

The Double-Edged Screen: An Empirical Study on Post-COVID Smartphone Usage and Its Impact on Student Learning Behaviour

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ABSTRACT

Smartphone technology has brought a significant transformation in the modern learning environment due to its rapid growth and accessibility in recent years. This change became especially noticeable during the COVID-19 pandemic when educational institutions worldwide shifted from traditional classroom teaching to online and remote learning. During this period, smartphones became one of the most important and convenient digital devices for students, enabling them to attend virtual classes, access digital study materials, and communicate with teachers and classmates through platforms such as Zoom, Google Classroom, and Microsoft Teams. These technologies helped students continue their education even when schools and colleges were closed.

However, along with these benefits, excessive smartphone usage has also created several challenges. Overuse of smartphones has been associated with reduced attention span, frequent distractions from social media platforms, and increased dependency on digital devices. Notifications from entertainment applications, games, and social networking sites often interrupt study sessions and affect students' ability to maintain concentration. Prolonged screen time may also influence sleep patterns, physical activity, and overall mental well-being.

This paper reviews the role of smartphone usage in shaping students' learning behaviour in the post-COVID educational environment. The study is based on survey data collected from 177 respondents through an online questionnaire. The questionnaire examined students' daily smartphone usage patterns, the purposes for which smartphones are used, and their perceived effects on academic performance and lifestyle. The findings indicate that many students use smartphones for both educational purposes such as online classes, learning videos, and digital study materials, as well as entertainment activities like social media and video streaming.

Overall, the results suggest that smartphones function as a double-edged tool in modern education. While they improve access to learning resources and support flexible learning, excessive usage can lead to distractions and reduced study focus. Therefore, responsible smartphone usage, digital discipline, and proper time management are essential to maximize the educational benefits while minimizing negative effects. Educational institutions and teachers can also play an important role by promoting productive digital practices and integrating educational technologies effectively into the learning process.

Keywords: Smartphone Usage, Post-COVID Education, Digital Distraction, Academic Productivity, Screen Dependency, Student Behaviour, Social media distraction.

I. INTRODUCTION

The COVID-19 pandemic caused a major transformation in the global education system. Schools and colleges were forced to suspend traditional classroom teaching and adopt online learning methods to continue academic activities. As a result, digital technologies became central to education, and students increasingly relied on internet-enabled devices to attend virtual classes and access study materials. Among these devices, smartphones became one of the most widely used tools because of their portability, affordability, and easy internet connectivity [1]. Educational institutions adopted online platforms such as Google Classroom, Zoom, Microsoft Teams, and other Learning Management Systems (LMS) to facilitate teaching and communication between students and teachers. Smartphones enabled students to attend online lectures, download study materials, submit assignments, and interact with teachers and classmates through digital platforms [2]. Students were also able to access educational videos, online tutorials, digital libraries, and academic resources, which helped maintain learning continuity during lockdowns and encouraged self-directed learning [3]. However, along with these benefits, excessive smartphone usage has introduced several challenges related to students' learning behaviour. Frequent use of social media, gaming, and entertainment applications often distracts students during study

sessions and reduces their ability to concentrate. Research also suggests that prolonged screen time may negatively affect cognitive performance, sleep patterns, and overall mental well-being [4]. In addition, smartphones provide constant access to entertainment platforms, which may reduce students' academic focus and learning efficiency. Because of this dual impact, smartphones are often described as a "double-edged technology" that offers both educational opportunities and potential distractions [5]. Therefore, understanding the impact of smartphone usage on students' learning behaviour after the pandemic has become an important research area. This study examines how smartphone usage influences academic performance, study habits, and digital engagement among students based on survey data. The findings aim to provide insights into how smartphones can be used more effectively as learning tools while minimizing their negative effects on academic performance.

II. LITERATURE SURVEY

Several studies have explored the relationship between smartphone usage and students' learning behaviour. With the rapid growth of digital technology, smartphones have become an essential part of students' academic and daily activities. Researchers have examined both the benefits and challenges associated with smartphone use in educational environments. Twenge and Campbell (2018) found that excessive screen time is associated with lower psychological well-being, increased anxiety, and reduced concentration among students [1]. Similarly, Lepp, Barkley, and Karpinski (2015) reported that frequent smartphone use during lectures and study sessions negatively affects academic performance due to constant distractions and multitasking behaviour [2].

Montag and Elhai (2019) further highlighted the issue of smartphone addiction, explaining that excessive usage can lead to reduced attention span, cognitive control problems, and emotional stress [3]. However, smartphones have also played a significant role in supporting online education. Chen et al. (2021) reported that smartphones enabled students to access online classes, digital learning materials, and educational resources during the COVID-19 pandemic [4].

Similarly, UNESCO (2021) emphasized that mobile technologies helped maintain educational continuity during school closures, although responsible and balanced usage is necessary to avoid digital dependency [5]. Overall, previous research indicates that smartphones act as a double-edged tool in education, offering learning opportunities while also creating potential distractions for students.

III. METHODOLOGY

This study adopts a quantitative descriptive research approach to examine smartphone usage patterns and their impact on students' learning behaviour in the post-COVID educational environment. Quantitative descriptive research is commonly used to analyse behavioural trends within a population through structured data collection and statistical interpretation, allowing researchers to systematically evaluate the relationship between technology usage and academic activities among students [1].

The study includes 177 respondents from different academic backgrounds. The majority of participants belong to the 19–21 age group (59.9%), followed by 16–18 years (24.3%) and 22–24 years (15.3%). These age groups are particularly relevant as they represent students who experienced the transition from traditional classroom learning to online education during the COVID-19 pandemic.

Data was collected using a structured online questionnaire developed through Google Forms. The survey included questions related to demographic information, smartphone accessibility, daily usage duration, educational and entertainment usage patterns, study productivity, and psychological effects of excessive smartphone use. The questionnaire mainly consisted of multiple-choice questions, along with a few open-ended questions to capture students' personal opinions regarding smartphone usage and its influence on learning.

The collected responses were analysed using percentage distribution and descriptive statistical analysis, while thematic analysis was used to interpret qualitative responses. This combined approach helped provide a comprehensive understanding of smartphone usage behaviour and its influence on students' academic engagement in the post-pandemic learning environment [2][3].

IV. PROPOSED SYSTEM

The proposed system aims to analyse the impact of smartphone usage on students' learning behaviour in the post-COVID educational environment. It focuses on collecting and analysing data related to smartphone usage patterns, study habits, and the psychological effects of prolonged digital engagement. A survey-based approach is used to gather responses from students and understand how smartphones influence academic productivity and concentration.

The system collects data through an online questionnaire developed using Google Forms. The questionnaire includes questions about demographic information, smartphone accessibility, daily usage duration, educational activities, and levels of academic distraction. The collected responses are organized into categories such as usage time, purpose of smartphone use, and behavioural effects during study sessions.

The proposed system operates in three main stages: data collection, data processing, and data analysis. In the data processing stage, responses are organized and converted into percentage distributions to identify trends in smartphone usage. In the data analysis stage, statistical and thematic analysis methods are used to interpret the results and identify patterns related to academic productivity and digital distraction. Overall, the system helps evaluate the positive and negative effects of smartphone usage on students' learning behaviour and provides insights that can help educational institutions promote responsible and balanced smartphone use for academic purposes.

V. RESULTS AND DISCUSSION

One hundred and seventy-seven students took part in the survey where 63.3% were men and 36.7% were women and the largest percentage (72.9) of students were of undergraduate level. The findings reveal that a hundred percent of the students possess a smartphone, which clearly demonstrates its accessibility among students. In terms of daily usage, 44.1% of students spend their time on smartphones 1-3 hours/day, 26.6% 3-5 hours/day and 19.8% fewer than 1 hour/day, which proves that smartphones are a part of students. The survey further indicated that smartphones are multitask devices with 74% using it as a social media, 68.4% as video watchers, 50.8% as Messenger's, 48.6% as readers and students and 48% as online classes. In addition, 50.3% of students claimed that their use of the smartphone increased significantly since the COVID-19 pandemic, and 34.5% claimed that it increased slightly, which also demonstrates the effect of online learning on digital dependency. Most students also mentioned that they have been distracted by notification on the social media sites like Instagram and WhatsApp, affecting their learning process. Moreover, 22.6% of the respondents reported being stressed by heavy use of smartphones, and 28.8% said that they were sometimes stressed, which can be interpreted as the fact that screen time and digital overload can adversely affect the mental health of students.

1. Age / वय

177 responses

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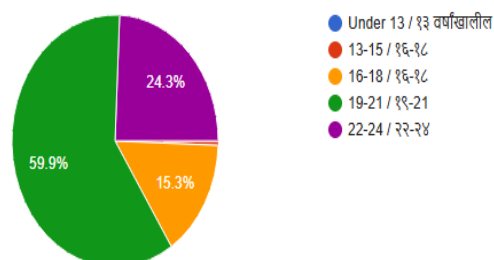


Fig. 1: Demographic Distribution of Respondents

The age distribution of the 177 survey respondents, as indicated in figure 1, is as follows. Most of the participants are aged 19-21 years (59.9) meaning that most respondents are undergraduate students and are actively involved in utilizing smartphones both academically and socially. The age group of 16-18 years constitutes 15.3 percent of the respondents and 24.3 percent fall within the 22-24 years. This distribution leads to believe that the research is mainly representative of the smartphone adoption behaviour of younger adults possessing a higher education level and more active in online platforms of learning post-COVID-19. The prevalence of 19-21 age bracket emphasizes the fact that smart phones are important when it comes to the life of students within this age bracket in terms of their studies and in their day-to-day life.

2. Gender / लिंग

177 responses

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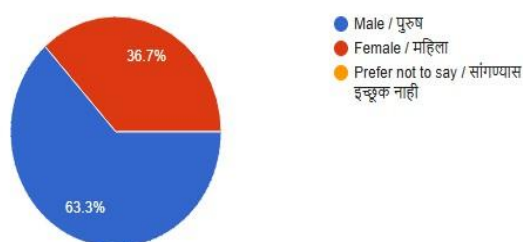


Fig. 2: Gender distribution

The survey respondents are 177 in number; this is shown by their gender distribution as depicted in figure 2. The findings show that 63.3 percent of the respondents are men with 36.7 percent being women. This demonstrates that most of the respondents in the research were male students. The gender distribution will give us a

description of the demographic makeup of the people taking part in the survey. The inclusion of both male and female students has a role in getting a wider perspective of smartphone use activities and its implication on learning behaviour when studying in the post-COVID context.

3. Education Level / शैक्षणिक स्तर

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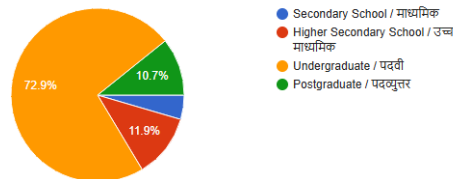


Fig. 3: Educational Level Distribution

Figure 3 shows the distribution of educational level of the 177 respondents taking part in the survey. Most of the respondents are undergraduate students (72.9 percent of the total population) as shown by the results, which implies that higher education institutions comprise of most respondents. Moreover, 11.9 percent of the respondents are in the higher secondary school, and 10.7 percent are postgraduates. A low percentage of the respondents are at the secondary school level. According to this distribution, the study is more of the smartphone usage behaviour of the students pursuing an undergraduate degree, the group of achievements that significantly depends on smartphones in academic tasks, including yet not limited to online classes, accessing studying materials, and contacting tutors.

4. Location Type / स्थान प्रकार

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177 responses

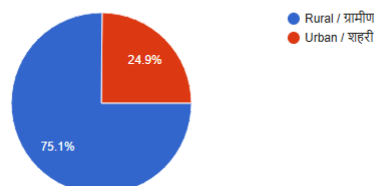


Fig. 4: Location Distribution

The 177 survey respondents are located as shown in figure 4. Findings show that 75.1 percent of the respondents live in the rural regions and 24.9 percent live in urban areas. This distribution is an indication that most respondents participating in the study are located in the rural areas. The statistics accentuate the increased access of smartphones and digital learning tools even to rural zones. It also implies that rural-based students are adopting smartphones more frequently to learn and take online classes as well as conduct online communication, especially post-digitization of learning due to COVID-19.

5. Do you own a smartphone? / ५. तुमच्याकडे स्मार्टफोन आहे का?

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177 responses

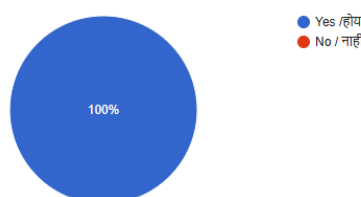


Fig. 5: Smartphone Ownership Among Survey Respondents

Figure 5 shows the responses to the question regarding smartphone ownership among the participants. The results indicate that 100% of the 177 respondents own a smartphone. This demonstrates the widespread availability and accessibility of smartphones among students across different educational levels and locations. The complete ownership of smartphones among participants highlights the importance of these devices in students' daily lives, particularly for activities such as attending online classes, accessing educational resources, communication, and entertainment. This finding also supports the relevance of the study in examining how smartphone usage influences students' learning behaviour in the post-COVID educational environment.

6. On average, how many hours per day do you use your smartphone? / ६. तुम्ही तुमचा स्मार्टफोन दररोज सरासरी किती तास वापरता?

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177 responses

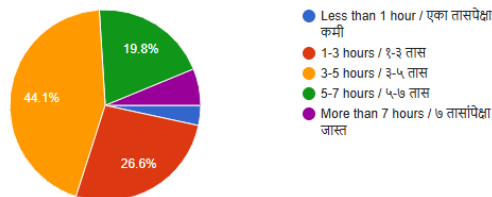


Fig. 6: Average Daily Smartphone Usage

Figure 6 shows the mean smartphone usage among the 177 respondents per day. The findings show that the highest percentage of students 44.1% spend 35 hours a day on their smartphones with the second-largest percentage of 26.6% spending between 13 hours a day. Further, 19.8 percent of the respondents have configured to smartphones 57 hours per day whereas lesser percentage of the students use smartphones less than one hour per day or more than seven hours per day. This evidence indicates that smartphones are becoming an important part of the lives of the students with a considerable percentage of students dedicating numerous hours every day to their smart phones. This prolonged usage can be associated with educational activities like taking online courses, reading learning resources, and communication and online use as well as the use of the entertainment platform and social media.

7. What do you use your smartphone for? / ७. तुम्ही तुमचा स्मार्टफोन कशासाठी वापरता?

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177 responses

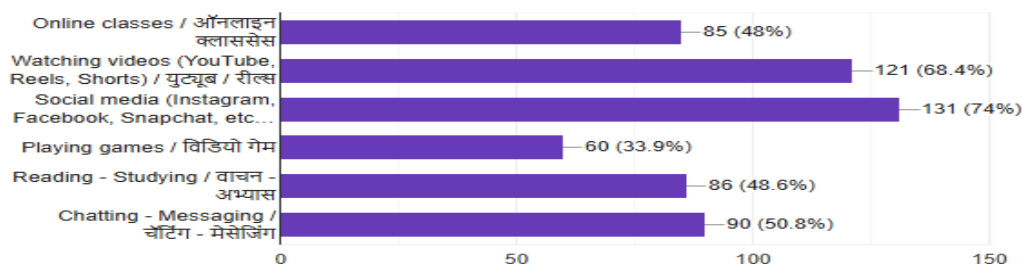


Fig. 7: Purpose of Smartphone Usage Among Students

This is demonstrated in figure 7 that displays the different ways in which students utilise their smartphones determined by the viewpoints of 177 respondents. The findings also show that most of the students are social media users with smartphones (74%), then watching videos through YouTube, reels, and shorts (68.4%). Moreover, 50.8 percent of those surveyed use smartphones to chat and send messages where 48.6 percent use the smartphones to read and study. About 48 percent of the students said they used the smartphones to take online classes depicting their contribution to digital learning. Moreover, 33.9 percent of the people respond that they play games on smart phones. These results indicate that smartphones can be used in different ways in the student life such as academics, communication and entertainment. Nonetheless, the social media and video consumption rate is so large, indicating that people tend to use smartphones not to study but to have fun.

8. Which app do you spend the most time on? /

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८. तुम्ही कोणत्या अॅपवर सर्वात जास्त वेळ घालवता?

177 responses

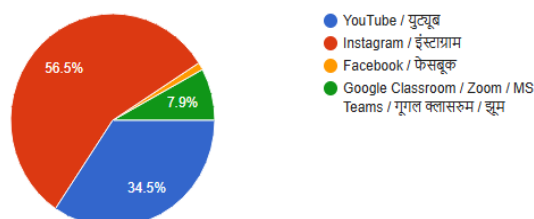


Fig. 8: Most Frequently Used Smartphone Applications Among Students

Figure 8 shows what applications are dedicated to the most by students when using their smartphones according to the answers of 177 respondents. The findings indicate that the most prevalent application is the Instagram as 56.5 percent of the surveyed people spend most of their time on this platform. This is preceded by YouTube, having a usage of 34.5 with the majority of students viewing videos, reels, and other online content. On the other hand, it was found that only 7.9% of the respondents spent the majority of their time on such a platform as Google Classroom, Zoom, or Microsoft Teams. The findings suggest that entertainment and social media

applications are the most common among smartphone because the educational applications are also used less. This implies that despite the fact that smartphones facilitate online learning, students spend a considerable amount of time using their phones on non-academic tasks.

9. Do you use your phone more for / ९. तुम्ही तुमचा फोन जास्त वापरता का?

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177 responses

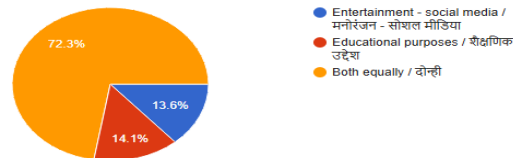


Fig. 9: Primary Purpose of Smartphone Usage Among Students

Figure 9 illustrates the primary purpose for which students use their smartphones, based on the responses of 177 participants. The results show that the majority of students, 72.3%, use their smartphones equally for both educational and entertainment purposes. Meanwhile, 14.1% of respondents primarily use their smartphones for educational purposes, such as attending online classes, studying, and accessing academic resources. In contrast, 13.6% of students reported using their smartphones mainly for entertainment and social media activities. These findings indicate that smartphones play a dual role in students' lives, serving both as tools for learning and as sources of entertainment. The balanced usage reported by most respondents suggests that smartphones are integrated into both academic and personal activities in the post-COVID digital learning environment.

10. Has your smartphone usage increased after COVID-19 lockdowns? / १०. कोविड-१९ लॉकडाऊननंतर तुमच्या स्मार्टफोनचा वापर वाढला आहे का?

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177 responses

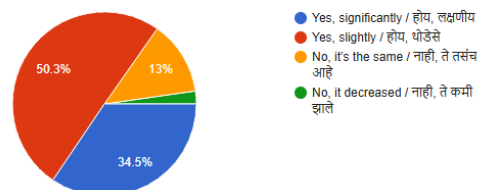


Fig. 10: Change in Smartphone Usage After COVID-19 Lockdowns

Figure 10 shows the change in smartphone usage among students after the COVID-19 lockdowns, based on the responses of 177 participants. The results indicate that 50.3% of respondents reported a slight increase in smartphone usage, while 34.5% stated that their smartphone usage increased significantly after the pandemic. In contrast, 13% of respondents mentioned that their smartphone usage remained the same, and only a very small percentage reported a decrease in usage. These findings suggest that the COVID-19 pandemic played a significant role in increasing smartphone usage among students, mainly due to the shift toward online education, digital communication, and increased reliance on smartphones for academic and daily activities.

11. Do you feel your study time has reduced due to mobile/social media use? / ११. मोबाईल/सोशल मीडियाच्या वापरामुळे तुमचा अभ्यासाचा वेळ कमी झाला आहे असे तुम्हाला वाटते का?

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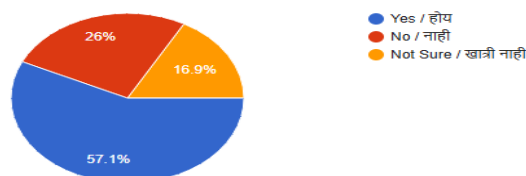


Fig. 11: Impact of Smartphone and Social Media Usage on Students' Study Time

Figure 11 illustrates students' perceptions regarding whether their study time has decreased due to smartphone and social media usage. The results show that 57.1% of respondents believe that their study time has reduced because of mobile and social media usage. Meanwhile, 26% of students reported that their study time has not been affected, and 16.9% were unsure about the impact. These findings suggest that a majority of students feel that excessive smartphone usage and engagement with social media platforms may negatively influence their academic study time. This highlights the potential impact of digital distractions on students' learning habits and academic productivity.

12. Have you ever been distracted from studies because of social media or notifications? / १२. सोशल मीडिया किवा नोटिफिकेशन्समुळे तुमचे कधी अभ्यासापासून लक्ष विचलित झाले आहे का?

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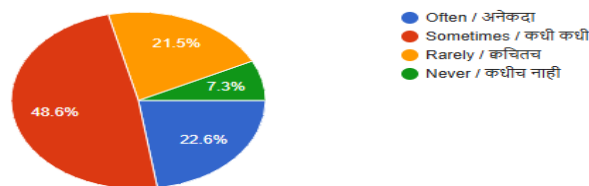


Fig. 12: Frequency of Academic Distraction Due to Social Media or Notifications

Figure 12 illustrates how frequently students experience distractions from their studies due to social media or smartphone notifications. The results show that 48.6% of respondents reported being distracted sometimes, while 22.6% stated that they are often distracted during study sessions. Additionally, 21.5% of students indicated that they are rarely distracted, and only 7.3% reported that they never experience such distractions. These findings suggest that social media and smartphone notifications are common sources of distraction for many students, which may affect their concentration and academic productivity.

13. Do you use any productivity or educational apps? / १३. तुम्ही कोणतेही उत्पादकता किंवा शैक्षणिक ॲप्स वापरता का?

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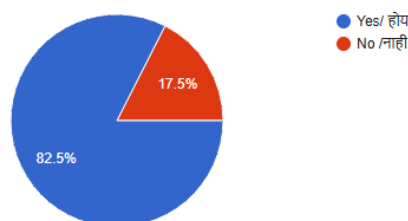


Fig. 13: Use of Productivity or Educational Applications by Students

Figure 13 will depict the answers on the use of productivity applications or educational applications of their smartphones. The findings have shown that 82.5 and 17.5 percent of the respondents use productivity or learning applications and do not use the applications respectively. This implies that most students use smartphones to apply within the academic setting either by accessing academic resources, task management or educational platforms. It is indicated that smartphones are an essential part of helping students with their learning processes in the post-COVID digital learning environment as the usage of educational applications is high.

14. Would you be willing to reduce social media use if it helped improve your studies? / १४. जर तुमच्या अभ्यासात सुधारणा झाली तर तुम्ही सोशल मीडियाचा वापर कमी करण्यास तयार असाल का?

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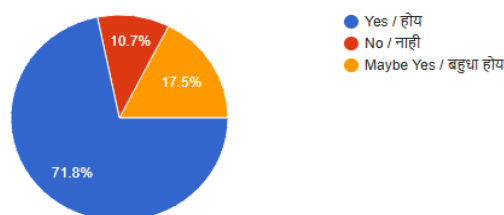


Fig. 14: Students Willingness to Reduce Social Media Usage to Improve Studies

Figure 14 illustrates students' willingness to reduce their social media usage if it helps improve their academic performance. The results show that 71.8% of respondents are willing to reduce their social media usage, indicating a strong awareness among students about the possible negative effects of excessive social media engagement on their studies. Meanwhile, 17.5% of respondents stated that they might consider reducing their usage, and 10.7% reported that they are not willing to reduce their social media usage. These findings suggest that most students recognize the importance of controlling social media use to improve their academic productivity and focus.

15. Do you experience stress or anxiety due to constant phone usage or social media? / १५. फोन किंवा सोशल मीडियाच्या सतत वापरामुळे तुम्हाला ताण किंवा चिंता वाटते का?

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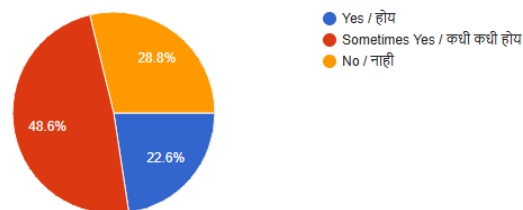


Fig. 15: Stress or Anxiety Experienced Due to Smartphone and Social Media Usage

Figure 15 presents the responses regarding whether students experience stress or anxiety due to constant smartphone or social media usage. The results show that 22.6% of respondents reported experiencing stress or anxiety, while 48.6% indicated that they sometimes feel stressed due to excessive phone usage. In contrast, 28.8% of students stated that they do not experience such stress or anxiety. These findings suggest that frequent smartphone and social media usage may contribute to psychological pressure or mental fatigue for many students, highlighting the importance of balanced and responsible digital usage to maintain mental well-being.

16. How often do you check your phone during study sessions? / १६. अभ्यासादरम्यान तुम्ही किती वेळा तुमचा फोन तपासता?

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177 responses

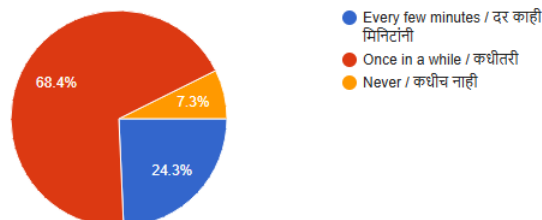


Fig. 16: Frequency of Smartphone Checking During Study Sessions

Figure 16 illustrates how frequently students check their smartphones during study sessions. The results indicate that 68.4% of respondents check their phones once in a while studying, while 24.3% reported checking their phones every few minutes. In contrast, only 7.3% of students stated that they never check their phones during study time. These findings suggest that smartphones often interrupt students' study sessions, which may affect concentration and academic productivity. The habit of frequently checking phones highlights the influence of digital distractions on students' learning behaviour.

17. Do you sleep with your phone next to you? / १७. तुम्ही तुमचा फोन शेजारी ठेवून झोपता का?

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177 responses

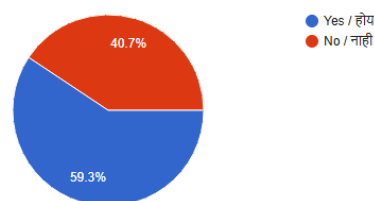


Fig. 17: Students Sleeping with Smartphones Nearby

Figure 17 illustrates whether students sleep with their smartphones next to them. The results show that 59.3% of respondents reported that they keep their phones nearby while sleeping, whereas 40.7% stated that they do not sleep with their phones next to them. This finding suggests that a significant number of students maintain close proximity to their smartphones even during rest periods. Such behaviour may indicate a high level of smartphone dependency and continuous connectivity, which could potentially affect sleep quality and overall well-being.

SECTION 5: Open Feedback / विभाग ५: अभिप्राय

18. In your opinion, how has smartphone usage affected your education post-COVID? / १८. तुमच्या मते, कोविडनंतर स्मार्टफोनच्या वापराचा तुमच्या शिक्षणावर कसा परिणाम झाला आहे?

177 responses

Fig. 18: Student Feedback on Smartphone Usage and Education After COVID-19

The responses show mixed effects of smartphone usage on education after COVID-19. Many students stated that smartphones helped them access online classes, study materials, and educational videos, making learning easier and more flexible. However, several respondents also reported distractions from social media, gaming, and notifications, which reduced their concentration and study time. Overall, smartphones act as a useful learning tool but can negatively affect studies if used excessively.

19. What would help you use your smartphone more for learning and less for distraction? / १९. तुमचा स्मार्टफोन शिकण्यासाठी जास्त आणि लक्ष विचलित करण्यासाठी कमी वापरण्यास तुम्हाला काय मदत करेल?

177 responses

Fig. 19: Student Recommendations for Productive Smartphone Usage

Most students suggested that reducing social media usage, turning off notifications, and setting screen-time limits would help them use smartphones more for learning. Many respondents also recommended using educational apps, focus modes, study planners, and fixed study schedules to improve concentration. Overall, students believe that self-discipline, better time management, and prioritizing educational content can help reduce distractions and make smartphones more useful for learning.

VI. CONCLUSION

The data analysis of opinions of 177 respondents makes the potential outcomes of smartphone use and its effect on learning attitudes in the post-COVID learning process valuable. The demographical findings indicate that the majority of the respondents are of the 19-21 years age origin with a larger percentage being the undergraduate students and 100 percent of the participants owning smartphones which means that smartphones have become a necessity among students.

The results indicate that students dedicate a number of hours each day on smartphones, and most of their time is devoted to social media, video viewing, messaging, online classes, and studying. The information also indicates that the use of smartphones became even more common following the COVID-19 pandemic and was largely due to the fact that online education, digital communication, and study resources were now contingent on mobile technology.

Even though smartphones are convenient in accessing educational resources, distance learning, and online learning, the outcomes also indicate various limitations. The students complained of less studying time, being distracted by always receiving notifications and using social media, and being dependent on screens. Many of the respondents acknowledged that they view their phones at school, thus interfering with their concentration and performance. Moreover, other students stated that they had been stressed or anxious because of using their smartphone too often.

Nevertheless, the survey also reveals that students understand these problems and want to implement corrective measures, i.e., decreasing the number of social media sessions, switching off the notifications, establishing time limits with screens, and employing learning or productive applications to change their learning behaviours.

Generally, the research ends by stating that smartphones are the solution that is a two-sided instrument in contemporary learning. On one hand, they are useful as a valuable source of digital learning, information and communication in academic activities. Conversely, overindulgences after using it too much and too much can produce distractions, lack of concentration and detachment of habits towards studying. Thus, prudent use of smartphones, digital discipline, and proper time management play a critical role in making sure that smart phones play a favourable role in contributing to the academic growth of the students in the post-COVID world.

VII. FUTURE SCOPE

This research can be developed in the future by involving a more diverse and larger sample of students with different regions and backgrounds of education to achieve more extensive results. It is also possible to compare the patterns of smartphone use in rural and urban students or in students of various ages in order to understand the differences in the patterns of smartphone use. Future research can focus on the sustained implications of smartphone use on education level, concentration, and mental well-being. Besides that, they can consider opportunities of educational apps, digital well-being tools, and AI-based learning platforms that can contribute to better outcomes in learning and decreased distractions. Establishing rules on how to be responsible in

smartphone use would also make the use of smartphones more profitable in learning among the students.

VIII. REFERENCES

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