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Effectiveness of Self-Instructional Module on Dark Side of Smartphones among Adolescence

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Abstract: ***Introduction: Adolescence is a transitional period leading to adulthood, representing a significant phase of life. This stage accounts for one-fifth of the world's population. The 21st century has brought about rapid technological advancements and shifts in mass media. In today's high-tech world, it is nearly impossible to prevent children from engaging with smartphones. However, they are susceptible to the harmful effects of electronic gadgets. Therefore, it is crucial to guide them in using these gadgets wisely. This study focuses on the hazards of smartphones during this complex phase of development.***
Objectives: To evaluate the effectiveness of the SIM and improve awareness among adolescents on the hazards of using smartphones and techniques to overcome the problems.
Methods: This study utilized a quantitative descriptive approach. The research was conducted using a one-group pretest-posttest quasi-experimental design. A non-probability convenience sample of 60 adolescent students from various schools in Bangalore was selected. Data was collected using a pre-tested semi-structured questionnaire administered both before and after the intervention.
Results: Results of this study indicated a 51% increase in overall knowledge scores among adolescents in the posttest. The calculated 't' value was 28.4, which is statistically significant at the level of P < 0.001. The high and statistically significant mean difference suggests that the SIM was highly effective.
Conclusions: Adolescents are particularly vulnerable to the effects of electronic gadgets on various aspects of their health. There is a clear need for health education, guidance, and counseling on the healthy use of these devices, which should be incorporated into the curriculum. As a result, they are more likely to use these gadgets wisely, with a focus on both physical and mental well-being.
Keywords: Effectiveness, Self-Instructional Module, Health hazards, Smartphones, Electronic Gadgets, Adolescence

I. INTRODUCTION

The use of technology has rapidly increased over the past few decades, with mobile phones and the internet, which emit radiation, becoming more prevalent. The less time you spend on electronic devices, the more physically active you'll be. As a tech-savvy adolescent, it's important to develop smart habits, including limiting your time on electronic devices. [11]

Common health hazards include Carpal Tunnel Syndrome, neck and shoulder strain, headaches, eye strain, poor sleep patterns, physical fatigue, stress, obesity, and weakened immunity. Additionally, the brain is the primary organ affected by radiation emissions from handheld wireless phones. A study by the London School of Hygiene & Tropical Medicine found that 92% of mobile phones carry bacteria, with 16% harboring the dangerous E. coli strain. In our climate, such bacteria can survive for hours. [1]

A cross-sectional study was conducted with 59 boys and 67 girls, all adolescents aged 16-18 years. Two tools were used: the adapted Play and Technology Questionnaire for older children and an interview questionnaire addressing the harmful effects of commonly used electronic devices on health. The results were categorized into mild, moderate, or severe effects. The findings indicated that adolescents experienced moderate to severe issues such as backaches, carpal tunnel syndrome, itchy eyes, and sleep problems, which led to difficulties with concentration and poor school performance. It is recommended that nurses provide guidance to parents and teachers and that ongoing medical and nursing education programs be developed to promote the safe and healthy use of electronic devices. [2]

The study aimed to evaluate the effectiveness of video teaching on adolescents' knowledge about the health hazards of electronic devices in the Kanyakumari District. The researcher used a one-group pretest-posttest design with 60 adolescents. The study found that the video teaching program was effective, as indicated by the knowledge test results on the health hazards of electronic devices among the participants. The paired 't' value was 9.304, with df = 59, and $P < 0.05$. The study concluded that video teaching was effective in enhancing adolescents' knowledge about the health risks associated with electronic devices. [3]

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The study aimed to determine the average time school children spend on computers and electronic games, the positions they adopt, and any associated discomfort. A questionnaire was administered to 476 children in grades one through eight in New York City. The findings suggest that children use computers and electronic games differently from adults, with more boys than girls engaging in electronic game play. The results clearly indicated that children are experiencing discomfort from using computers or electronic games, with the discomfort primarily concentrated in the neck region. [4]

Adolescence is a crucial period of significant growth and development. While some games can positively influence brain function, others may lead to addiction, causing children to neglect important aspects of life. The author offers recommendations for games that positively impact brain function and provides solutions for children who are addicted to gaming. The results indicate that educational games are more beneficial, promoting learning and reducing the risk of addiction, whereas game addiction is more likely to occur with purely entertainment-focused games. [5]

The International Agency evaluated the scientific evidence on the brain tumor risk for Research on Cancer at World Health Organization. The scientific panel concluded that radiation from devices emitting non-ionizing radiation in the 30 kHz–300 GHz frequency range is a "possible" human carcinogen. Regarding the health impacts of digital (wireless) technologies, it's crucial to consider neurological diseases, physiological addiction, cognitive issues, sleep disturbances, and behavioral problems, in addition to cancer. The effect of altered behavior due to interactions with modern digital technologies on the well-being of children and adolescents must be carefully assessed. [6]

A review study on the physical impact of computer and electronic game use on children and adolescents indicates that these activities may cause children to adopt prolonged and awkward postures, similar to those linked with musculoskeletal disorders in working adults. If such postures are maintained, the physical demands of extensive use could result in various adverse effects on developing children, including visual, neurological, and physical changes. Laboratory studies on vision, reports of game-related tendonitis, and ergonomic assessments of classroom computers suggest that these concerns are justified. [7]

The study focused on teenagers, screens, and social media through a narrative review. While research has emphasized the need to differentiate between various types of digital technology use, many studies fail to consider these crucial distinctions. The relationship between digital technology use and well-being remains unclear, with evidence suggesting effects in both directions, and little effort has been made to eliminate potential confounding factors. Additionally, there is a need for greater recognition of individual differences, which significantly influence each adolescent's response to digital technologies. [8]

A study was conducted to evaluate the effectiveness of a teaching program on "Ergonomics for Computer Use" among the staff of Majan College. The program included a PowerPoint presentation with multimedia clips and a demonstration of exercises related to computer ergonomics. The results indicated an increase in the posttest mean scores. The paired “t” test showed a significant difference between the pretest and posttest scores (t29 = 11.466) at a 5% level of significance, demonstrating the effectiveness of the teaching program. [9]

A cross-sectional study assessed the ownership, usage, and content consumption of electronic devices among students, and their association with health symptoms, sleep patterns, dependence, and sociability. Results revealed that 95.9% of students owned mobile phones. Among them, 31.6% reported using their phones for 1 to less than 3 hours, and more than 3 hours per day. Content consumption was high, with 90% of students using audio content, 67.8% interactive content, and 56.6% visual content. Mild headaches and poor sleep quality were reported by 39.2% and 52% of students, respectively. Dependence and sociability were noted in 77.2% and 86% of students. Significant correlations were found between visual content use and headaches (p=0.02), interactive use and ear symptoms (p=0.03), and dependence and audio use (p=0.039). Additionally, there was a significant correlation between time spent using mobile phones and sociability (p=0.01). [10]

II. MATERIALS AND METHODS

A. *Study Design and Setting*

The research approach used for this study was evaluative, with a quasi-experimental design to assess the effectiveness of a SIM in addressing smartphone hazards among 60 adolescent school students in Bangalore. The study was conducted from May 13, 2023, to August 20, 2023.

O1 → X → O2

KEY:

O1 - Level of knowledge before the intervention.

X – Self Instructional Module on hazards of smartphones.

O2 – Level of knowledge after the intervention.

B. Study Participants and Sampling

A purposive sampling method was used to gather data from 60 adolescent students aged 14 to 19 years. The study included students who were willing to participate, available for data collection, and proficient in reading and writing English.

C. Data Collection Tools and Technique

A semi-structured questionnaire was employed to collect data, comprising two sections:

- Section A: Demographic variables.
- Section B: A comprehensive set of questions regarding smartphone hazards. Scores were categorized as follows: 15-20 points indicated high knowledge, 11-15 points signified moderate knowledge and 5-10 points represented poor knowledge.

D. Statistical Analysis

The collected data were summarized and tabulated using both descriptive and inferential statistics. The analysis was performed with the Statistical Package for Social Sciences (SPSS) version 22, and appropriate statistical tests were applied based on the findings.

E. Ethical Considerations

Participants were thoroughly informed about the study's purpose, procedures, and potential benefits. All students provided voluntary consent by signing a consent form.

III. RESULTS

Figure – 1 Percentage Distribution of Samples According to Demographic Variables.

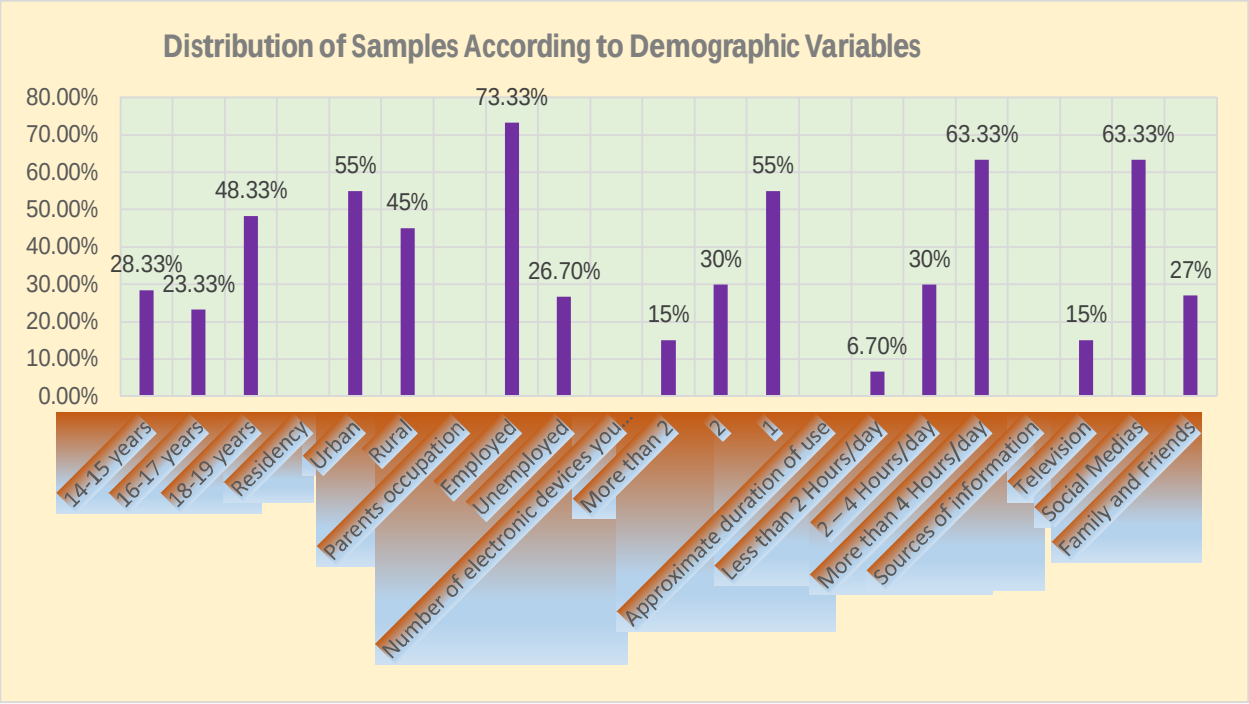


Figure 1 indicates the following demographic details of the study samples: The majority of students, 29 (48.33%), were aged between 18 and 19 years. Most students, 33 (55%), resided in urban areas. A significant portion of students, 44 (73.33%), had employed parents. The majority of students, 33 (55%), used more than 3 electronic devices. Many students, 38 (63.33%), used electronic devices for more than 4 hours per day. Social media was a major source of information for 38 (63.33%) of the students.

Table 1: Assess the pre and post-test Level of Knowledge of Adolescents on hazards of smartphones.
N = 60

	Pretest		Post-test		Pretest Mean score	Overall Knowledge %	Pretest Mean score	Overall Knowledge %
	Mean score	% of knowledge score	Mean score	% of knowledge score				
General information	1.45	42.1%	2.85	96.3%		41.38 %		92.52 %
Hazards of over-usage	2.15	41.7%	4.88	96.0%			23.26	
Exercises/relaxation	1.68	34.0%	5.88	94.0%				
Early Signs and Symptoms	2.05	42.0%	4.22	84.4%				
Prevention	2.70	47.1%	5.43	91.9%	10.03			

Table 1 demonstrates that the pretest overall knowledge score regarding the health hazards of smartphones was 41.38% among adolescents. After the intervention, the posttest overall knowledge score increased to 92.52%. This represents a 51.14% improvement from the pretest score, indicating that the SIM program was highly effective in enhancing adolescents' understanding of smartphone health hazards.

Table 2: Comparison of Mean Knowledge Score between pretest and posttest

Knowledge	Post-test		Pre test		t– value p - value
	Mean	S.D	Mean	S.D	
Overall, Knowledge	51.98	9.09	22.39	6.25	t = 28.41, p<0.001 (Significant)

Table 2 presents the comparison of knowledge levels between the pretest and posttest. The overall calculated ‘t’ value was 28.41, which is significant at the level of P < 0.001. The mean difference was substantial and statistically significant, indicating that the SIM program was effective in improving adolescents' knowledge about the health hazards of smartphones.

IV. DISCUSSION

The findings of this study are discussed about the study’s objectives and existing research. The study aimed to assess the effectiveness of the SIM program on adolescents' knowledge regarding smartphone hazards.

In this study, the majority of adolescents were from urban areas, had employed parents, and owned their mobile phones. The mean pre-test knowledge score was 22.39, while the mean post-test knowledge score increased to 51.98 regarding smartphone health hazards. The significant increase in the post-test score, with a mean difference of 29.59 and a calculated ‘t’ value of 28.41 (greater than the tabulated ‘t’ value at a 0.001 level of significance), indicates that the SIM program was effective in improving knowledge among adolescents. Consequently, the null hypothesis (H0) was rejected, and the research hypothesis (H01) was accepted, confirming the effectiveness of the SIM program.

However, there was no significant association between variables such as age, parent occupation, area of residence, number of mobile phones owned, or daily usage of electronic devices with the pre-test knowledge score among adolescents.

The present study is supported by a similar study conducted to evaluate the effectiveness of video teaching on knowledge about health hazards of electronic devices among adolescents in selected schools in Gandhinagar, Gujarat. In that study, the mean pre-test knowledge score was 13.66, and the mean post-test knowledge score increased to 23.2 regarding health hazards of electronic devices. The significant increase in the post-test score, with a mean difference of 9.54 and a calculated ‘t’ value of 16.95 (exceeding the tabulated ‘t’ value of 2.00 at a 0.05 level of significance), demonstrated that the video teaching was effective in enhancing adolescents' knowledge.[13]

A. Limitations

The main limitation of this study is the smaller sample size and the inclusion of only selected adolescent students.

B. Recommendations

The study recommends conducting research across a diverse group of students to gain a more comprehensive understanding of the subject under investigation. Additionally, examining perspectives from various age groups and experience levels could provide valuable insights into the challenges and opportunities associated with overcoming addiction and physical and mental health issues related to smartphone use.

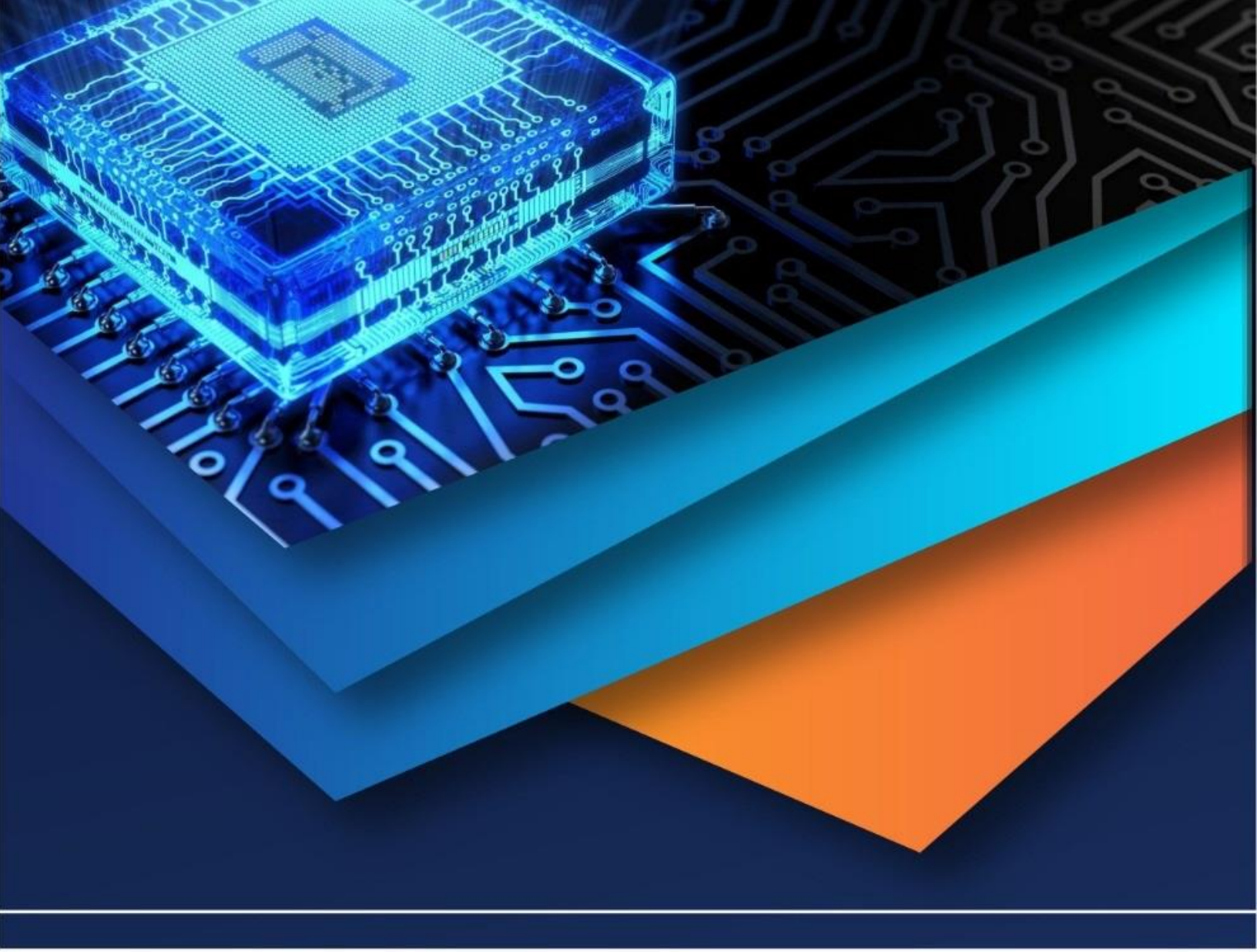
V. CONCLUSION

In today's technological world, it is unrealistic to completely keep adolescents away from electronic gadgets. Therefore, it is crucial to ensure that adolescents use these gadgets wisely, develop life skills that technology cannot provide, and prepare them to manage their lives, solve problems, and contribute positively to society. Promoting healthy usage and implementing safety measures are essential to prevent these tools from becoming detrimental. Children, adolescents, and professionals who use electronic gadgets are particularly vulnerable. [12] Thus, caregivers need to guide and take proactive steps to manage and reduce excessive electronic device usage among school students.

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2) Conflict of Interest: There are no conflicts of interest in this work.
3) Funding: Nil.

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