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Assessment of Secondary School Science Students' Digital Citizenship

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Abstract

This study was planned to assess how secondary school science students are aware of digital citizenship and its nine components. Major objectives of the present study were; to assess the knowledge of digital access, digital communication, and digital etiquette among secondary school science students, to explore the skills of digital law, digital literacy, and digital commerce among secondary school science students, and to assess the awareness of digital safety and security, digital rights and responsibilities, and digital wellness among secondary school science students. This study was quantitative. The sample of this study consists of 111 secondary school science students of four schools located in Tehsil Lahore of District Swabi. Stratified sampling was used in the selection of the sample. In this study, the self-developed instrument was applied for the collection of data. Data were analyzed through SPSS where Percentage and frequency were used as statistical tools. The data were presented in the form of tables. The findings showed that most of the respondents have better knowledge, awareness, and skills about digital access, digital communication, digital literacy, digital rights and responsibilities, digital safety and security, while a majority of the students have no knowledge and skills about digital law, and digital etiquette and most of the students have moderate skills and awareness about digital commerce and digital health and wellness.

Keywords: quantitative, digital access, digital literacy, digital citizenship

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Introduction

The speedy growth in information, communication, and technology (ICT) over the past decade has strongly predisposed the teaching-learning practice in secondary schools. Moreover, student life today is incomplete without the technology that surrounds it. Today's students, also known as "Digital Natives", develop continuously using technologies such as computers, the Internet, and cell phones from the early years of life. Because of this early disclosure to technology, today's students believe, correspond, seek out assistance, learn, and access information in a different way. In support of this reason, it was noted that digital natives require being educated in essentially unusual means. Students become familiarized with using technology to resolve numerous recurring responsibilities in a much simpler way that previously formed the basis of traditional learning. Therefore, it is predictable that educators will shift from traditional teaching methods to more novel and technologically improved teaching and learning. Technology consumers, especially youngsters, cannot stay away from the violence of technology. Youngsters are victims of violence, unfairness, cybersecurity, and individuality theft. It pertains to programmed social media platforms which include a lot of content and is not easy to manage. Thus, this condition exposes adolescents to physiological approaches and risks (Abdulrahman, 2015).

In the light of the foregoing, digital citizenship is concerned with preparing students and providing them with standards and values that enable them to use modern technology and its advanced tools, and the values of digital citizenship are defined procedurally as a set of rules, standards, and behavioral, ethical and legal controls that should be taught to students in schools. The values of digital citizenship relate to the rules, standards, and ethics necessary to deal with digital technologies, and Hassan, (2021) defines it as a set of controls and standards in the use of digital technology, which is a set of rights that citizens, young and old, should enjoy while using their technologies, The duties they must perform and adhere to during their use, as Saleem, (2018) defines them as a set of appropriate and responsible rules and behaviors that must be followed while dealing with the digital world to improve the use and proper use of technology and the Internet. To respect themselves and others, educate themselves and communicate with others, and protect themselves and others in the digital community, it is clear from this definition that the values of digital citizenship include giving students the skills to help them deal with digital technology safely and securely, Their positive and responsible participation in the digital community.

Information security understanding can play a significant function in combating cyber-attacks by intruders. The accessibility of this technology with highly developed computing surroundings, networks, and applications is fundamental for today's online educational development and connections. Students and teachers know how to access the boundless quantity of information not just to extend their learning perspectives and knowledge, but furthermore to enrich their vibrant educational practices. Regrettably, these technologies are demonstrating gradually more complicated to defend against malicious actions. In light of this, the negative impacts of these occurrences, with illegal access to personal and institutional data, individuality abuse, academic property theft, and financial scam, create prospective threats to communications based on poor basic digital skills (Choudhary, Javed, & Khan, 2021). It is well known that there is a direct association between information security, knowledge, and precautionary action that advances safety performance.

Technology misuse issues occur when individuals are not qualified in the definite laws and strategies in place for the dependable and right use of technology. Internet access presents many dangers (Shillair, Cotton, Tsai, Alhabash, Larose & Rifon, 2015) citizens should be learning protected online performance at a younger age than constantly before. Elementary students are predominantly vulnerable to the misuse of technology as they are in the early stages of digital literacy and understand the performance suitable for interrelating with others in real-world relations and online communications. The real-life contact has resulted in face-to-face discussions after online communication, loss of friendship, or reacting uncomfortably going to school after online circumstances. Such statistics point out that dependable and suitable use of technology should be dealt with at the school level. Access to the technology by students is not inadequate to devices supplied by the school; though, the misuse of social media and technology has an impact on the social environment of the school, rising bullying due to the physical restrictions of face-to-face connections (Ribble & Miller, 2013).

Objectives of the Study

1. To find out the knowledge of digital access, digital communication, and digital etiquette among secondary school science students.
2. To examine the skills of digital law, digital literacy, and digital commerce among secondary school science students.

3. To check the awareness of digital safety and security, digital rights and responsibilities, and digital wellness among secondary school science students.

Research Questions

1. Have the science students of secondary level knowledgeable about digital access, digital communication, and digital etiquette?
2. Are the science students of secondary level skillful regarding digital law, digital literacy, and digital commerce?
3. What is the awareness of secondary school science students about digital safety and security, digital rights and responsibilities, and digital wellness?

Significance of the study

Being online today is more than surfing the web; it's a means of life. Learning and involving by technology is currently fundamental in our everyday life that means being an excellent digital citizen is becoming more and more important. This research assessed the likelihood of respondents on how to deal with technology properly. This study will be significant for secondary school science students, secondary school teachers, teacher trainers, course developers, researchers researching the relevant area. This study will help them to awareness of social networks with values of digital citizenship and the extent to which these values are included in their uses.

Delimitations of the study

1. District Swabi (Khyber Pakhtunkhwa)
2. Tehsil Lahore
3. Two Public Sector Boys Secondary Schools, Two Public Sector Girls Secondary Schools
4. Secondary school science students

Review of Literature

Digital citizenship is described as a set of proper regulations and a responsible approach using correctly technological tools. Digital citizenship can also be described as a value required by citizens to make use of digital tools and act well in a variety of digital surroundings (Searson, Hancock, Soheil, & Berger, 2015). Digital citizenship is a concept related to the belongings of digital consumers as a result of technology being used properly and proficiently. In the other sense, digital

citizenship is to administer and observe performance in the use of technology, taking into account moral principles, standards, culture, and security. Digital citizenship is how digital citizens are familiar with the best approach to utilize technology. Choudhary, Javed, & Khan (2021) identify digital citizenship as a category of rules on dependable behavior in the correct use of technological progress. Digital citizenship entails the proposals of what users necessitate to identify the use of technology fairly and appropriately for rights and commitments.

Children nowadays are frequently illustrated as a digital generation that has exploited the opportunities of the internet since birth. Mounting up on the internet entails social activities, which means kids, like adults, require cybersecurity. Cyber security for children is an under-researched region and slight is acknowledged regarding how preeminent to educate children and teens concerning security online. We focus on what is referred to as "Understanding the Internet" by children and teens, disagreeing to it's unfeasible to educate kids about cybersecurity until it is known further about how it is comprehending what the Internet is mainly. Students who fulfill digital technology laws are accountable for their online performance. They require to be familiar with what is fine and what is not, as well as what is good and what is not in online dealing. Digital users ought to be responsive to the permissible consequences of violating applicable rules and regulations. People who know the ethical values of technology will form a constructive and dependable digital culture. Ethics can be explained by representing that people online are technologically digital citizens able of showing suitable ethics (Oxley, 2011).

Components of Digital Citizenship

Digital Access

The values and standards associated with full participation in the digital community equal digital rights, and equal opportunity for all to access and use technology. Technology users necessitate being responsive to and sustaining electronic access for all to lay the establishment for digital citizenship. Digital elimination of any type does not amplify consumer development in an electronic society. All citizens must have equal access to technology, no matter who they are. It is also necessary to deal with sites or organizations with incomplete connectivity. To become creative citizens, we have to strive for the same digital access. Acilar (2011) reported that younger consumers are more probably to have a rationally greater experience to Internet services and, consequently, more positive in their capability to assist from them. However, that will just depend on the education of these young users. If so, they are

likely to make use of Internet services more for educational information resources than for recreation or entertainment.

Digital Communication

Exchange of information and knowledge electronically. The study discloses the link between the mobile devices' existence and the distinction of real life, societal communications in persons. The society confers be deficient in of mobile devices accounted superior position of empathic hesitation, while citizens who communicate in the maintenance of mobile devices accounted for the small step of perception (Misra, Cheng, Genevie, & Yuan, 2014). Further new research suggested that this approach is still useful to social network sites like Facebook, with conclusions presenting that as older users of Facebook include a smaller number of friends comparing adolescent users, real friends' proportion is higher, linked to inferior levels of isolation (Chang, Choi, Bazarova, & Löckenhoff, 2015).

Digital Law

The legal decisions, ethics of technology within a society, relate to the digital environments. Students ought to be responsive to authorized and unlawful use of the information accessible on the Internet, where technology made it very easy to upload, download, locate and access information. Improper online performance includes developing and distributing computer viruses or hacking practices, using illegally and allocating other people's posts stating them as their work, sharing files to be paid for before use, creating and distributing other people's publications, undesirable nature, such as child pornography, dynamically persecuting a person and assaulting their life by using social media to cause them damage or terror (Curran & Ribble, 2017).

Digital Etiquette

Suitable principles of behavior or process that describe students' use of digital technology, online contribution, and social communication with others in the essential world. Furthermore, etiquette is all about improving the relations people have with each other by the identification that they are not a machine, however, an individual while they receive texts, tweets, and emails. A survey conducted by (Chou & Peng, 2011) indicates that teachers ought to be more responsive to the utilization of the Internet as a medium of education to make sure the security of students. Teachers need to be capable to recognize prospective threats and disreputable student performance on the Internet. This will help to promote good computer and

internet use performance in their everyday lives. The survey also categorized Internet security into four main areas, such as communications security and safety, information affability and competency, online interpersonal security, and computer or Internet security.

Digital Literacy

Digital literacy refers to mastering the use and security of interactive digital tools and searchable networks. This literacy comprises the capability to utilize these tools carefully and efficiently to learn, collaborate and generate. It also defends against network crimes such as phishing and malicious hacking. Today's students are estimated to acquire and apply skills that are infinitely diverse from those of earlier generations, as well as flexible digital communication and relationship, literacy, critical judgments, and problem-solving. The achievement of digital literacy has quickly developed into major distress for young people today. According to a study in 2018 by the Pew Research Center in the United States (Anderson & Jiang, 2018), 95% of adolescents now report having or accessing a smartphone, and 45% report being online almost constantly. There has also been a significant increase in the number of teenage social media users (an increase of over 100% over the past four years). The prevalence of disinformation is also disturbing. A study by Vosoughi, Roy, and Aral (2018), conducted by investigating information disseminated on Twitter from 2006 to 2017, proposed that fake news increase further, more rapidly, deeper, and wider than the reality.

Digital Commerce

It is the performance of buying and selling products online. With the emergence of more complicated mobile devices, that is smartphones, the innovative junction towards e-marketing has led to controlling consumers who now have stores in their hands. Cell phones offer businesses extra opportunities as an additional means of advertising. The dilemma of customer interruption makes the need for marketing authorization very fundamental. It can be used to boost customer commitment with a brand, through text messaging, mobile advertising, permission-based marketing, mobile content deliverance, user-generated content, and mobile commerce (Spaid & Flint, 2014). The era of communication and information of people has highly developed extremely in workplaces, schools, and colleges and everywhere through the use of digital devices such as iPhones, iPods, iPads, and laptops, which annoyed young students to discover they are prospective in the universal market and thereby amplify the requirements for technology.

Digital Rights and Responsibilities

These are the necessities and freedoms extensive to all users of the digital world. When taking into consideration the use, abuse, and management of cell phones and social media in schools, we must also believe in the responsibility of education in the socialization of young people. Engaging students with educational materials, including social media and ubiquitous computing systems, is an independently making experience that assists them to learn more about the world around them. Beduschi (2019) has stated that children are interested in new technologies and the Internet and can be contacted by strangers online upon friend request. When a website publishes a child's personal information without giving the child's parents (or child's guardian) the power to select privacy options, potential predators may use some of the child's personal information, such as a cell phone number, to engage in sexual contact activities.

Digital Safety and Security

The protection of information and data in digital devices of various kinds through a series of preventive measures that users must take to ensure their safety and maintain the security of their networks and privacy from any external interruption. Cyber security is increasingly important due to the growing dependence on digital equipment and software to manage our daily lives, including the transmission and storage of personal information. The digital world offers many amenities, but it also presents new risks that often go unnoticed or unrecognized. The growth rate of the Internet has exceeded the expectations and forecasts of the early Internet developers (Chouchri, Madnick, & Ferwerda, 2014).

Digital Health and Wellness

This can be described as the impact of technologies and digital services on people’s mental physical, psychological and emotional health. This involves identifying and understanding the positive benefits and any potential negative aspects of engaging with digital activities and being aware of ways to manage and control these to improve wellbeing. The increasing use of smartphones is being boosted by an increase in negative effects. This negative adherence includes harmful health claims resulting from the spread of lightning and wireless waves. It will cause malignant agents, brain tumors, anxiety disorders, inattention, and problems related to iris function and immunity. This can result from harmful consequences on the joints, wrist, neck, and eardrum. In addition to the health and well-being impact of issues such as bullying, hate speech, and radicalization, the excessive use of technology can lead to a range of physical problems,

ranging from discomfort postural and lack of exercise to disturbing life balance (Vorderer, 2016).

Research Methodology

Research Design

The study was quantitative. A descriptive survey research design was used for this study. Data were collected by the quantitative method by using a self-developed questionnaire

Population

The population of the study consisted of 1110secondary school science students of the four schools located in tehsil Lahor of District Swabi. These are Government High School Lahor West, Government High School Lahor East, Government Girls Higher Secondary School Lahore West, and Government Girls High School Lahor East.

Sample and Sampling Procedure

The desired sample was 10% of 1110 students, by applying stratified sampling technique which was 111 students of the targeted schools.

Table 1.
Demographics of the Participants

Schools	Class 9th	Class 10th	Total	10 %
GHS Lahor West	180	140	320	32
GHS Lahor East	107	126	233	23
GGHSS Lahor West	136	104	240	24
GGHS Lahor East	180	137	317	32
Total	603	507	1110	111

Research Instrument

Keeping in mind the previous studies conducted in the relevant area, a five-point Likert scale questionnaire was developed which was contained 34 closed-ended questions about digital citizenship and its components covering the objectives and research questions of the study.

Validity and Reliability

The validity of the instrument was assured in the field of education. The tool was altered and adapted according to the implications of the professionals. The reliability of the tool was checked through Cronbach's alpha. The total reliability of the instrument was 0.81.

Data Collection

Data was collected by distributing a questionnaire among 111 secondary school science students of the targeted four schools. The researcher was available during data collection if any students have confusion regarding questions; the researcher cleared that confusion on the spot.

Results

According to the findings presented in table 2, the majority of the secondary school science students (84.6%) can access the internet, 82.8% of the students log in to several social media sites, 91.8% of the students use the internet for understanding better the school subjects at school, and 98.1% of the students use the internet for knowledge boosting.

Table 2.
Frequencies and Percentages of the Items for Digital Access

Digital Access	SA	A	N	DA	SD
I can access the internet through digital technology tools wherever I want to use it.	59 (53.1%)	35 (31.5%)	3 (2.7%)	7 (6.3%)	5 (4.5%)
I regularly log into several social media sites (i.e. Facebook, Twitter, and WhatsApp).	45 (40.5%)	47 (42.3%)	6 (5.4%)	7 (6.3%)	6 (5.4%)
I use the internet to understand better the school subjects at school.	72 (64.8%)	31 (27%)	1 (0.9%)	4 (3.6%)	3 (2.7%)
I use the internet to find and download "application" that is useful for boosting my knowledge.	68 (61.2%)	41 (36.9%)	0 (0%)	1 (0.9%)	1 (0.9%)

According to the findings presented in table 3, the majority of the secondary school science students (86.4%) respect the opinions of others while being online, 94.5% of the students enjoy communicating with others online, 93.6% of the students use social media as an effective way to communicate with others, and 94.5% of the students find better information regarding their assignment topics.

Table 3.
Frequencies and Percentages of the Items for Digital Communication

Digital Communication	SA	A	N	DA	SD
I respect the opinion & feelings of others online.	36 (32.4%)	60 (54%)	6 (5.4%)	8 (7.2%)	1 (0.9%)
I enjoy communicating and collaborating with others online more than offline.	72 (64.8%)	33 (29.7%)	3 (2.7%)	2 (1.8%)	1 (0.9%)
I use social media (Twitter, Facebook, and WhatsApp) as an effective way to communicate with others.	66 (59.4%)	38 (34.2%)	3 (2.7%)	2 (1.8%)	2 (1.8%)
I use the internet to find better information on my assignment topics.	36 (32.4%)	69 (62.1%)	4 (3.6%)	1 (0.9%)	1 (0.9%)

According to the findings presented in table 4, the majority of the secondary school science students (69.3%) were not professional to their information, 61.2% of the students were not sure about their secure connection before getting online, 96.3% of the students had no awareness that hacking into others' information is unethical behavior, and 87.3% of the students practice safe browsing.

Table 4.
Frequencies and Percentages of the Items for Digital Law

Digital Law	SA	A	N	DA	SD
I keep my personal information limited and professional.	12 (10.8%)	19 (17.1%)	3 (2.7%)	52 (46.8%)	25 (22.5%)
I make sure that my internet connection is secure before getting online.	11 (9.9%)	28 (25.2%)	4 (3.6%)	45 (40.5)	23 (20.7)
I believe that hacking into others' information is unethical behavior.	3 (2.7%)	1 (0.9%)	0 (0%)	69 (62.1%)	38 (34.2%)
I practice safe browsing while being online.	42 (37.8%)	55 (49.5%)	1 (0.9%)	7 (6.3%)	6 (5.4%)

According to the findings presented in Table 5, the majority of the secondary school science students (91.8%) thought that using the digital tool during class is unethical, 87.3% of the students did not follow acceptable user policies within school IT labs, 89.1% of the students did not believe that unverified information sharing on social media is unethical, and 97.2% of the students use someone ideas without giving any reference.

Table 5.
Frequencies and Percentages of the Items for Digital Etiquette

Digital Etiquette	SA	A	N	DA	SD
It is inappropriate to use digital tools during class.	65 (58.5%)	37 (33.3%)	3 (2.7%)	6 (5.4%)	0 (0%)
Acceptable user policies must be followed while using the School IT lab's PCs.	4 (3.6%)	6 (5.4%)	4 (3.6%)	38 (34.2%)	59 (53.1%)
It is inappropriate to share unverified information on social media.	5 (4.5%)	5 (4.5%)	2 (1.8%)	77 (69.3%)	22 (19.8)
I use someone's ideas and thoughts without giving a reference.	38 (34.2%)	70 (63%)	0 (0%)	3 (2.7%)	0 (0%)

According to the findings presented in Table 6, the majority of the secondary school science students (98.1%) know computer infected software, 92.8% of the science students use digital tools for learning purposes, 96.3% of the students log in computer with a password, and 90.9% of the students believe that use of digital communication tools has increased their interaction with teachers.

Table 6.
Frequencies and Percentages of the Items for Digital Literacy

Digital Literacy	SA	A	N	DA	SD
I can understand if my computer is infected by malicious software.	43 (38.7%)	66 (59.4%)	1 (0.9%)	1 (0.9%)	0 (0%)
I find the related knowledge for learning by using digital tools.	71 (64%)	32 (28.8%)	3 (2.7%)	3 (2.7%)	2 (1.8%)
When I turn on my computer, I log in with a password.	28 (25.2%)	79 (71.1%)	1 (0.9%)	3 (2.7)	0 (0%)
Digital communication tools have increased my frequency of interaction with teachers.	56 (50.4%)	45 (40.5%)	6 (5.4%)	3 (2.7%)	1 (0.9%)

According to the findings presented in Table 7, the majority of the secondary school science students (53.1%) have no idea regarding reliable and corporate online shops, 87.3% of the students have surety about the quality of the demanded services, and 84.6% of the students believe that digital commerce gives them reasonable prices with the better choice.

Table 7.
Frequencies and Percentages of the Items for Digital Commerce

Items for Digital Commerce	SA	A	N	DA	SD
I make sure that the website I shop for is corporate and reliable.	17 (15.3%)	33 (29.7%)	2 (1.8%)	40 (36%)	19 (17.1%)
The quality of my demanded services meets my expectations.	66 (59.4%)	31 (27.9%)	3 (2.7%)	5 (4.5%)	6 (5.4%)
Digital commerce gives me more reasonable prices and better choices.	25 (22.5%)	69 (62.1%)	4 (3.6%)	6 (5.4%	7 (6.3%)

According to the findings presented in Table 8, the majority of the Secondary school science students (78.3%) always check the information before sharing it on social media, 89.1% of the students regularly change their passwords for privacy protection, 96.3% of the students use authentic websites free of unethical contents, and 84.6% of the students aware of the responsibilities of safe computer and internet use.

Table 8.
Frequencies and Percentages of the Items for Digital Rights and Responsibilities

Digital Rights and Responsibilities	SA	A	N	DA	SD
I always check the information on social media before sharing or sending it to others	29 (26.1%)	58 (52.2%)	3 (2.7%)	13 (11.7%)	8 (7.2%)
I regularly change my passwords to protect my privacy for future safety.	67 (60.3%)	32 (28.8%)	2 (1.8%)	7 (6.3%)	3 (2.7%)
I do not use websites with inappropriate content.	78 (70.2%)	29 (26.1%)	2 (2.8%)	1 (0.9%)	1 (0.9%)
I am aware of the responsibilities in ensuring safe computer and internet use.	55 (49.5%)	39 (35.1%)	1 (0.9%)	8 (7.2%)	8 (7.2%)

According to the findings presented in Table 9, the majority of the secondary school science students (88.2%) use antivirus programs, 63% of the students do not share information with unknown people, and 95.5% of the students examine whether the website is safe or not.

Table 9.
Frequencies and Percentages of the Items for Digital Safety and Security

Digital Safety and Security	SA	A	N	DA	SD
I use an antivirus program for my security in digital media.	50 (45%)	48 (43.2)	4 (3.6%)	6 (5.4%)	3 (2.7%)
I share my personal information with unknown people.	12 (10.8%)	26 (23.4%)	3 (2.7%)	50 (45%)	20 (18%)
I investigate whether the website on which I download the program is safe.	35 (31.5%)	71 (64%)	2 (1.8%)	3 (2.7%)	0 (0%)

According to the findings presented in Table 10, the majority of the secondary school science students (97.2%) were addicted to digital media and spend most of their time on screen, 58.5% of the students have no idea regarding the correct physical position during the use of the digital device, 70.2% of the students have no awareness regarding the health problems by the use of digital technology, and 48.6% of the students avoid the use of digital devices in full darkness while 48.6% do not avoid the use of digital devices in full darkness.

Table 10.
Frequencies and Percentages of the Items for Digital Health and Wellness

Digital Health and Wellness	SA	A	N	DA	SD
I spend a lot of time using digital technology.	72 (64.8%)	36 (32.4%)	3 (2.7%)	0 (0%)	0 (0%)
When I use a digital device, I make sure to be in the correct and comfortable physical position.	31 (27.9%)	12 (10.8%)	3 (2.7%)	46 (41.4%)	19 (17.1%)
I am aware of all health-related problems concerning digital technology use.	10 (9%)	22 (19.8%)	1 (0.9%)	55 (49.5%)	23 (20.7%)
I avoid using digital devices in full darkness as it may mental and sight disorders.	26 (23.4%)	28 (25.2)	3 (2.7%)	13 (11.7%)	41 (36.9%)

Table 10 shows that majority of the science students said that they spend a lot of time using digital technology.

Discussion

Technology users frequently see that digital etiquette is one of the most critical issues when dealing with digital citizenship. We distinguish unsuitable behavior when we see it, though formerly than human beings practice science they do no longer learn digital etiquette. As technological know-how has advanced, the law has contested to continue up, causing ever-evolving guidelines and regulations. Teachers and students want to be familiar and informed about what is legitimate and appropriate in this digital age. Technology customers prerequisite to recognize that a considerable delivery of market economy is being completed electronically. Real and lawful trades are happening; however, the purchaser should be responsive to the difficulties related to it. Eyecare, tiresome stress syndrome, and sound ergonomic performance two are complications that need to be addressed in a new technological world. Users need to be trained that there are essential hazards of technology. Digital Citizenship comprises a practice where science users are taught how to protect themselves through training and training with the help of school management and by giving awareness. However, it was revealed that secondary school science students have no knowledge and skills about digital law and digital etiquette as well as most of the secondary school science students are moderately aware of digital commerce and digital health and wellness. This corroborated with the findings of Roberto (2019) which states that Digital etiquette, Digital Commerce, and Digital Health and wellness were considered to a little extent. This implies that students may need to be aware of important elements of digital citizenship. The finding is also supported by Siwapathomchai (2021) that most of the children are more likely to practice digital etiquette practices in their class and computer lab but not when they are at home. Children are more likely to use the internet for socializing purposes at home. When children are online within an educational environment, they are required to follow digital etiquette because their online behavior is closely monitored by their teacher. The knowledge of digital etiquette does not prove that children really understand what digital etiquette rules are. From the survey, only 33% of the respondents knew what digital etiquette is. The result highlights that without a clear understanding of digital etiquette, it is impossible for children to follow or apply the appropriate etiquette to their online activities. Similarly, our data reveals that 87.3% of the students do

not follow acceptable user policies within school IT labs. The current study has found that 97.2% of the students are digital and screen-addicted, 58.5% of the students have no idea regarding the correct physical position during the use of the digital device, and 70.2% of the students have no awareness regarding the health problems by the use of digital technology. This result was quite similar to the work of Suliman, et al. (2016) that the most significant indicators of smartphone addiction were overuse of smartphones, the technological dimension, the psychological-social dimension, preoccupation with smartphones, and the health dimension respectively. The degree of smartphone addiction proved to be high concerning overuse and the technological dimensions and moderate concerning the other dimensions. This translates to students spending considerable time using their smartphones and a dependence on the several technological applications they provide. Students have come to depend on a smartphone to do even the simplest daily tasks. This overdependence can result in negative physical, psychological, social, familial, and educational effects.

Conclusion

Based on results and interpretations of data it was concluded that;

1. Digital access was helpful for science students wherever they want to use it for boosting their knowledge, logging into several social media sites, and understanding school subjects better.
2. Digital communication was an effective way for the science students to communicate with others, to find out better information regarding assignment topics, and enjoy, respect the opinions of others online.
3. Most of the science students do not know digital law because their information is not limited and professional; having no surety of secure internet connection before getting online, not aware that hacking into other's information is unethical behavior while most of the students practice safe browsing,
4. Most of the science students have no knowledge about digital etiquette that acceptable use policies must be followed while using digital tools in IT labs, use of digital tools during class and sharing unverified information is unethical while most of the students use and share someone's ideas without any reference.
5. Most of the science students are digitally literate by having the knowledge of computer infected software, using digital tools for

learning purposes, logging in to computers with a password, and interacting with teachers by using digital communication tools.

6. Most of science students have fewer skills concerning digital commerce because they don't know the reliable and corporate online shops. On the other hand, they have surety about the quality of demanded services and online shopping give them reasonable prices and better choices.
7. Most of science students have a better awareness level regarding their digital rights and responsibilities by checking the information before sharing on social media, changing their passwords regularly, use of authentic websites, and safe use of computers and the internet.
8. Most of the students are aware of their digital safety and security that they use antivirus programs, do not share their personal information with unknown people, and examine the safety of the website.
9. The awareness about digital health and wellness is very weak because the majority of the students are digital and screen-addicted, unaware of health injuries related to overuse of digital devices, having no idea of correct physical position during digital device use. On the other hand, half of the students avoid the use of digital devices in full darkness while half of the students do not avoid the use of digital devices in full darkness.

Recommendations

Following are the recommendations of the study based on major findings:

1. Workshops may be organized by the schools for the students to fulfill the weak areas of digital citizenship like digital commerce and digital health and wellness.
2. To develop a healthy relationship with digital media, students may need to be aware by Computer teachers concerning digital etiquette and digital law during computer class or using computer labs.
3. Digital citizenship training may be arranged before starting the academic year for computer teachers by the education department.

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