Impact of Digital Technology Usage on Children's Behavior: *A Case Study*

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Abstract

In the era of digital technology, various technologies have been used with the change in time and found to be updated. But there are limited research updates related to the impact of digital technology today on children. This study aims to examine the effect of digital technology usage on children's behavior. Piaget's theory of cognitive development is used in the study. Children's behavior talks about aggression, slow responsiveness, socially inactive, and anxiety. The research study was designed to identify the impacts of digital technology usage on children's behavior at Ramailo Pathshala School, Jarankhu, Kathmandu. Only one variable is taken as an independent variable in the study, i.e., digital technology usage. Here, children's behavior is taken as the dependent variable. Data collection was done with the help of a structured questionnaire which was distributed among 125 students, out of which 105 students represent the sample size. Descriptive, relational, and causal research designs were used in this study and correlation and regression were used as major statistical tools. The findings revealed that digital technology usage significantly affects children's behavior.

Keywords: digital technology usage, children behavior, social interaction, aggression

1. Background of the problem

Digital technologies stimulate children's interaction with society, most children are found to be engaged to maintain their social relationship virtually (Winther, 2017). Due to the excessive use of digital technology such as cell phones, the internet, and gaming systems, today's children are less likely to interact face-to-face. Children spend most of their time on gaming systems and online platforms, which reduces their ability to interact outside the natural world socially, leading social isolation, which affect children's physical, personal, and social development (Winther, 2017) .

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Recently, an online game called PUBG was banned in various states and institutions in India, leading to multiple psychological impacts on children. Children were aggressive while the restrictions to play the games were imposed (Mukherjee, 2019). Excessive addiction to the digital world can harm children's health as they spend more time playing virtual games rather than having some physical exercise, increasing the risk of childhood obesity (Chopra, Khan, & Nikita, 2015). Getting access to the digital world for long hours can affect children's overall performance. Studies have shown that a higher amount of time spent playing onscreen games can be associated with lower attention and performance level (Chopra, Khan, & Nikita, 2015).

Digital technology has been the major factor that affects children's behavior. Its usage in children's daily lives influences their cognitive, emotional, and social development, which continues to be detrimental (Linebarger & Piotrowski, 2009). Excessive use of social media and the interaction with the new media has been the major factor shaping children's behavior. Children have been found with negative results such as anxiety and depression due to the use of digital media and technology (Hoge, Bickham, & Cantor, 2017). The use of digital technology has been associated with lack of attention, aggressive behavior, and physical inactivity, which harms the overall development of children. Hence, monitoring the time, frequency, and content viewed while using technological devices is must (Mustafaoglu, Zirek, Yasac, & Ozdincler, 2018).

The excessive use of digital technology always leads to behavioral issues for the children. They are likely to be more aggressive, socially inactive, slow responsiveness, and maybe the victim of anxiety. The previous research papers have been limited to foreign countries only; there is a lack of enough research on this specific problem related to children's behavior in the context of Nepal as some of the research were based on the parent's perspectives only. Thus, this research paper is conducted to determine the impact of digital technology usage on children's behavior with the given research question.

- How does the usage of digital technology affect children's behavior?

2. Objectives of the study

Excessive use of digital technology is characterized by behavioral issue in children. Behavioral issue is the change in the behavior of the children such as: aggression, socially inert, slow to respond, and anxious. This can happen when one gets addicted to the digital technology. It is necessary to know the consequences regarding the excessive use of digital technology. Therefore, the study aims the following purposes:

- To determine the relationship between digital technology usage and children's behavior;

- To examine the role of digital technology usage on children's behavior; and

- To identify children's behavioral issues due to the use of digital technology.

3. Literature survey

The theory reviewed in the study is Piaget's theory of cognitive development. Piaget (1952) a biologist was interested in how the organisms adapt to the environment and the children's thinking and found that the answers of the children were more qualitatively different than the older ones and started to study the children's development. The theory suggests that children move from various stages of intellectual development, such as the sensorimotor stage, preoperational stage, concrete operational stage, and formal operational stage, respectively.

Children from birth to 18-24 months are at the stage of the sensorimotor stage where intelligence is demonstrated without symbols. The intellectual abilities are about to develop with physical development, and the children acquired object permanence about seven months ago. Children from the age of two-seven years old are at the stage of preoperational, where intelligence is demonstrated through symbols and languages. Memories and imagination are developed during the stage, and thinking is not logical and irreversible. Similarly, the children from the age of 7-11 years old are at the stage of concrete operational where intelligence is demonstrated through rational thoughts and the systematic manipulations of symbols related to the tangible objects. The fourth stage is divided by the children from adolescence to adulthood, and the intelligence is demonstrated through scientific reasoning. The theory suggests that the children behavior differ with the environment they are exposed to.

Mustafaoglu, Zirek, Yasac, and Ozdincler (2018) found that excessive use of digital technology has, directly and indirectly, affected the children's health. Digital technologies such as smartphones, tablets, computers, laptops, television etc. have been a major cause of the disturbance in the child's health and development. Studies found that inappropriate use of devices and excessive screen time led to different defects in children's mental health. In addition, the use of digital technology has been associated with physical inactivity, slow responsiveness, lack of attention, and aggression. Gottschalk (2019) discovered that when children use technology at an early age, they may be uninformed of society and others and unable to engage in social activities. Also, the study concludes that overuse of technology may be associated to lower results in children, including physical, behavioral, attentional, and psychological disorders.

Agha and ZaaZa (2021) found that 37% of the children had a slow active play level, 65% had high screening time, and 26% had a combination of these two. Also, the study found that the use of digital technology is associated with a lack of attention, aggression, obesity, physically inactive and sleep problems, and inappropriate use of technology in terms of the contents, postures, frequency, and duration, which has been affecting the child's behavior. Hoge, Bickham, and Cantor (2017) discovered that the varied characters displayed on online platforms and television could cause youngsters dread, anxiety, and depression. A significant association has been observed between the use of social networking sites and depression or anxiety symptoms in children and adolescents. Zimmerman and Christakis (2007) measured the elements of attention; difficulty in concentrating impulsive, restlessness, and easily confused. Also, the study expressed that

the early exposure to television had a direct impact on the development and behavioral change of children.

Wu et al. (2014) suggested that digital technology has positive impacts on children; children could learn the academic activities through the use of the devices, have a positive attitude toward learning, alphabet recognition, useful to increase digital knowledge and development. However, O'Keeffe and Pearson (2011) revealed that constant interruption has an adverse effect on attention and reduces learning and performance. Thus with these reviews, the study hypothesizes:

H_{01}: *There is no significant relationship between digital technology usage with children's behavior.*

H_{02}: *There is no significant impact of digital technology usage on children's behavior.*

According to O'Keeffe and Pearson (2011), teenagers who heavily use social media do not spend enough time on activities that increase mental abilities, skills, and physical movement. Mccarrick and Li (2007) mentioned that technology is socially, physically and intellectually harmful to children, and they might face various developmental defects in the early stage if the devices are excessively used.

The research papers before have only been limited to foreign countries. Some papers as such Palikhe and Adhikari (2020) have attempted to measure the effect of online devices on children's health. However, the sample population have been considered as parents rather than children themselves. This research has attempted to measure the impact of digital technology usage on children's behavior using the children themselves as the study population. The research framework of the study is illustrated in *Figure 1*.
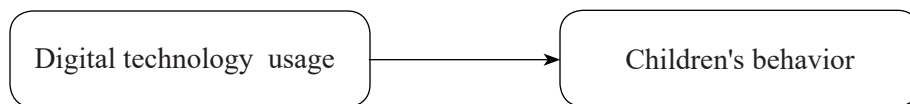

Figure 1. Research framework of the study

A research framework is developed to illustrate the variables of the impacts of digital technology on children's behavior. Usage of digital technology is an independent variable and children's behavior is a dependent variable. Usage of digital technology measures screen time, mobile gaming, and social media, whereas children's behavior measures the behavioral change that measures physical inactivity, slow responsiveness, lack of attention, and aggression. It shows the relation between the usage of digital technology and the impacts that have led to the children's behavior.

Gottschalk (2019) stated that technology use has been rising all over the world. Although there have been no specific ages that could define the particular group of adolescence using the technology, even the preschool children are found to be much more familiar with the digital technology. In this research paper, digital technology usage tends to measure the availability of the devices, perception, choice of the children who use digital technology

and its effect on the children's behavior. Here, on the study usage of digital technology is an independent variable that measures mobile gaming, screen times, frequency of using the devices and social media engagement.

Wu et al.(2014) found that the children with an increase in the use of digital technology have suffered from anxiety, depression, aggression, physically inactive, violent behavior, increased social isolation, and a decrease in family time. In addition, children have been engaged with the usage of digital technology in such a way that they have been caught stealing the money from their family members to purchase digital items like the diamonds and passes for the online games (Mccarrick & Li, 2007). Children's behavior is a dependent variable in the study, which measures behavioral change, social interactions, physical inactivity, aggression, and anxiety.

5. Research methodology

This section briefly explains the research design, population, sample, and sources of the data used in the study. The descriptive research design was used to describe the characteristics and nature of the variables used in the research and identify problems and justify the current conditions and practices of using digital technologies among school children. Similarly, the relational research design was adopted to study the relation between digital technology usage on children's behavior (Hoge, Bickham, & Cantor, 2017). The causal research design was aimed to investigate the impact of digital technology usage on children's behavior. The population for the study were the entire students (9-18 age group studying in class 5-10) of the Ramailo Pathshala School, Tarkeshwor municipality, Kathmandu, which was 300 as per the registration in school as of 26th September, 2021. The desired sample size was 73, which seems to be sufficient at 85 percent confidence level and a margin error of 10 percent (Rao , 2004). The study distributed the questionnaire using convenience sampling method to select the respondents because of the accessibility and proximity to 125 respondents, among them only 105 responses were valid with a response rate of 84 per cent. Thus, the final sample size for the study was 105.

Primary data was collected and analyzed systematically to get the empirical findings. The structured questionnaire was constructed and distributed to 125 sample respondents to determine the impact of digital technology usage on children's behavior in Ramailo Pathshala School on 26th September, 2021. In the questionnaire survey, the respondents were asked to answer the questions with multiple options like Yes/No, choose questions, and Likert scale questions. The items measured in interval scales were derived from the study work of Reyna and Meier (2018), and some were self developed in an anchoring of "1" as strongly disagree and "5" as strongly agree.

6. Presentation and analysis of the data

The study has been conducted using different measurable statistical tools such as frequency, percentage, cumulative percentage, mean, median, standard deviation, Pearson correlation, and multiple regression analysis. Correlation is the statistical method of analyzing the relationship between the variables that help to assess the strength of the relationship between the variables. In this study, the correlation was calculated to find the degree of relationship

between independent and dependent variables of all samples. Similarly, regression is used to test the impact of independent variables on the dependent variable, and it attempts to determine the strength of the relationship between the dependent variable and independent variables. In this study, regression was calculated for the responses provided in the Likert scale question to determine the relationship between the independent and dependent variables for all samples. The regression model for the study is given as:

Y= a + bX + e

Where, Y= Children's behavior, a= Intercept, b= coefficient of usage of digital technology, X= Usage of digital technology, and e = Error terms

The study has been conducted to determine the impact of digital technology usage on children's behavior. The responses received from the respondents were calculated using various statistical tools and techniques to achieve the descriptive information of the study. The data were analyzed using Microsoft Office Excel.
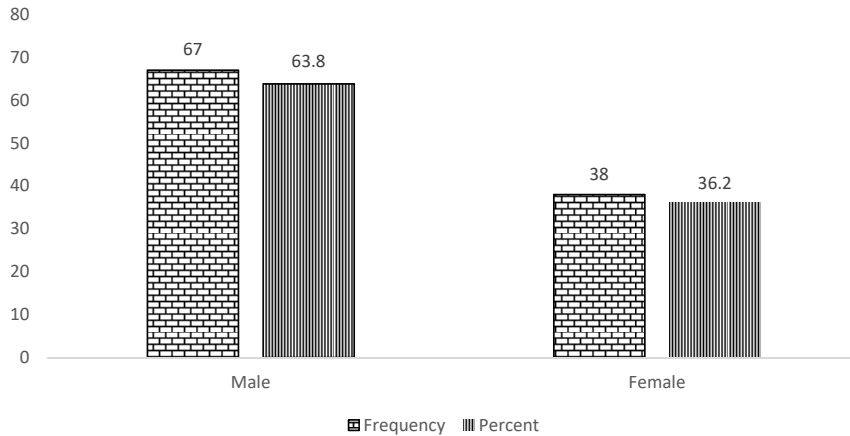

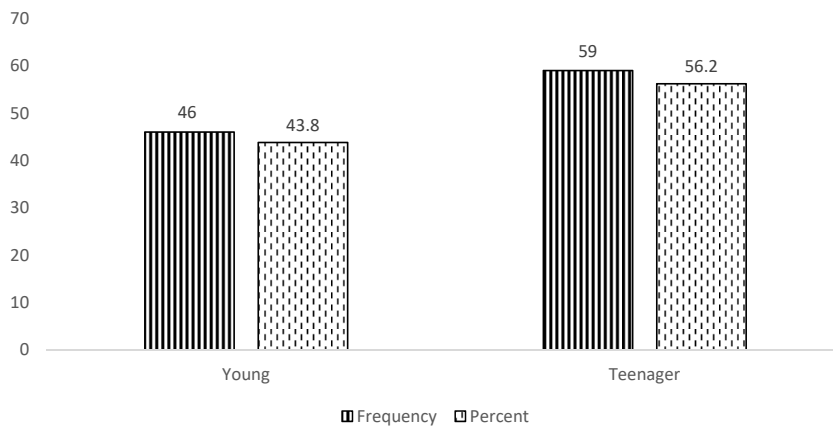*Figure 2. Gender of the respondents*

Figure 3. Age group of the respondents

The *Figure 2* shows the profile of the respondents based on strata of gender category and indicates no equal participation of males and females. There were 105 respondents in total, out of which 67 respondents were male, and 38 respondents were female. The figure shows that there was less number of female as compared to male in the sample. Among all the respondents, the majority 63.8% were male, while the rest 36.2% were female.

The *Figure 3* exhibits the profile of the respondents based on strata of age group category. Students of ages between 9-12 were considered young, and ages between 12-18 were considered teenager. Out of 105 respondents, 46 respondents were young, while the rest 59 respondents were teenager i.e., 43.8 % samples were young and 56.2 % were teenagers.

Table 1
Summary of descriptive samples

Statistics	N	Mean	Median	STD
Digital technology usage	105	2.98	2.75	0.83
Children behavior	105	3.42	3.43	0.73

Table 1 summarizes the descriptive analysis of the variables under the study. The table shows that the mean value of the dependent variable is greater than the mean value of an independent variable. It is found that children's behavior is highest among digital technology usage with a mean value of 3.42 and whereas the mean value for digital technology usage was 2.98. Similarly, mid-value of children's behavior is found to be highest with a median value of 3.43 followed by the median value of 2.75 for digital technology usage. Similarly, the standard deviation is highest for digital technology usage with 0.83 followed by children's behavior with a 0.73 standard deviation value.

Table 2
Relationship between variables for all samples

Variables		Digital technology usage	Children behavior
Digital technology usage	Pearson Correlation	1	
	Sig. (2-tailed)		
Children behavior	Pearson Correlation	.480**	1
	Sig. (2-tailed)	(0.001)	

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

Table 2 depicts the relationship between the independent and dependent variables under the study of all samples. The table clearly shows that the correlation for all samples between digital technology usage and children's behavior is positive and significant at a 99 percent confidence level with a correlation coefficient of 0.480 which means digital technology usage positively relates with the children's behavior at significance level of 0.01 stating that the relationship is not merely by chance.

Table 3
Impact of variables for all samples

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F	Sig.	Adjusted R^2
	B	Std. Error	Beta					
(Constant)	2.164	0.234		9.236	0.001	30.808	0.001	0.223
Digital technology usage	0.421	0.076	0.48	5.551	0.001			

[a] Dependent Variable: Children's behavior

The *Table 3* delineates the positive impact of digital technology usage on children behavior among the students of Ramailo Pathshala. The impact is observed to be significant at 0.02 level of significance or 99% confidence level with coefficient of 0.421 i.e., increase in digital technology usage by one unit leads to increase in behavior of the children by 0.421 unit. The regression model seems to be fit as the F value is 30.808 and the sig value is 0.001. The adjusted R square value of the model is 0.223 indicating that the explanatory power of digital technology usage is 22.3 percent of the variation in children's behavior.

7. Findings and discussion

The purpose of the study was to determine the effect of digital technology usage on children's behavior. Based on data analysis, the major findings of the study are as follows:

- The relationship between digital technology usage with children's behavior is observed to be positive and statistically significant at 99 percent confidence level with a correlation coefficient of 0.480, which indicates that digital technology usage positively relates with the children's behavior.

- The impact of digital technology usage is found to be positive and significant at 99 percent confidence level. The coefficient of digital technology usage shows that an increase in usage of digital technology causes an increase in change in behavior of children. The children may get more aggressive, become inactive and face the attention problem if there is an increase in usage of digital technology.

- The study also found that the children could learn different activities through the use of digital devices and have a positive attitude towards digital communication and learning behavior.

- The study even found that the individuals with excess screen time and involvement in social media lead to negative emotions such as anxiety and depression. But also, to some extent, digital technologies help to avoid the fear, worries, anxiety, and depression of an individual through connection with peers from time to time and engagement with the articles related to humor and entertainment.

The study result is consistent with Mccarrick and Li (2007) i.e., the excessive use of digital gadgets affects human interaction including the increase in the tendency of ignoring the social interaction. The result of the study also confirms with Zimmerman and Christakis (2007) findings which concluded that children suffer from the attention

problem as they are engaged more with the digital gadgets. Likewise, the study is also consistent with the results of O'Keeffe and Pearson (2011) which had concluded that the excessive use of digital technologies led the children to depression and which has been a common problem. The result also corroborates with the findings of Hoge, Bickham, and Cantor (2017) that observed using the different social networking sites is associated with anxiety and depression as children cannot handle anything harsh at a certain time. Similarly, the result of the study supports the notion of Mustafaoglu, Zirek, Yasac, and Ozdincler (2018) which found that the use of digital technology has been associated with Physical inactivity, slow responsiveness, lack of attention, and aggression but contradicts with the findings of Wu, et al. (2014) who found that the digital technology usage could be beneficial to the children as it aids in digital communication and coordination in the era of digital technology respectively.

8. Conclusion

Digital technology has been widely used by the children as a part of their daily lives. Half of the children have access to the mobile phones and most of them play survival games and use social media in their leisure time. Children are aggressive when they do not get access to the digital gadgets and at the time when they lose their games. Few of the children use the digital technology for their own personal and recreational purpose. Digital technology can be regarded as a boom when utilized properly. Each and every individual could learn about the digital world, digital communication could be better whereas, digital technology can be curse if used insignificantly. Children who have high exposure to digital technology are found to be aggressive, physically inactive, slow responsiveness, socially inactive, anxious and depression too. Technological use has severe effect on emotional, psychological and social aspect of the children. Thus, to avoid the negative results from use of digital technology, management regarding the type of device, the type of use, the amount and extent of use should be highly emphasized.

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