at home, but only 34% (n=71) of learners have a computer at home. Many of the respondents used smartphones (n=179, 85.2%) and half of the respondents spent several times a day using the internet (n=109, 51.9%). Nearly 60% of the learners used Word application (58.6%; n=123), however it was reported that no more than 50% of the learners use computer and internet access to do school assignments occasionally.

Descriptive Analysis

Access to Digital Technology:

In terms of the Internet usage, respondents were asked two items namely "how do they get connected to Internet?" and "what are digital activities they did?" These items were multi-responses. As seen on Table 1, Home (n=145, 69%) and school (n=85, 22%) were the common places that the school students had the Internet connection. Table 1 describes digital activities and how to get internet connection among the school students.

Table 1. Getting Internet Connection and digital activities (N=210)

Variable			
		n	%
Connecting to Internet	Home	145	69.0
	Friend's or relative house	64	30.5
	Cybercafé	46	21.9
	Other eateries	44	21.0
	School	73	34.80
Digital activities	Play online games	132	62.9
	Social media and networking	141	67.1
	Email	14	6.7
	Media sharing and internet searching	70	33.3
	Smartphone usage	123	58.6
	Pictures and Video recording	108	51.4
	Information searching	95	45.2
	TV and movie viewing	101	48.1
	Online friendship	117	55.7
	Work with learning software	65	31.0
	Listen to music	153	72.9

*multi-responses items

In view of digital activities, the three most common digital activities among the learners were listening to music (n=15, 73%), visiting social media and networking (n=141, 67.1%) and playing online games (n=132, 62.9%). On the other hand, the least three digital activities were using email (n=14, 6.7%), work with learning software (n=65, 31.00%) and media sharing (n=70, 33.3%). A study conducted in primary schools were also found that playing online games, surf the websites, participating in chatting with friends through social networking sites were significant digital activities among the school students who above aged of 10 [13].

Digital Perception and Behaviour:

Beliefs towards ICT usage of school students were presented according to two dimensions (33 items); including computer (13 items) and internet (20 items). Participants responded on a Likert-type basis of 1 (totally unacceptable) to 5 (Totally acceptable). Table 2 shows basic descriptive statistical results of student's self-beliefs of ICT usage statements. Most participants believed that most ICT usage statements were acceptable and completely acceptable; between 98% to 60.5%. However, 52.4% of participants believed that using ready-made homework at websites was totally acceptable and acceptable, 33.3% and 28.1%, respectively. Moreover, more than half of participants believed that "using materials like music, picture, film, program and files without permission" and "playing computer games of violence" statements were unacceptable and totally acceptable, 55.7% and 56.2%. There were 20% responded not sure to these statements. Overall, there was a high percentage of acceptable reactions to unethical behaviour among school students.

Table 2: Perceptions of ICT Usage (N=210)

Dimension	Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	M (SD)
Computer	Using pirated software.	61.9	21.9	11.9	3.3	1.0	1.60 (0.893)
	Using crack programs.	45.7	33.8	16.2	3.8	0.5	1.80 (0.881)
	Accessing private information on the computer without permission.	47.1	33.3	16.7	1.9	1	1.76 (0.864)
	Accessing other people's personal computers (PC) and files.	61.9	24.8	11	1.9	0.5	1.54 (0.801)
	Using materials like music, picture, film, program and files without permission.	27.1	28.6	23.3	14.8	6.2	2.44 (1.210)
	Playing computer games of violence.	33.8	22.4	21.9	14.8	7.1	2.39 (1.283)
	Using inappropriate computer materials.	58.6	29	7.6	3.3	1.4	1.60 (0.876)
	Deleting the files of other people.	67.1	23.3	5.7	2.9	1	1.47 (0.808)
	Deliberately damaging the hardware of computers designed for public use.	84.3	11.4	2.9	0.5	1	1.22 (0.613)
	Damaging the hardware and software of computers for personal benefit.	72.4	21.9	3.3	1.9	0.5	1.36 (0.686)
	Copying the data in a computer without the consent of the owner.	58.1	28.6	8.6	4.3	0.5	1.60 (0.915)

	Selling music files in any audio file formats (e.g., MP3, WMA, WAV, etc.).	65.5	21	9	2.9	1.9	1.55 (0.912)
	Selling video files.	64.8	19	9.5	5.2	1.4	1.60 (0.960)
Internet	Using ready-made homework websites.	11.4	6.7	20.5	28.1	33.3	3.65 (1.312)
	Disturbing people on the internet.	52.4	29.5	12.9	4.3	1	1.72 (0.914)
	Giving misinformation over the internet.	67.1	21.9	5.2	4.8	1	1.50 (0.871)
	Making shameful talks over the internet.	79	11.4	5.2	2.4	1.9	1.37 (0.871)
	Entering websites containing pornographic content.	73.8	17.6	6.7	1	1	1.38 (0.736)
	Entering websites containing violence and terror.	72.4	14.8	8.1	3.3	1.4	1.47 (0.887)
	Trusting the strangers and chatting with them.	63.8	23.3	11	1.4	0.5	1.51 (0.784)
	Sending emails containing viruses intentionally.	80.0	14.3	3.3	2.4	-	1.28 (0.643)
	Overloading inboxes and blocking email boxes.	78.1	17.6	3.3	0.5	0.5	1.28 (0.595)
	Forcing people to leave online group conversations (e.g.: wechat, whatsapp or game websites).	66.7	21.4	10	0.5	1.4	1.49 (0.808)
	Pretending to be someone else when online.	62.4	27.1	8.1	1.9	0.5	1.51 (0.766)
	Using other people's names in order to cause them to suffer by sending emails or videos.	82.9	12.9	2.4	1.9	-	1.23 (0.585)
	Publishing websites that will cause harm.	80.0	16.2	3.3	0.5	-	1.24 (0.530)
	Hacking email accounts and doing harm.	81.4	13.8	4.8	-	-	1.23 (0.525)
	Publishing negative information about others on the Internet.	78.1	16.2	3.3	1.9	0.5	1.30 (0.672)
	Spreading personal information through emails.	71.7	19.5	7.1	1.4	-	1.38 (0.683)
	Sending pornographic email to people without request.	85.7	12.4	1.4	0.5	-	1.17 (0.444)
	Deliberately sending a virus e-mail	80.5	11.9	5.7	1.9	-	1.29 (0.661)
	Distributing audio files through Internet.	42.9	21	23.8	9	3.3	2.09 (1.152)
	Hacking through the Internet.	80.5	9	7.6	1.9	1	1.44 (0.863)

*5 - Totally acceptable; 4 - Acceptable; 3 - Neutral; 2 - Unacceptable; 1 - Totally unacceptable

Table 3 presents basic descriptive statistical findings of frequency on students' action towards ICT usage. Participants responded on a Likert-type basis of 1 (never) to 5 (always). Most participants had never or hardly ever done the digital acts as stated in table 3. However, 52.4% of participants had always and often used ready-made homework at websites and 22.9% had always playing a violence computer games.

Table 3. Frequency of ICT Usage Behaviour (N=210)

Dimension	Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	M (SD)
Computer	Using pirated software.	72.9	16.2	8.1	1.4	1.4	1.42 (0.816)
	Using crack programs.	62.4	22.4	12.4	1.0	1.9	1.58 (0.884)
	Accessing private information on the computer without permission.	61	21.9	15.2	1.0	1.0	1.59 (0.849)
	Accessing other people's personal computers (PC) and files.	72.9	16.2	7.6	1.4	1.9	1.43 (0.846)
	Using materials like music, picture, film, program and files without permission.	35.7	24.8	22.4	10.5	6.7	2.28 (1.237)
	Playing computer games of violence.	41.9	15.2	20	14.3	8.6	2.32 (1.366)
	Using inappropriate computer materials.	69	20.5	3.8	3.3	3.3	1.51 (0.965)
	Deleting the files of other people.	81.4	10.5	6.2	1	1	1.30 (0.711)
	Deliberately damaging the hardware of computers designed for public use.	91.9	4.8	1.9	1	0.5	1.13 (0.519)
	Damaging the hardware and software of computers for personal benefit.	80.5	15.2	3.3	1	-	1.25 (0.558)
	Copying the data in a computer without the consent of the owner.	71.4	19.5	5.7	2.4	1	1.42 (0.786)
	Selling music files in any audio file formats (e.g. MP3, WMA, WAV, etc.).	77.6	13.8	6.7	1.4	0.5	1.33 (0.708)
	Selling video files.	78.1	10	8.1	1.9	1.9	1.40 (0.864)
	Using ready-made homework websites.	12.4	14.8	20.5	30	22.4	3.35 (1.312)
	Disturbing people on the internet.	57.6	23.3	11.9	5.2	1.9	1.70 (0.997)
Internet	Giving misinformation over the internet.	78.6	13.8	4.8	2.9	-	1.32 (0.697)
	Making shameful talks over the internet.	81.4	9	4.8	2.4	2.4	1.35 (0.869)
	Entering websites containing pornographic content.	78.6	13.8	4.3	1	2.4	1.35 (0.811)
	Entering websites containing violence and terror.	71.9	12.9	9.5	4.3	1.4	1.50 (0.934)
	Trusting the strangers and chatting with them.	71.4	17.1	10	1	0.5	1.42 (0.749)
	Sending emails containing viruses intentionally.	87.1	7.1	3.8	1.9	-	1.20 (0.596)
	Overloading inboxes and blocking email boxes.	86.2	10	3.3	-	0.5	1.19 (0.526)

	Forcing people to leave online group conversations (e.g.: WeChat, WhatsApp, or game websites).	74.3	17.1	7.1	0.5	1	1.37 (0.721)
	Pretending to be someone else when online.	72.9	15.7	8.6	2.9	-	1.41 (0.767)
	Using other people's names in order to cause them to suffer by sending emails or videos.	89	7.1	3.3	0.5	-	1.15 (0.475)
	Publishing websites that will cause harm.	89	9	1.9	-	-	1.13 (0.388)
	Hacking email accounts and doing harm.	90.5	4.8	3.3	1.4	-	1.16 (0.535)
	Publishing negative information about others on the Internet.	89	8.1	2.4	0.5	-	1.14 (0.447)
	Spreading personal information through emails.	84.3	11.4	3.3	1	-	1.21 (0.539)
	Sending pornographic email to people without request.	93.3	4.8	1.4	0.5	-	1.09 (0.374)
	Deliberately sending a virus e-mail	90	7.1	2.4	-	0.5	1.14 (0.474)
	Distributing audio files through Internet.	47.6	21	22.9	5.7	2.9	1.95 (1.093)
	Hacking through Internet.	80.5	9	7.6	1.9	1	1.34 (0.780)

*5 – Always; 4 – Often; 3 – Sometimes; 2 – Rarely; 1 - Never

More than 20% only sometimes commit the following actions in table 5. Moreover, less than 60% of participants never and hardly ever “used materials like music, picture, film, program and files without permission” and “playing computer games of violence”. Overall, a significant percentage of respondents demonstrated a low incidence of unethical behaviour among school students. The study findings are inconsistent with previous study that was reported many of the youth have a high involvement in immoral behavior over the net [14].

Correlation and Regression Analysis

To conduct the inferential analysis, the Pearson correlation and linear regression tests were applied. This section presents the influencing factors of digital competence and ethics towards attitudes of ICT usage. First, correlation analysis was employed to assess the relationship between the school students' attitudes and digital competence, as well as cyber-ethics. Digital competence consists of the following dimensions: technological, cognitive skills, communication, and ethical knowledge. Meanwhile, cyber-ethics includes intellectual property, privacy, accuracy, and accessibility. Cohen's created criterion benchmarks for small ($r=0.10$), medium ($r=0.30$), and large ($r=0.50$) effect sizes to help interpret the relative size of the correlation magnitudes [15].

Table 4. Correlation's analysis

N o	Variables		1	2	3	4	5	6	7	8	9
1	Technological	Pearson Correlation	1								
2	Cognitive Skills	Pearson Correlation	.690**	1							
3	Communication	Pearson Correlation	.762**	.755**	1						
4	Ethical knowledge	Pearson Correlation	.387**	.461**	.494**	1					
5	Intellectual property	Pearson Correlation	0.018	0.027	0.038	0.050	1				
6	Privacy	Pearson Correlation	.381**	.337**	.350**	.419**	0.035	1			
7	Accessibility	Pearson Correlation	-0.042	-0.030	-0.018	0.127	.347**	.146*	1		
8	Accuracy	Pearson Correlation	.282**	.365**	.366**	.463**	0.076	.453**	0.064	1	.
9	Attitudes towards ICT	Pearson Correlation	.406**	.426**	.476**	.286**	.137*	.214**	0.072	.223**	1

** . Correlation is significant at the 0.01 level (2-tailed); * . Correlation is significant at the 0.05 level (2-tailed).

The findings reported a medium positive significant correlation were found between attitudes towards digital technologies usage and areas of technological ($r=.406$, $p<0.000$), cognitive skills ($r=.426$, $p<0.000$), communication ($r=.476$, $p<0.001$), ethical knowledge ($r=.286$, $p<0.001$), intellectual property ($r=.137$, $p<0.05$), privacy ($r=.214$, $p=0.002$) and accuracy ($r=.223$, $p=0.001$). Nevertheless, the correlation of attitude towards digital technologies with accessibility was found to be not statistically significant, $r=.072$, $p=0.297$. In general, the results suggest that the school students who had skills of digital competence areas and cyber-ethics were correlated with positive attitudes towards ICT usage [16]. Second, regression analysis was used to test if cyber-ethics and digital competence dimensions significantly predicted attitudes towards ICT usage. Table 5 presents the regression results. The results show that 23% of the variations in attitudes towards ICT usage are significantly ($R^2 = 0.227$, $F(8, 201) = 8.684$, $p<0.05$) predicted by communication dimension $t(209) = 2.691$, $p<0.05$; and not by other variables; including technological $t(209) = 0.718$, $p=0.473$; cognitive skills $t(209) = 1.294$, $p=0.197$; ethical knowledge $t(209) = 0.369$, $p=0.712$; intellectual property $t(209) = 1.575$, $p=0.117$; privacy $t(209) = 0.116$, $p=0.908$; accessibility $t(209) = 0.647$, $p=0.518$; and accuracy $t(209) = 0.273$, $p=0.785$. Moreover, in terms of gender, the results show that 19% of the variations in attitudes towards ICT usage are significantly ($R^2 = 0.19$, $F(8, 88) =$, $p<0.05$) predicted from digital competence constructs for male respondents while 31% of the variations in attitudes towards ICT usage are significantly ($R^2 = 0.314$, $F(8, 104) = 7.394$, $p<0.05$) predicted from cyber-ethics and digital competence constructs for female respondents. It was found that communication $t(96) = 2.436$, $p<0.05$ and accessibility $t(96) = 2.222$, $p<0.05$ constructs significantly predicted attitudes towards ICT usage among male school students. However, all dimensions did not statistically significant predicted attitudes towards ICT usage among female school students. The study result is consistent with several previous studies that have

demonstrated an inequality in the use of information and communication technology (ICT) and the development of related skills between genders, with a significant majority of male students demonstrating a more positive attitude towards ICT and employing it to enhance their learning [17].

Table 5. Regression analysis

	Dimensions	M (SD)	B	SE B	Beta	t	p
	(Constant)		2.195	0.338		6.496	.000
Digital competence	Technological	3.137 (0.668)	0.065	0.09	0.072	0.718	0.473
	Cognitive skills	2.906 (0.637)	0.12	0.093	0.127	1.294	0.197
	Communication	3.021 (0.761)	0.237	0.088	0.298	2.691	0.008
	Ethical knowledge	3.676 (0.886)	0.019	0.053	0.028	0.369	0.712
Cyber-ethics	Intellectual Property	3.594 (0.563)	0.110	0.070	0.103	1.575	0.117
	Privacy	3.913 (1.128)	0.005	0.039	0.009	0.116	0.908
	Accessibility	3.551 (0.772)	0.034	0.052	0.043	0.647	0.518
	Accuracy	3.462 (0.658)	0.018	0.068	0.020	0.273	0.785

Notes: Overall $R^2 = 0.29$, $F(4, 120) = 12.23$, $p < 0.05$; male respondents: $R^2 = 0.33$, $F(4, 60) = 7.30$, $p < 0.05$; female respondents: $R^2 = 0.26$, $F(4, 55) = 4.73$, $p < 0.05$

CONCLUSION

In general, significant correlations were found between intellectual property, privacy, accuracy, technological, cognitive, and communication factors and the attitudes of individuals towards digital technologies. However, the study found no statistically significant correlation between accessibility and attitudes towards digital technologies. It was found that the communication dimension predicts the attitudes towards digital technologies. These findings can be useful for educators seeking methods to enhance the digital literacy and competence of their students and incorporate them into the curriculum, thereby promoting responsible digital citizenship. It is essential to cultivate digital citizenship skills through education to equip students to avoid undesirable digital behaviours such as cyberbullying, online threats, digital irresponsibility, and privacy concerns. This sole concentration of the study on rural secondary school students, including both lower and upper forms, is a limitation. This limitation was a result of time and resource constraints during the study. It is recommended, for future research, to include participants from a variety of geographical areas, including urban and suburban regions, to ensure that the findings are representative of digital competency among school students across the country.

References

- [1]. Cabero-Almenara, J., Gutiérrez-Castillo, J.J., Guillén-Gámez, F.D. et al. Digital Competence of Higher Education Students as a Predictor of Academic Success. *Tech Know Learn* 28, 683–702 (2023). <https://doi.org/10.1007/s10758-022-09624-8>
- [2]. Hippe, R. and Jakubowski, M. Is student digital competence shaped by schools or individual factors ? Insights from SELFIE using multilevel models. (2022) Luxembourg: Publications Office.
- [3]. Burr, C., Taddeo, M., & Floridi, L. The ethics of digital well-being: A thematic review. *Science and engineering ethics*, 26(4), 2313-2343. Haddouche, A., et al., Detection of the foveal avascular zone on retinal angiograms using Markov random fields. *Digital Signal Processing*. (2020) 20(1): p. 149-154.

- [4]. Henz, P. The psychological impact of the Metaverse. *Discov Psychol* **2**, 47 (2022). <https://doi.org/10.1007/s44202-022-00061-3> Hatanaka, Y., et al. Automated analysis of the distributions and geometries of blood vessels on retinal fundus images. *SPIE*.
- [5]. Kartsanis N, Murzyn E. Me, my game-self, and others: A qualitative exploration of the game-self. In 2016 International Conference on Interactive Technologies and Games (ITAG) 2016 Oct 26 (pp. 29-35). IEEE.
- [6]. Dodge, A. M., Husain, N., & Duke, N. K. (2011). Connected kids? K—2 children's use and understanding of the internet. *Language Arts*, 89(2), 86-98.
- [7]. Dennis M, Harrison T. Unique ethical challenges for the 21st century: Online technology and virtue education. *Journal of Moral Education*. 2021 Jul 3;50(3):251-66.
- [8]. He T, Zhu C. Digital informal learning among Chinese university students: the effects of digital competence and personal factors. *International Journal of Educational Technology in Higher Education*. 2017 Dec;14(1):1-9.
- [9]. Celik V, Yesilyurt E. Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education. *Computers & Education*. 2013 Jan 1;60(1):148-58.
- [10]. Lai C, Wang Q, Lei J. What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. *Computers & Education*. 2012 Sep 1;59(2):569-79.
- [11]. Jan S. Investigating the Relationship between Students' Digital Literacy and Their Attitude towards Using ICT. *International Journal of Educational Technology*. 2018; 5(2):26-34.
- [12]. Keane, T., Linden, T., Hernandez-Martinez, P. et al. Digital technologies: students' expectations and experiences during their transition from high school to university. *Educ Inf Technol* **28**, 857–877 (2023). <https://doi.org/10.1007/s10639-022-11184-4>
- [13]. Masrom M, Hasnaa N, Mahmood N, Zainon O. (2013) Cyberethics and Internet Behaviour of Malaysian Primary Education Students. *J Emerg Trends Educ Res Policy Stud*.
- [14]. Bouhnik D, Deshen M. Unethical Behavior of Youth in the Internet Environment. *International Journal of Technology, Knowledge & Society: Annual Review*. 2014 Mar 1;9(2).
- [15]. Cohen J. Statistical power analysis for the behavioral sciences. Academic press; 2013 Sep 3.
- [16]. Orehovački T, Diković M, Dautović I. Perceived digital competence of primary and secondary school teachers-a pilot study. In 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO) 2022 May 23 (pp. 557-562). IEEE. Wasan, B., et al., Vascular network changes in the retina with age and hypertension. *Journal of hypertension*, 1995. 13(12).
- [17]. Qazi, A., Hasan, N., Abayomi-Alli, O. et al. Gender differences in information and communication technology use & skills: a systematic review and meta-analysis. *Educ Inf Technol* **27**, 4225–4258 (2022). <https://doi.org/10.1007/s10639-021-10775>.
- [18]. Calvani A, Fini A, Ranieri M. Assessing digital competence in secondary education. Issues, models and instruments. *Issues in information and media literacy: Education, practice and pedagogy*. 2009; 2:153-72.
- [19]. Calvani A, Fini A, Ranieri M, Picci P. Are young generations in secondary school digitally competent? A study on Italian teenagers. *Computers & Education*. 2012 Feb 1;58(2):797-807.
- [20]. Kavuk M, Keser H, Teker N. Reviewing unethical behaviors of primary education students' internet usage. *Procedia-Social and Behavioral Sciences*. 2011 Jan 1; 28:1043-52.