A Study on Impact of COVID-19 Pandemic on Usage of Digital and Communication Technology.

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Abstract

The goal of this study is to explore how people in different countries use digital devices, including when working from home environments in their daily lives, during the pandemic. These devices include mobile phone, laptop, PC, TV, Alexa, wearables etc.

The COVID-19 pandemic has had an unprecedented impact on societies worldwide, causing widespread disruptions in daily life, including changes in work and communication patterns. With many people working from home, digital and communication technology (DCT) have become increasingly important for both work and personal life. This study aimed to explore the impact of the COVID-19 pandemic on the use of DCT across different cultures.

Participants were recruited from India and other countries with different cultural backgrounds. Participants completed an online survey that assessed their usage of DCT, including mobile phones, laptops, PCs, televisions, Alexa, wearables, and other devices. They also provided information about their work and living situations during the pandemic.

Results showed that the use of DCT significantly increased during the pandemic across all countries, with mobile phones and laptops being the most commonly used devices. Differences in DCT usage were observed based on age, gender, and occupation.

This study provides insights into the impact of the COVID-19 pandemic on DCT usage across different cultures. Findings suggest that the pandemic has accelerated the adoption of DCT in daily life, particularly for work-related activities. The results have implications for policy-makers and technology developers in creating strategies to support the increasing demand for DCT in the post-pandemic era.

Keywords

Digital Devices Usage, Internet Use, Covid19, Technology

Introduction

The global outbreak of the COVID-19 pandemic has spread worldwide, affecting almost all countries and territories. The outbreak was first identified in December 2019 in Wuhan, China. The countries around the world cautioned the public to take responsive care. The public care strategies have included handwashing, wearing face masks, physical distancing, and avoiding mass gathering and assemblies. Lockdown and staying home strategies have been put in place as the needed action to flatten the curve and control the transmission of the disease (Sintema, 2020).

Bhutan first declared closing of schools and institutions and reduction of business hours during the second week of March 2020 (Kuensel, 2020, 6 March). The complete nationwide lockdown was implemented from 1 August 2020 (Palden, 2020). In between, movements were allowed, offices began functioning, schools and college reopened for selected levels and continued with online class for others. More than 170,000 children in Bhutan from classes PP–XII are, today, affected by the school closure. The impact is far reaching and has affected learning during this academic year or even more in the coming days. Several schools, colleges and universities have discontinued face-to-face teaching. There is a pressing need to innovate and implement alternative educational and assessment strategies. The COVID-19 pandemic has provided us with an opportunity to pave the way for introducing digital learning (Dhawan, 2020).

Research highlights certain dearth such as the weakness of online teaching infrastructure, the limited exposure of teachers to online teaching, the information gap, non-conducive environment for learning at home, equity and academic excellence in terms of higher education. This article evaluates the impact of the COVID-19 pandemic on teaching and learning process across the world. The challenges and opportunities of online and continuing education during the COVID-19 pandemic is summarized and way forward suggested.

Methodology

This section describes the methodology employed in the study to investigate the impact of the COVID-19 pandemic on the usage of digital and communication technology (DCT). The research aimed to gather responses from people around the world and conduct exploratory data analysis to derive meaningful conclusions. Additionally, qualitative analysis was performed on the obtained results. The following subsections provide a detailed overview of each aspect of the methodology.

Participant Recruitment:
To ensure a diverse and representative sample, participants were recruited from various countries across different continents. The recruitment process involved using online platforms and social media channels to reach a wide range of individuals. Efforts were made to target individuals from different cultural backgrounds, age groups, and occupations to capture a comprehensive understanding of DCT usage during the pandemic.

Data Collection:
An online survey was designed to collect data on participants' usage of DCT devices

and their work and living situations during the COVID-19 pandemic. The survey questionnaire included multiple-choice questions, Likert scale items, and open-ended questions. It covered various digital devices such as mobile phones, laptops, PCs, televisions, Alexa, wearables, and other relevant technologies. Participants were encouraged to provide detailed and accurate responses to ensure the reliability and validity of the data.

Exploratory Data Analysis:

Once the data collection phase was completed, exploratory data analysis techniques were applied to gain insights into the collected data. This analysis involved examining the distribution, patterns, and relationships among different variables. Descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated to summarize the data. Correlation among different variables was analyzed using chi-squared test. Visual representations, including charts and graphs, were utilized to aid in the interpretation of the findings.

Qualitative Analysis:

In addition to the quantitative analysis, qualitative analysis was conducted on the obtained results. This involved a systematic and in-depth examination of the open-ended responses provided by participants. Common themes, trends, and recurring patterns were identified through a process of coding and categorization. The qualitative analysis provided a richer understanding of participants' experiences, perceptions, and challenges related to DCT usage during the pandemic.

Ethical Considerations:

Ethical guidelines were followed throughout the study to protect the rights and confidentiality of the participants. Informed consent was obtained from each participant before their involvement in the study. The survey ensured anonymity and confidentiality, and participants were assured that their responses would be used only for research purposes.

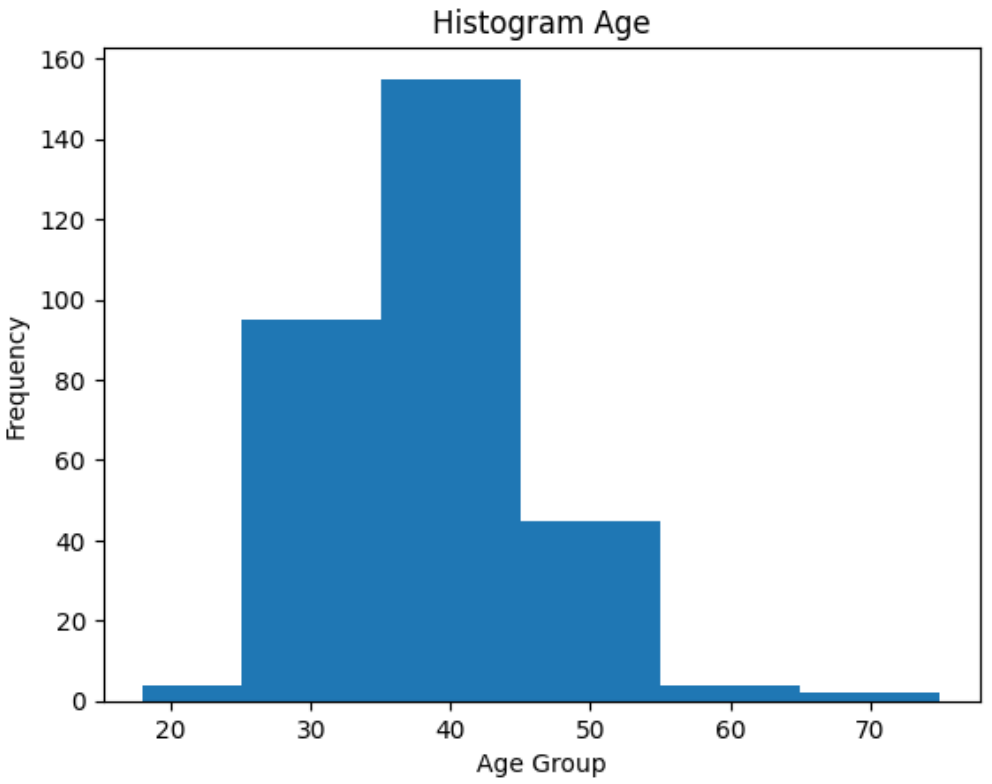
Limitations:

It is important to acknowledge the limitations of the study. Due to the online nature of data collection, there may have been some selection bias, as participants with greater access to digital platforms may have been overrepresented. Additionally, self-report measures rely on participants' accurate recall and subjective interpretation, which may introduce response biases. These limitations should be taken into consideration when interpreting the findings.

By employing a mixed-methods approach combining quantitative and qualitative analysis, this study aimed to provide a comprehensive understanding of the impact of the COVID-19 pandemic on DCT usage across different cultures. The methodology ensured a diverse sample and rigorous data analysis, allowing for meaningful conclusions to be drawn from the collected data.

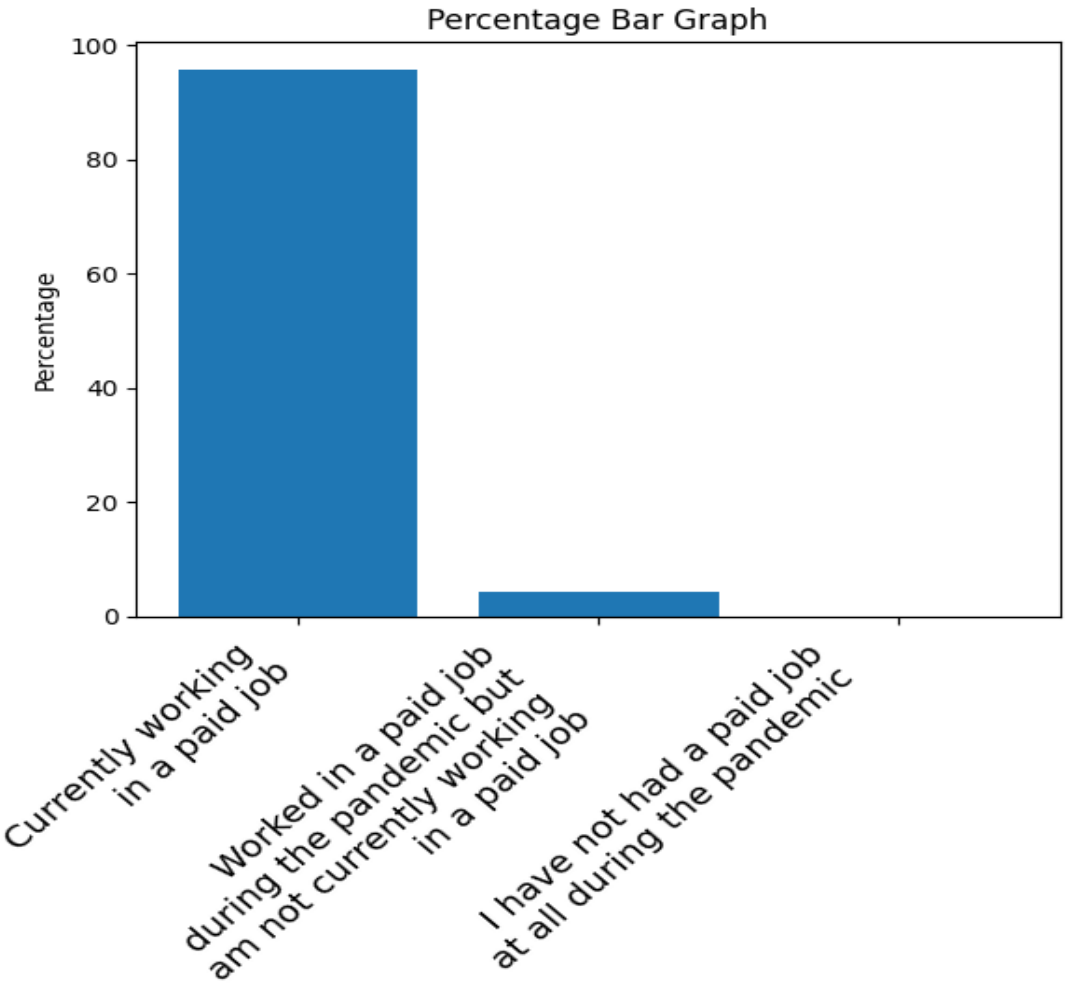
Results

Age Group



The age group with the highest number of participants is 35-44, followed by the 25-34 age group. This suggests that individuals in their mid-30s to mid-40s are more likely to participate in the survey. It could be due to factors such as higher digital device usage or greater interest in the topic among this age group. The 18-24 and 65-74 age groups have relatively smaller numbers of participants. This could indicate potential challenges in recruiting individuals from these age brackets or lower interest/participation rates among these groups. Consequently, it may be necessary to interpret findings related to these age groups with caution due to the smaller sample size.

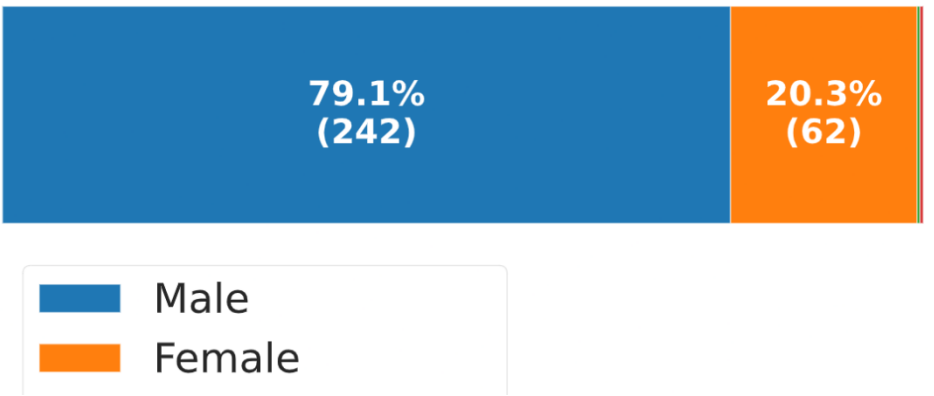
Employment Status



While the majority of participants, 292 individuals, are currently working in a paid job, a smaller number of participants, 13 individuals, reported having worked in a paid job during the pandemic but are currently not working in a paid job. This indicates a temporary period of unemployment for these individuals. It could be due to factors such as job loss, furloughs, or career transitions.

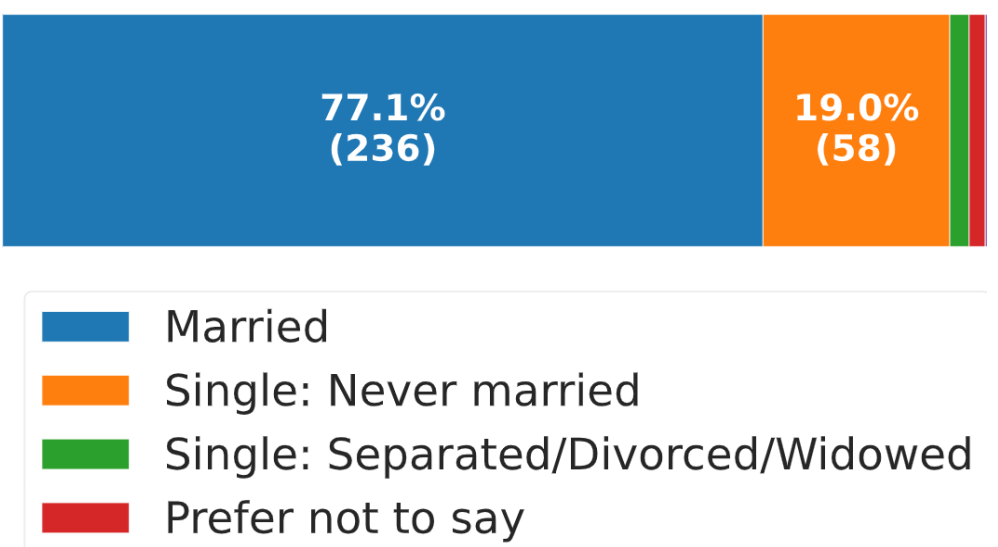
All volunteers who participated in this survey were working from their respective homes due to the COVID-19 pandemic. The survey specifically targeted individuals who had transitioned to remote work arrangements as a result of the global crisis.

Gender Ratio



Based on the survey findings, it can be concluded that the distribution of participants in terms of gender reveals a significant disparity, with males comprising 79.1% and females 20.3% and rest others of the respondents. This gender imbalance highlights the need for further investigation into potential variations in device usage, work patterns, and challenges faced during remote work. Future research should consider the implications of this gender disparity to ensure the development of inclusive digital solutions and a comprehensive understanding of the experiences of individuals working from home during the pandemic.

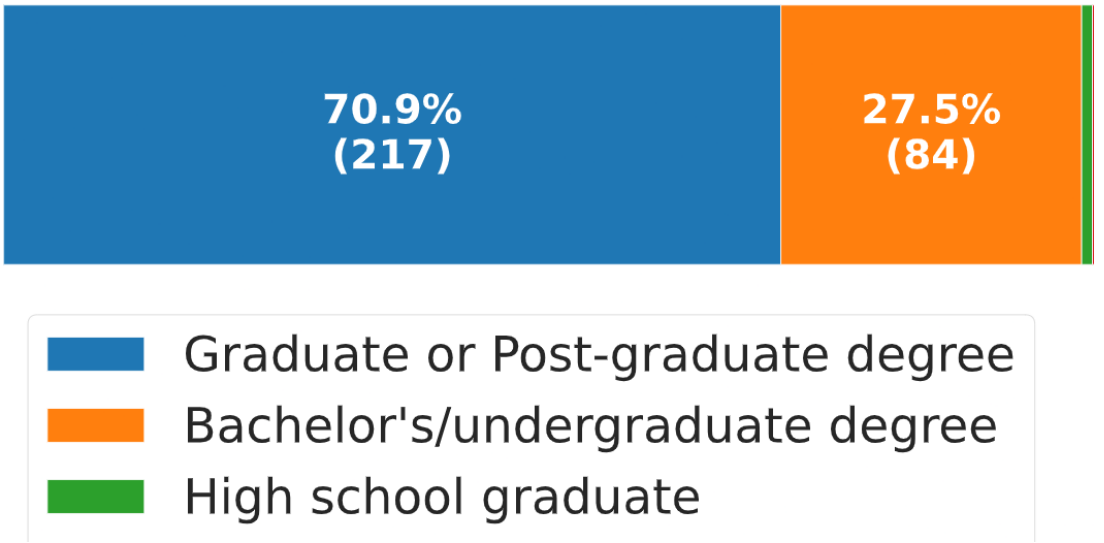
Marital Status



Based on the survey findings, it can be concluded that the participants' marital status distribution reveals that 77% are married, 19% are single and never married, and the remaining participants fall into other categories such as single but separated/divorced/widowed or preferred not to disclose their marital status. This indicates the presence of diverse marital statuses among individuals working from home during the pandemic. Understanding the marital status demographics can provide insights into how different relationship dynamics may influence device

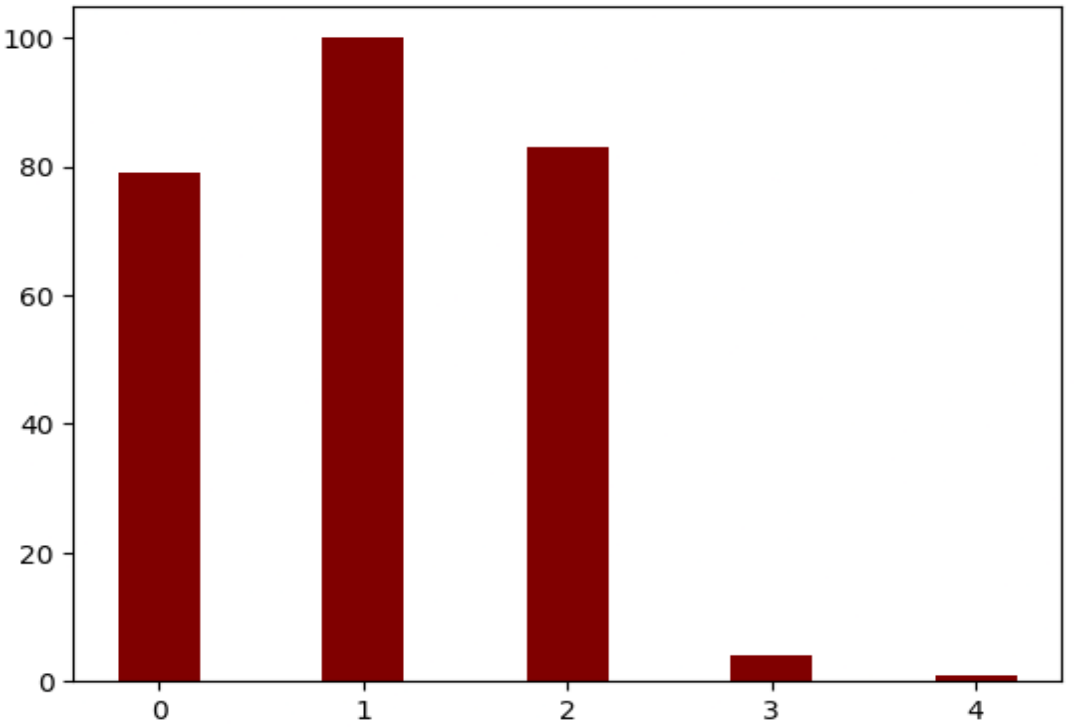
usage, work-life balance, and potential challenges faced during remote work. These findings emphasize the need to consider marital status as a relevant factor in developing targeted strategies and support systems for individuals utilizing digital devices in their daily lives while working from home.

Graduation Status



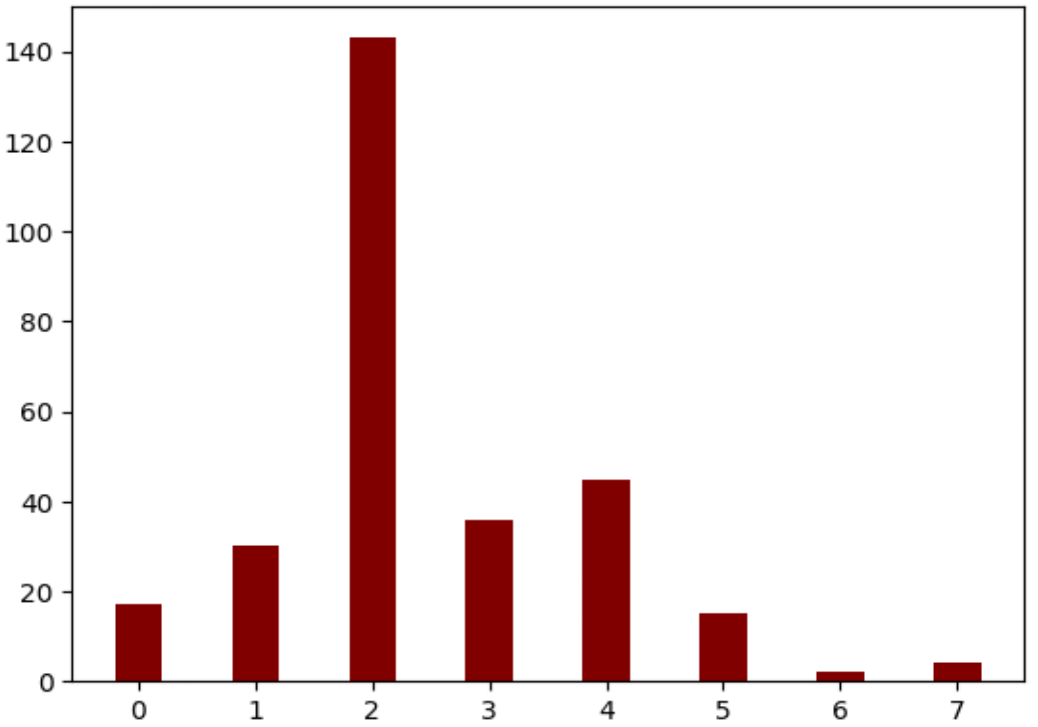
An analysis of the participants' graduation status revealed that the majority (70.9%) were graduate or postgraduate degree holders, while 27.5% had undergraduate/bachelor's degrees, and the remaining participants had completed high school. This suggests that the sample consisted primarily of individuals with higher levels of education. The educational attainment of the participants could influence their knowledge and skills related to digital devices and technology. Moreover, the high percentage of graduate/postgraduate participants indicates that the sample may have included professionals and individuals in higher-skilled occupations. However, it is important to consider that these conclusions are limited to the specific sample recruited for the study and may not be representative of the entire population.

Number of Children in a Household (under 18 years)



The findings from the survey regarding the number of children under 18 years old among the participants provide several key conclusions. Firstly, the data suggests that the surveyed participants from India, have diverse family sizes. The largest percentage of participants (37%) reported having one child, followed closely by 30% who reported having two children. These results indicate that a significant portion of the participants have small families with one or two children. Moreover, a notable percentage of participants (29%) reported having zero children, highlighting the presence of individuals without dependent children in the sample. It is worth noting that the survey data suggests a limited representation of larger families, with lower percentages of participants reporting three children (1.8%) or four children (1.1%). It is important to consider that these conclusions are specific to the surveyed participants and may not be fully generalizable to the overall population.

Number of Adult in a Household (between 18-60 years)

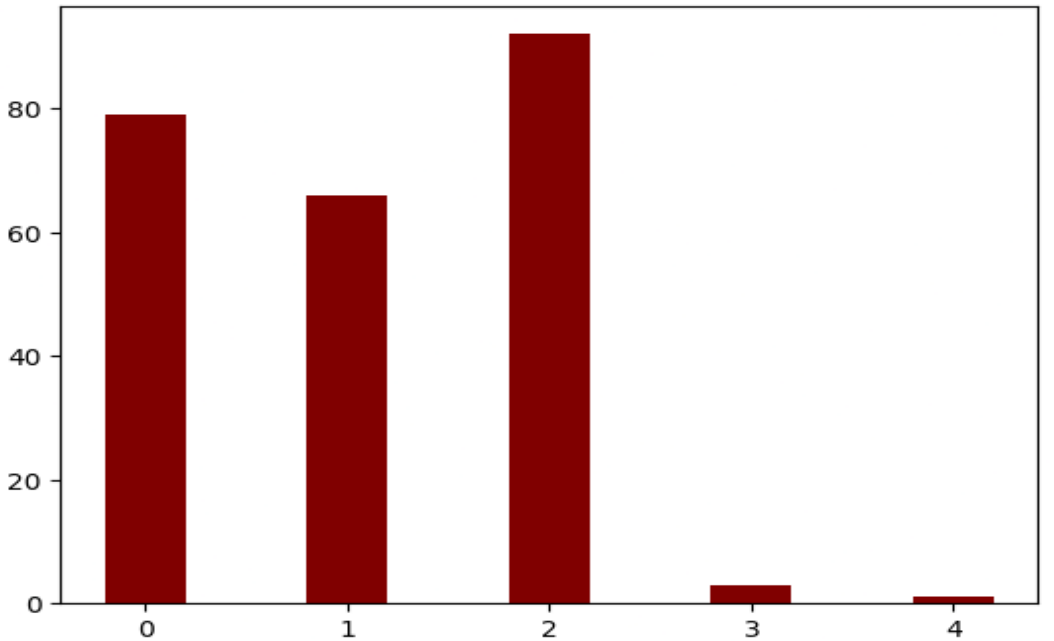


The data from the survey provides valuable insights into the composition of households among the participants, focusing on adults between the ages of 18 and 60. The findings reveal a diverse range of household sizes and dynamics. The most common household size reported by the participants is two adults (50%), indicating a significant proportion of participants live in households with two working-age individuals. Additionally, a notable percentage of participants (10.3%) reported living in single-adult households, suggesting that some individuals are either living alone or are the sole working-age adult in their household.

The survey also uncovered the presence of larger households, with 14.5% reporting four adults and 12% reporting three adults. A smaller proportion of participants reported having five (6.2%), six (0.7%), or seven (0.1%) adults in their households. These findings highlight the diversity of household compositions among the surveyed participants, which may have implications for their usage of digital devices and technology during the pandemic.

Understanding household composition is crucial when examining the impact of the COVID-19 pandemic on the use of digital devices and technology, as it can influence work and communication patterns within a household. For example, households with multiple adults may experience higher demand for digital devices and communication technology due to simultaneous remote work or online activities.

Number of Seniors in a Household (60+ years)



The data obtained from the survey regarding the number of seniors (individuals aged 60 years and above) living in households among the participants allows us to draw several conclusions. Firstly, a significant portion of the surveyed participants (33%) reported not having any seniors living in their households during the pandemic. This suggests that a considerable number of participants do not have elderly individuals residing with them.

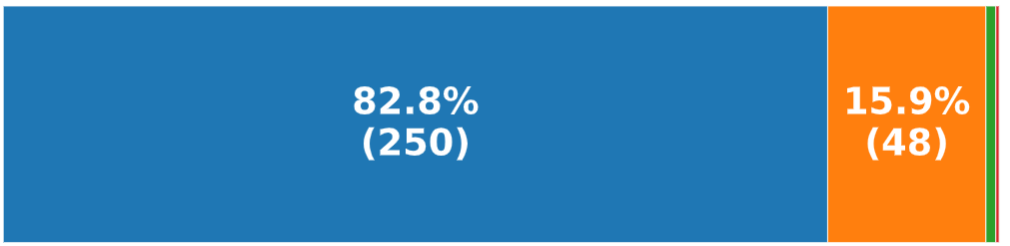
Secondly, the survey findings indicate that a notable proportion of participants (28.7%) reported having one senior living in their households. This suggests that a significant number of participants have at least one elderly family member or relative as part of their household during the pandemic.

Moreover, the data reveals that a substantial number of participants reported having multiple seniors living in their households. Around 35.8% of participants reported having two seniors, while smaller percentages reported having three seniors (1.6%) or four seniors (0.8%) residing with them during the pandemic.

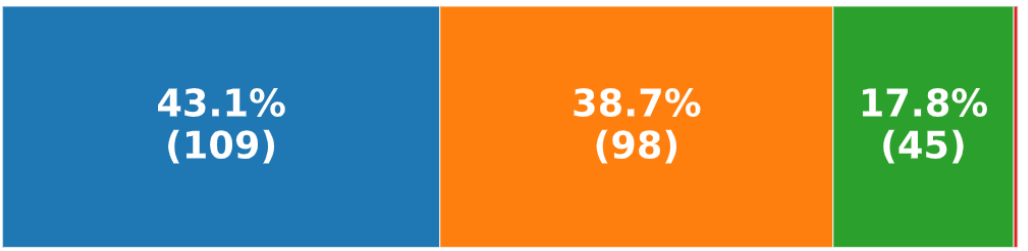
These findings shed light on the composition of households with regards to seniors during the COVID-19 pandemic. However, it is important to acknowledge that these conclusions are specific to the surveyed participants and may not be fully representative of the broader population. Such analysis would provide a more nuanced perspective on how the presence of seniors in households influences the usage of digital devices and technology across different cultures during the pandemic.

Device- Desktop/PC:

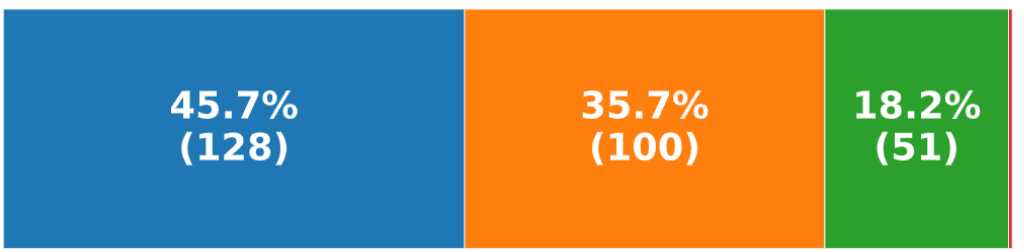
Device- Laptop:



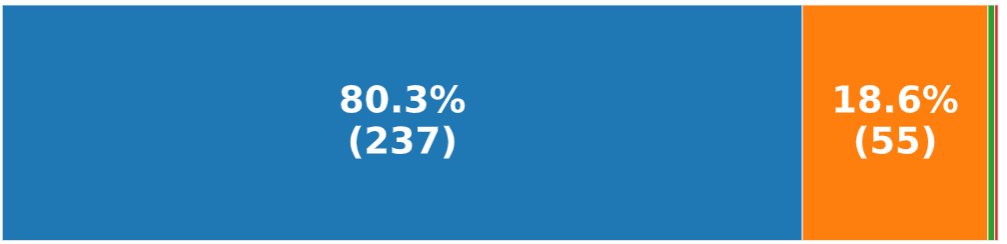
Device- iPad/Tablet:



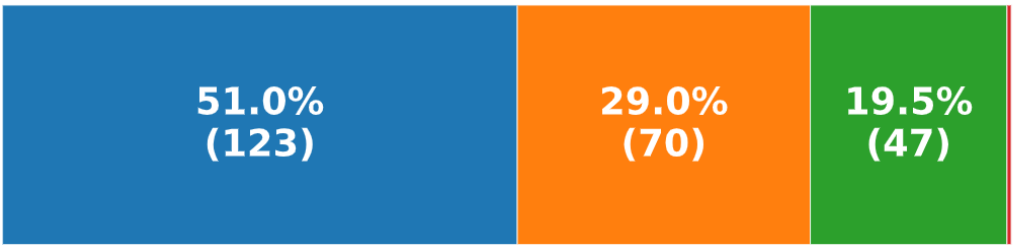
Device- Mobile/Feature:



Device- Smart phone:

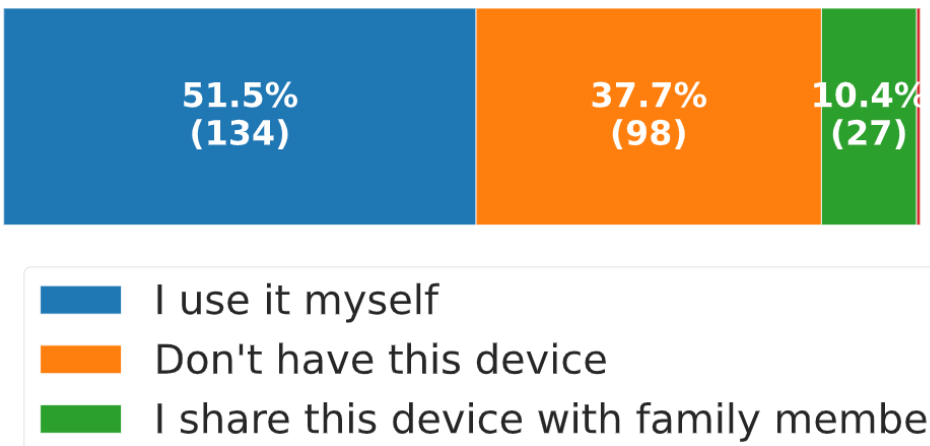


Device- e-Readers (Kindle etc.):



Device- Smart/Digital TV:

Device- Wearables (Apple Watch, Fitbit etc.):



Based on the above data, we can draw the following conclusions:

Personal Usage Dominates: Across all device categories, a significant majority of participants reported using the devices for themselves rather than sharing them with family members. This suggests a preference for personal ownership and individual usage of digital devices.

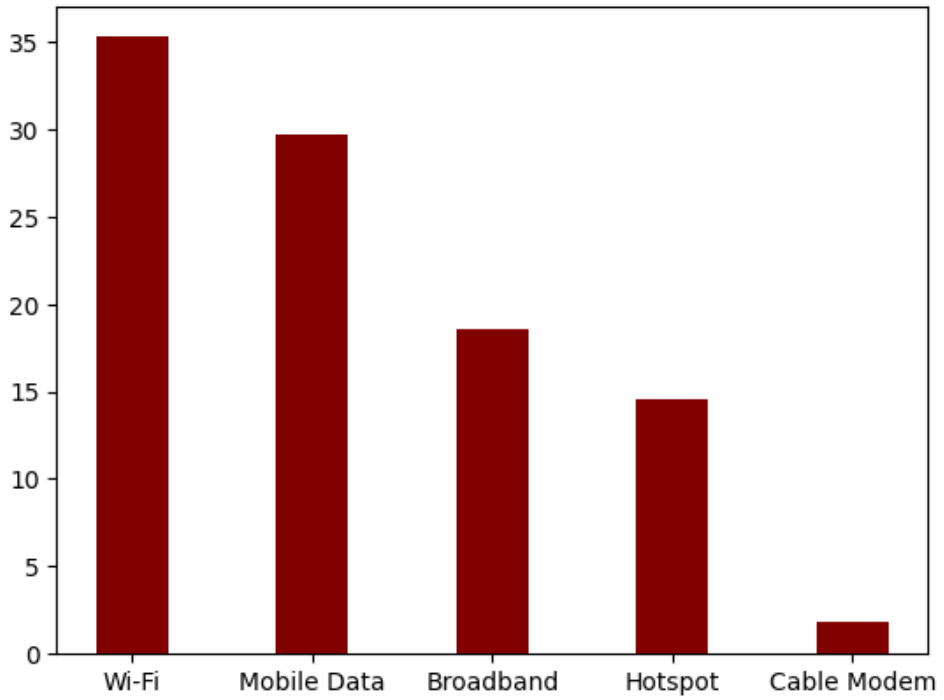
Laptop and Smartphone Dominance: Laptops and smartphones were the most commonly used devices among the participants. A high percentage of respondents reported using these devices for themselves, indicating their importance in both work and personal contexts during the pandemic.

Limited Sharing of Devices: The data indicates that sharing devices with family members was relatively less common. While sharing was reported to some extent for most devices, it was least prevalent for laptops and smartphones. This finding aligns with the need for personal devices to support remote work and individual communication needs.

PC and TV Usage: Personal computers (PCs) and smart/digital TVs were also frequently used by the participants. Although a significant number of respondents reported using these devices for themselves, a notable portion shared them with family members. This implies that PCs and TVs are more likely to be utilized by multiple household members.

Limited e-Reader and Wearable Usage: e-Readers and wearables had lower overall adoption rates compared to other devices. A considerable proportion of participants reported not having these devices. However, among those who did, they were primarily used by individuals rather than being shared with family members.

These conclusions provide insights into the patterns of digital device usage during the pandemic. They suggest a strong reliance on personal laptops and smartphones, while highlighting variations in sharing behaviors across different device types.



Based on the responses from the survey participants regarding how they connect to the internet, the following conclusions can be drawn:

WiFi is the most common method of connecting to the internet: With 273 respondents selecting WiFi as their preferred method of internet connection, it indicates that WiFi is widely available and commonly used across different countries. WiFi offers convenience and flexibility for users to connect their devices to the internet without the need for physical cables.

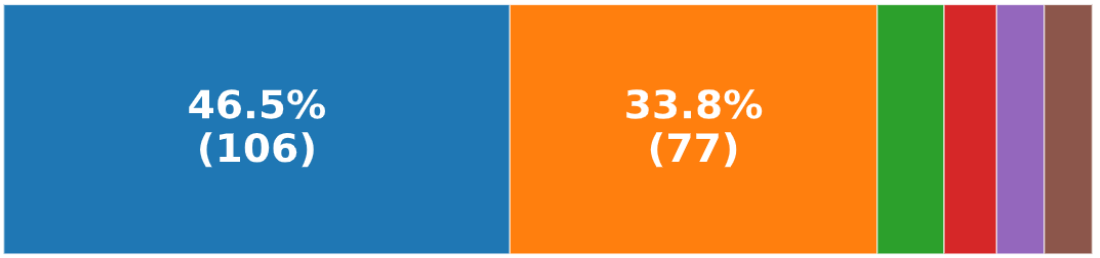
Mobile data is a popular choice: A significant number of respondents (230) reported using mobile data to connect to the internet. This suggests that accessing the internet through mobile networks is a common practice, particularly in areas where WiFi might not be readily available or during situations when individuals are on the move.

Broadband connections are still prevalent: While not as common as WiFi and mobile data, 144 respondents mentioned using broadband connections. Broadband typically provides faster and more stable internet connectivity compared to mobile data, making it suitable for activities that require higher bandwidth, such as video streaming or online gaming.

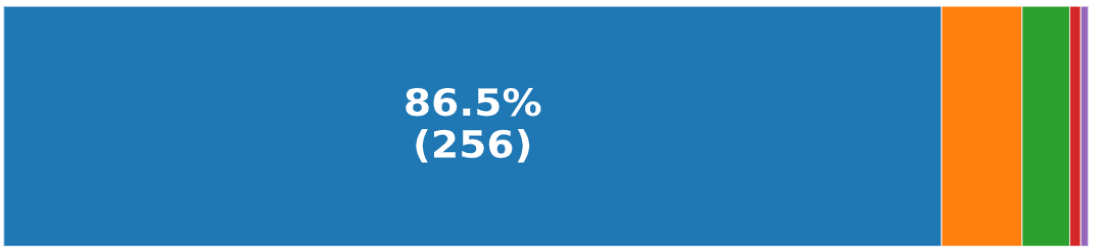
Hotspot usage is noteworthy: The survey indicated that 113 respondents rely on hotspots for internet connectivity. Hotspots allow users to create a localized wireless network by utilizing their mobile devices or dedicated hotspot devices. This finding suggests that individuals might use hotspots as a backup or alternative option when other methods of internet connection are unavailable or unreliable.

Cable modem usage is relatively low: Only 14 respondents reported using a cable modem for internet access. Cable modems are typically used in fixed locations where cable infrastructure is in place, such as homes or offices. The relatively low number of respondents may indicate that cable modem availability or usage might be limited in the surveyed regions.

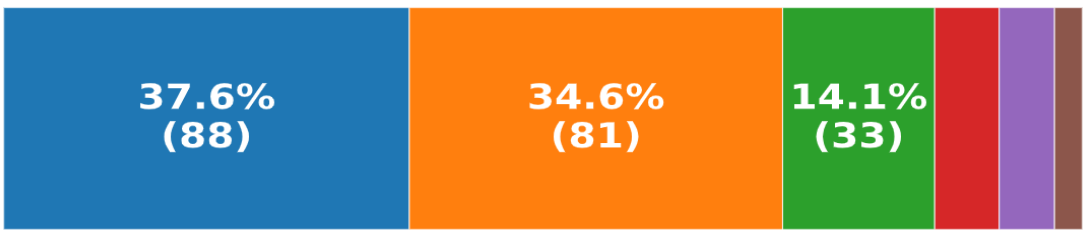
How many of them uses internet on Desktop/PC:



How many of them uses internet on Laptop:

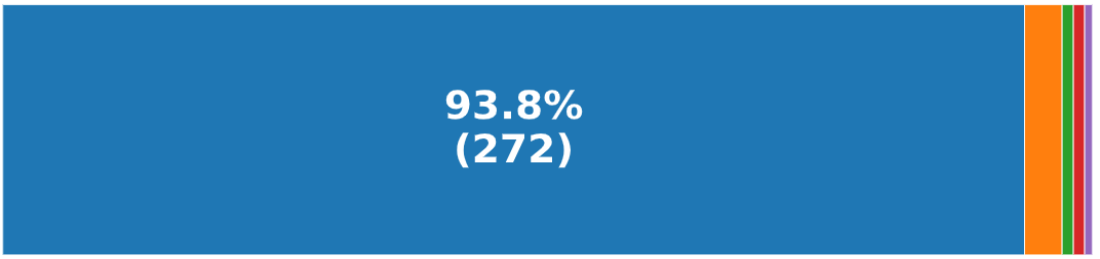


How many of them uses internet on iPad/Tablet:

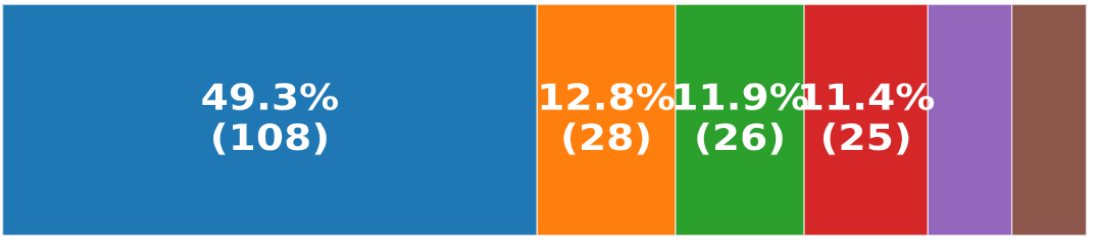


How many of them uses internet on Mobile/Feature phone (keypad phone):

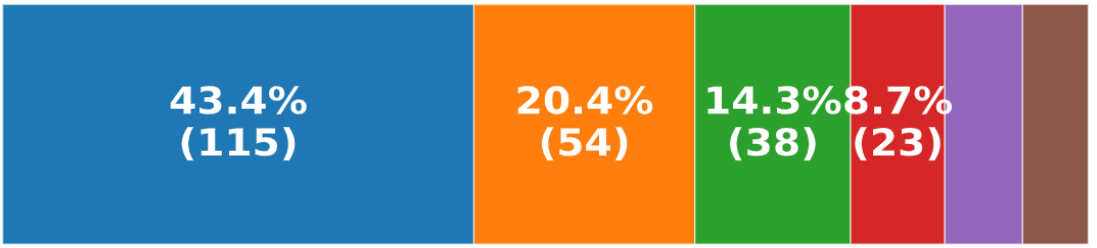
How many of them uses internet on Smart phone (iPhone, Android):



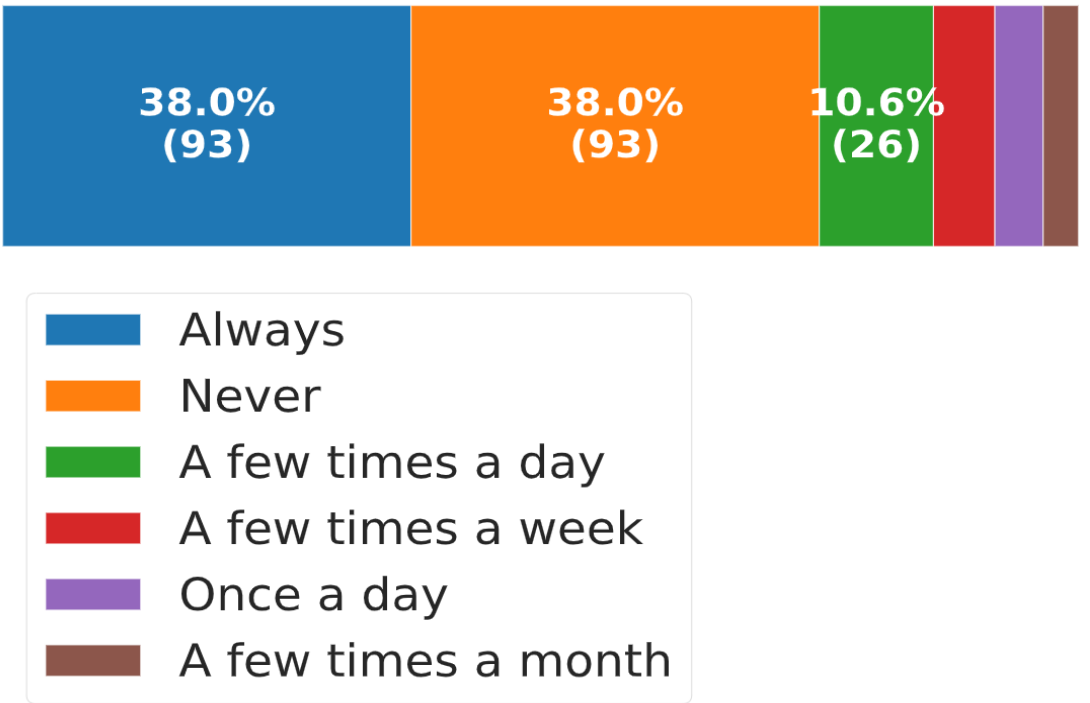
How many of them uses internet on e-Readers (Kindle etc.):



How many of them uses internet on Smart/Digital TV:



How many of them uses internet on Wearables (Apple Watch, Fitbit etc.):



Based on the provided data on the percentage of people who agree that COVID-19 has helped them improve their digital skills, we can draw the following conclusions:

Mobile Phones (iPhone, Android) with 93.8% agreement, it can be concluded that a significant majority of respondents who use mobile phones believe that COVID-19 has helped them improve their digital skills. This could be attributed to the increased reliance on mobile devices for various activities such as remote work, online communication, and accessing digital resources during the pandemic.

Laptops with 86.5% agreement, it is evident that a majority of participants who use laptops also acknowledge the positive impact of COVID-19 on their digital skills. Laptops provide a more comprehensive computing experience compared to mobile phones, allowing users to engage in a wider range of tasks, including remote work, online learning, and content creation.

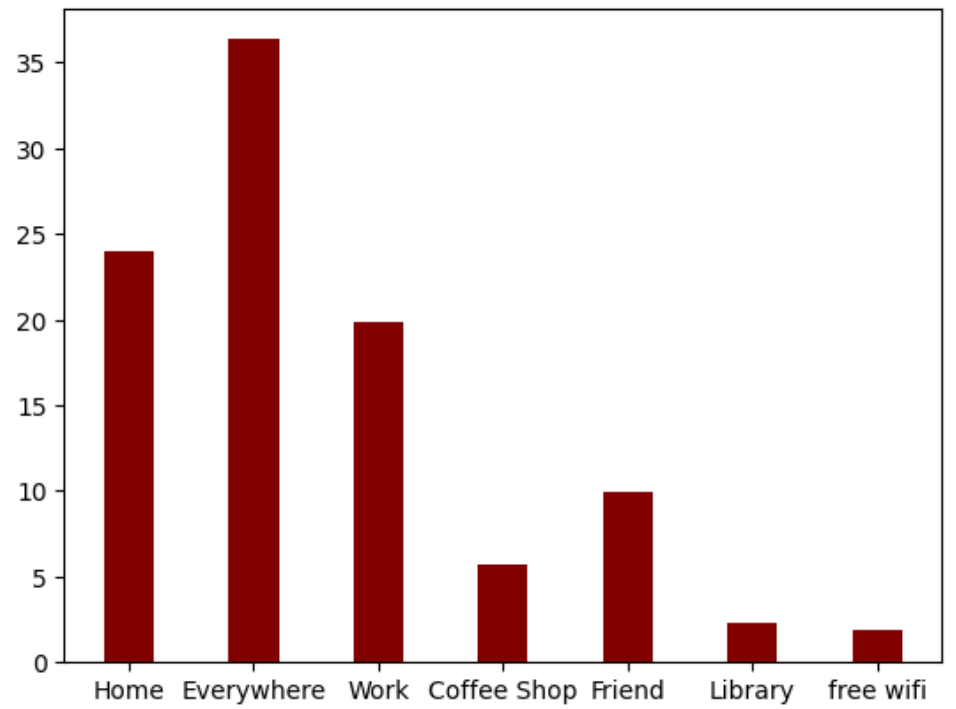
E-Readers (Kindle, etc.)ith 49.3% agreement, it appears that a relatively smaller proportion of respondents who use e-readers perceive COVID-19 as a catalyst for improving their digital skills. This could be because e-readers typically have a more specific use case focused on reading e-books, and their role in remote work or online communication may be limited compared to other devices.

Desktops with 46.5% agreement, a moderate proportion of participants who use desktop computers acknowledge the positive impact of the pandemic on their digital skills. Desktops are often associated with more stationary and office-based work, and the lower agreement rate might be due to a slower transition to remote work or

limited exposure to digital skills development opportunities compared to laptops and mobile phones.

Smart/Digital TV with 43.4% agreement, it seems that a significant proportion of respondents who use smart/digital TVs believe that COVID-19 has contributed to improving their digital skills. This could be attributed to the increased consumption of digital content through streaming services, online learning platforms, and video conferencing applications.

Wearables (Apple Watch, Fitbit, etc.) with 38% agreement, a relatively smaller proportion of participants who use wearables attribute their improved digital skills to the pandemic. Wearables primarily focus on health and fitness tracking, and their role in digital skill development might be limited compared to other devices.



Based on the provided responses regarding where participants connect to the internet, we can draw several conclusions:

Home is the most common location: Most participants (298) reported connecting to the internet from their homes. This finding suggests that home has become the primary base for accessing the internet during the pandemic, likely due to the increased prevalence of remote work and stay-at-home measures.

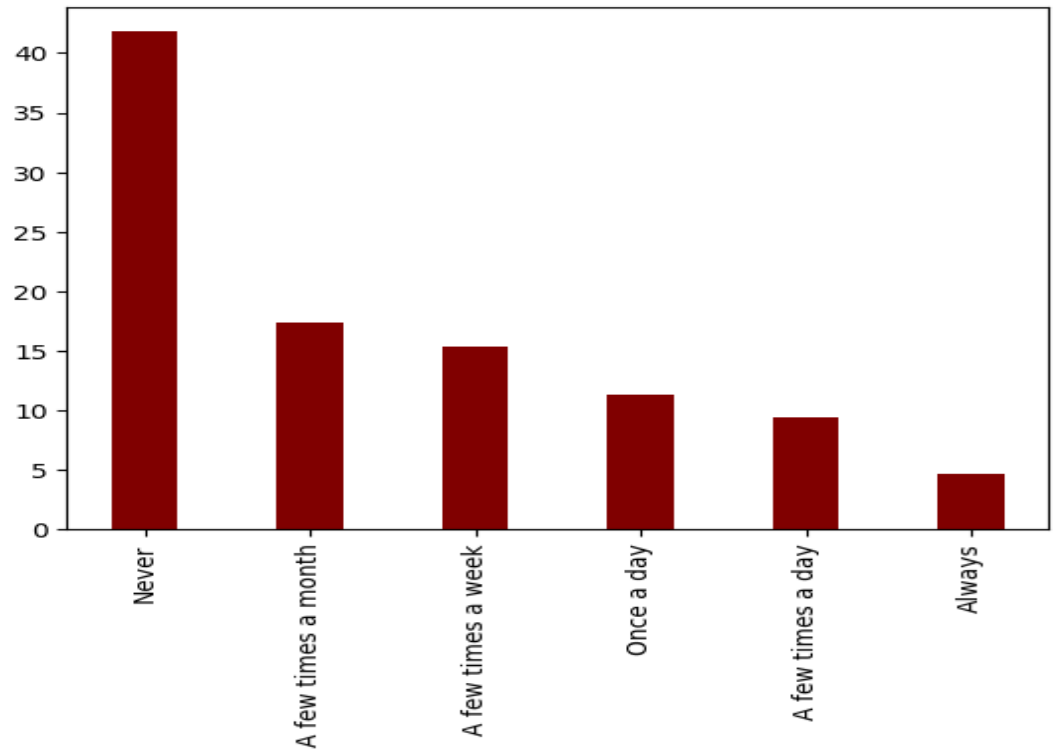
Mobile data enables connectivity on the go: A significant number of participants (452) mentioned connecting to the internet everywhere via mobile data. This indicates that individuals value the convenience and flexibility of mobile devices,

allowing them to stay connected while outside their homes.

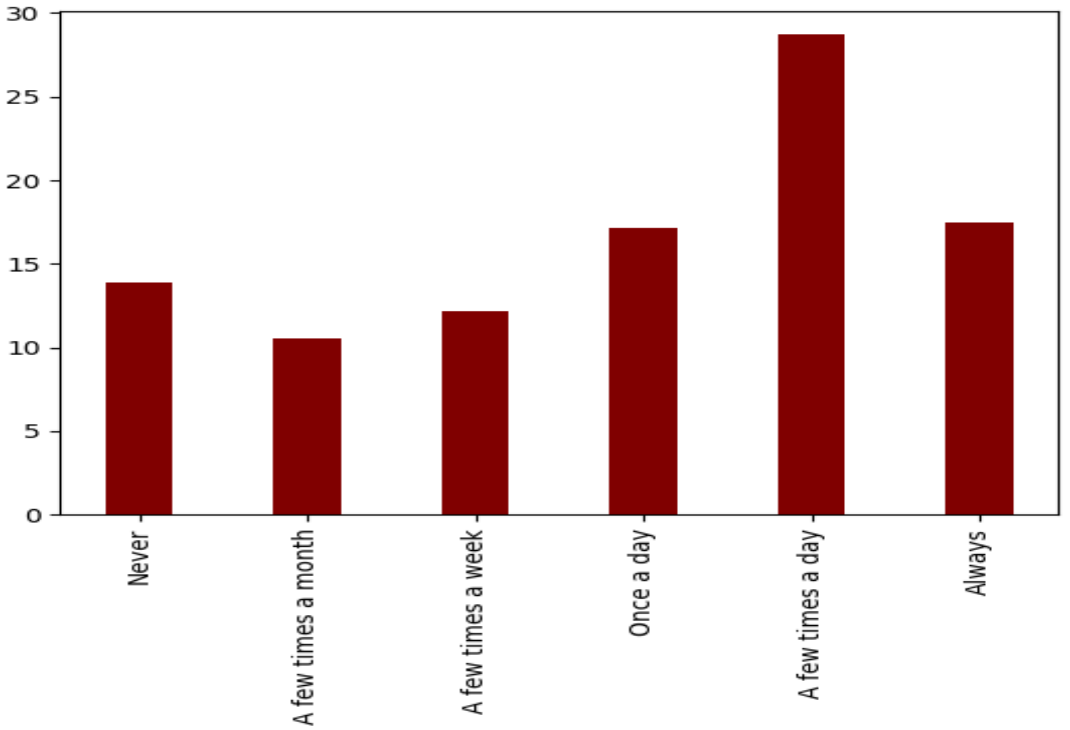
Work remains a significant connection point: Despite the shift to remote work for many people, a considerable portion of participants (247) reported connecting to the internet at their workplaces. This finding suggests that certain individuals either have jobs that require on-site presence or have returned to working in physical office spaces.

Public spaces are still utilized, but less frequently: While some participants mentioned connecting to the internet at coffee shops (71), friends' places (123), libraries (29), and locations with free Wi-Fi (23), the numbers are comparatively lower. This indicates that public spaces have seen reduced usage for internet connectivity, possibly due to restrictions, safety concerns, or the availability of more convenient options like mobile data

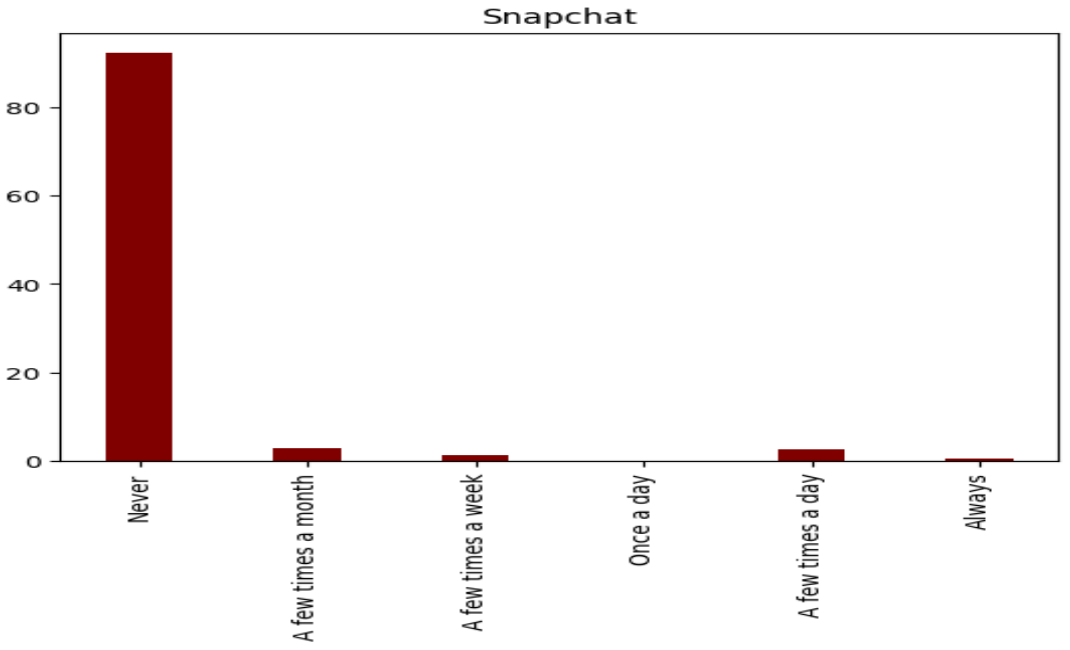
Facebook:



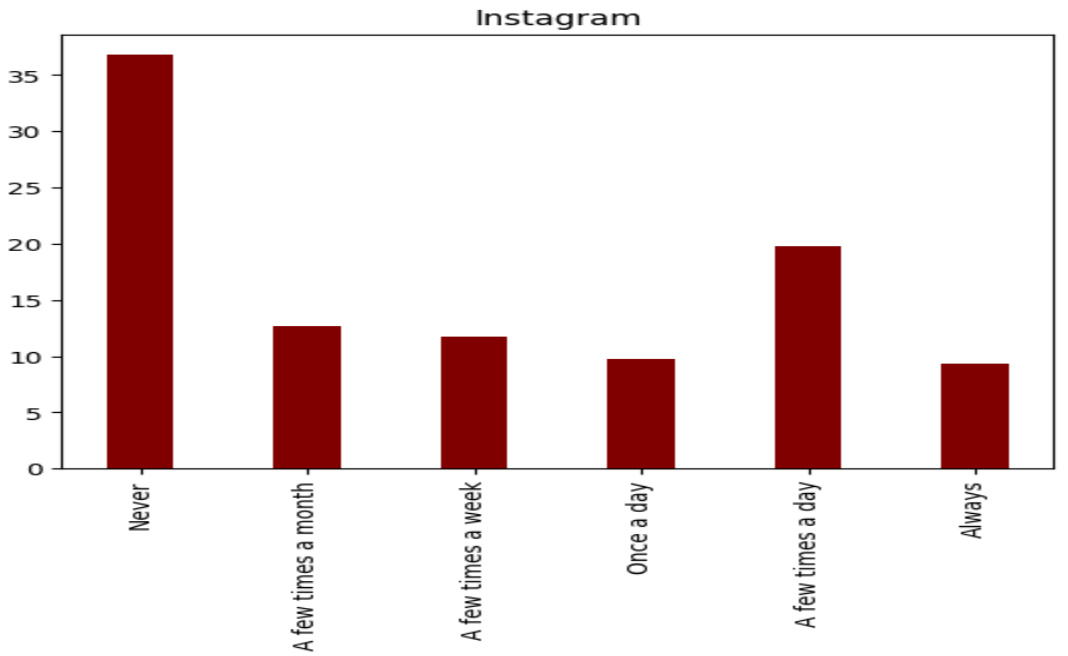
Twitter:



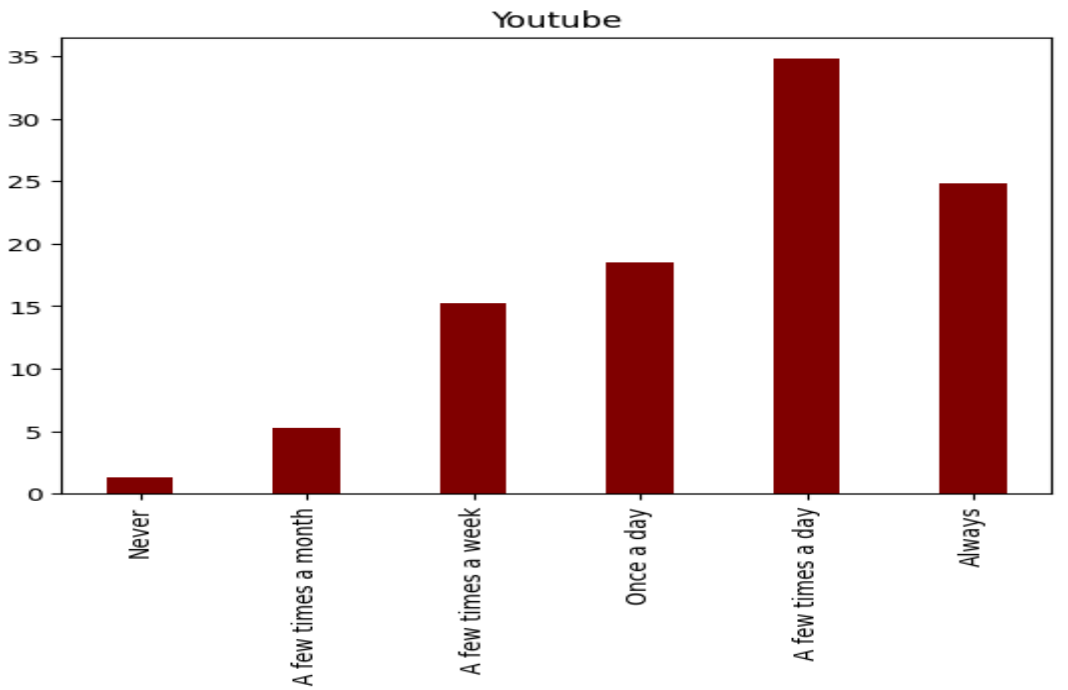
Snapchat:



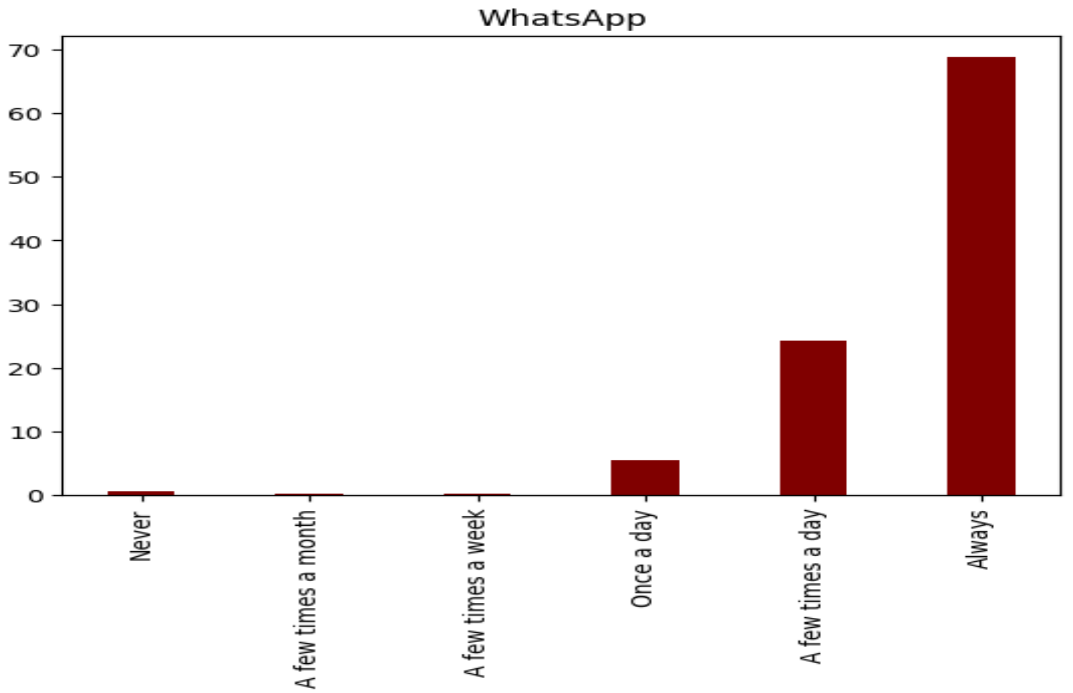
Instagram:



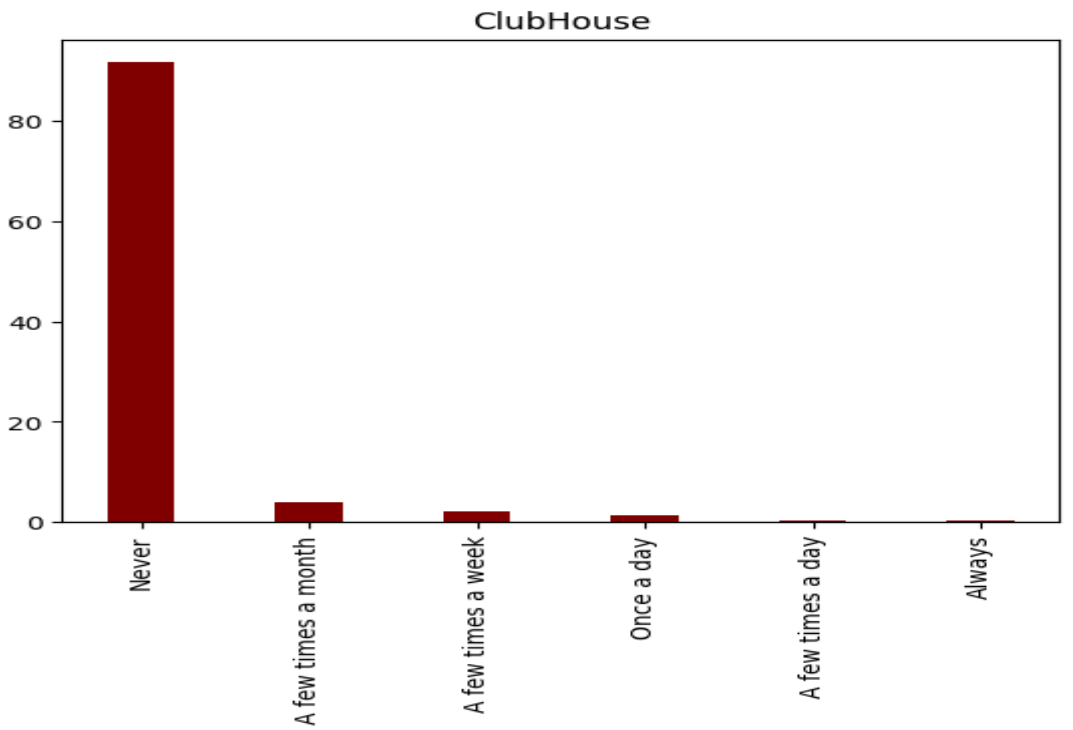
Youtube:



WhatsApp



ClubHouse



Based on the above data, we can draw the following conclusions:

Facebook: Among the participants, Facebook is the most commonly used social media platform, with a few times a day being the highest usage frequency (87 respondents). This is followed by always (53 respondents) and once a day (52 respondents). However, a significant number of participants reported never using Facebook (42 respondents).

Twitter: Twitter is less popular compared to Facebook among the surveyed participants. The majority of respondents (125) reported never using Twitter. Among those who use Twitter, a few times a month (52 respondents) and a few times a week (46 respondents) were the most common usage frequencies.

Snapchat: Snapchat had the highest number of respondents reporting never using the platform (270 respondents). Among the participants who do use Snapchat, a few times a month (9 respondents) and a few times a day (8 respondents) were the most common usage frequencies.

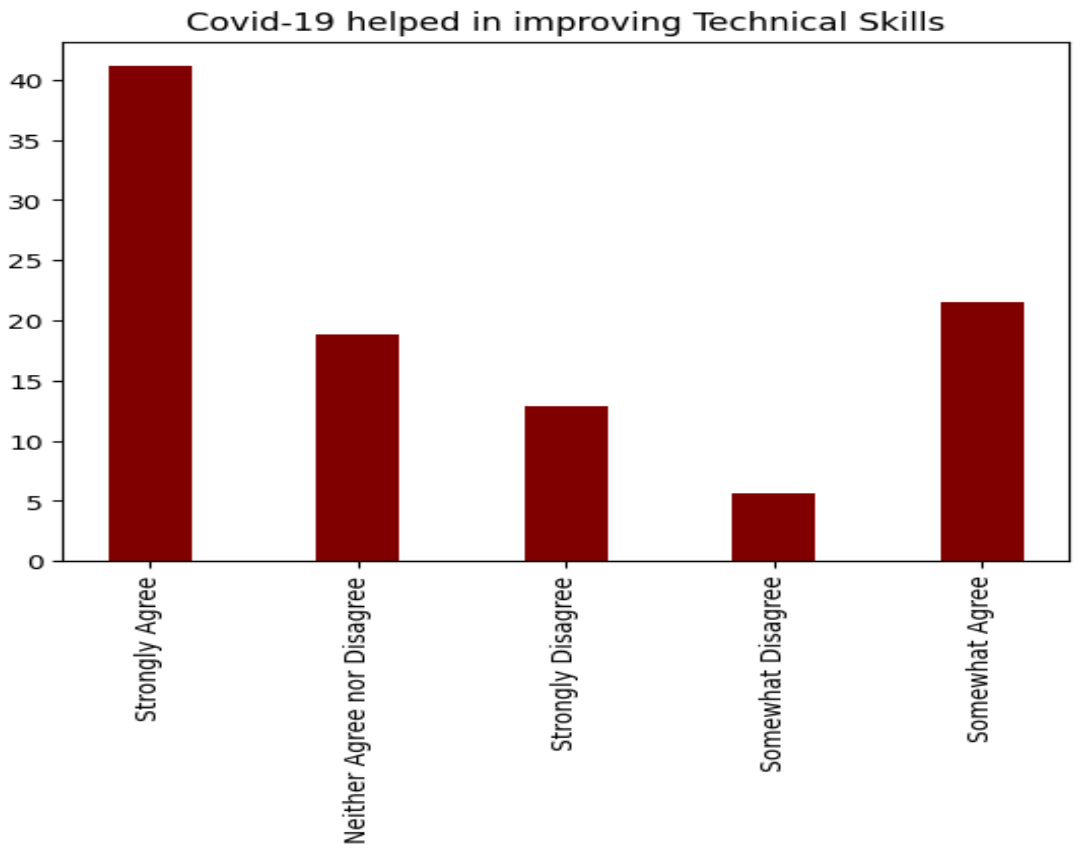
Instagram: Instagram is a moderately popular social media platform, with a significant number of respondents reporting never using it (110 respondents). Among those who use Instagram, a few times a day (59 respondents) and a few times a month (38 respondents) were the most common usage frequencies.

YouTube: YouTube is a widely used platform for video content consumption. Among the surveyed participants, a few times a day (105 respondents) and always (75 respondents) were the most common usage frequencies. However, a small number of participants reported never using YouTube (4 respondents).

WhatsApp: WhatsApp is a popular messaging app, especially for communication in group settings. The majority of respondents reported always using WhatsApp (209 respondents). A few times a day (74 respondents) was the second most common usage frequency.

Clubhouse: Clubhouse, an audio-based social media platform, had the highest number of respondents reporting never using it (253 respondents). Among those who use Clubhouse, a few times a month (11 respondents) was the most common usage frequency.

Overall, Facebook and WhatsApp are the most popular platforms among the surveyed participants, with high usage frequencies reported. Twitter, Snapchat, Instagram, YouTube, and Clubhouse had varying levels of usage, with a significant number of respondents reporting never using some of these platforms.



Based on the above data, we can draw some conclusions regarding people's perceptions of how the COVID-19 pandemic has helped them improve their digital skills. Here are the conclusions based on the given percentages:

Positive Impact on Digital Skills: Approximately 41% of the participants strongly agree that the COVID-19 pandemic has helped them improve their digital skills. This suggests that a significant portion of the respondents believe that the pandemic has had a positive impact on their digital proficiency.
Reasoning: The pandemic forced many people to adapt to remote work and virtual communication, leading them to rely heavily on digital devices and technologies. As individuals spent more time using digital devices for work, communication, and daily activities, they likely had more opportunities to develop and enhance their digital skills.

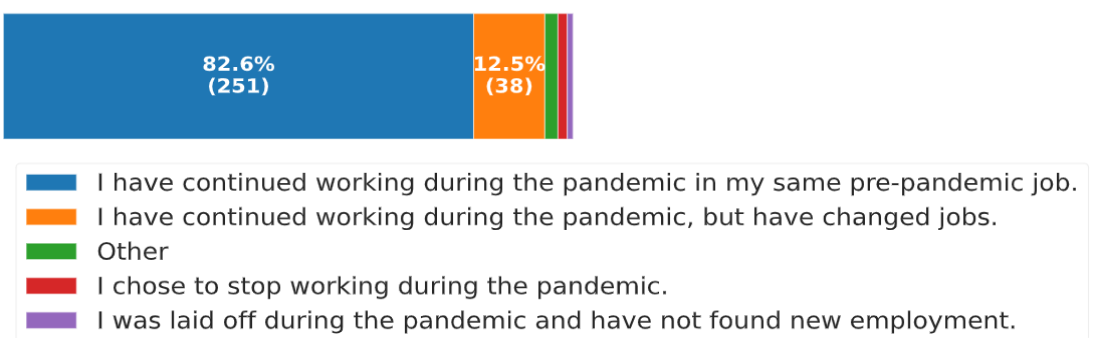
Neutral Perception: Around 18% of the respondents neither agree nor disagree with the statement, indicating a neutral stance regarding the improvement of their digital skills during the pandemic.
Reasoning: Some individuals may not have experienced significant changes in their digital skills or may not be fully aware of their skill improvement. They might have been using digital devices as part of their routine even before the pandemic or had limited exposure to new technologies during this period.

Mixed or Limited Impact on Digital Skills: A combined total of 26% of the participants either somewhat disagree (5%) or strongly disagree (12%) that the pandemic has helped them improve their digital skills.
Reasoning: While a majority of respondents acknowledged the positive impact of the pandemic on their digital skills, a notable percentage disagreed or expressed uncertainty. Various factors could contribute to this perception, such as limited access to digital resources, difficulties in adapting to remote work, or personal preferences for traditional methods of communication and work.

Moderate Impact on Digital Skills: Approximately 21% of the participants somewhat agree that the COVID-19 pandemic has helped them improve their digital skills.
Reasoning: These respondents acknowledge some improvement in their digital skills but may not attribute it solely to the pandemic. They might have found themselves using digital devices more frequently due to remote work requirements, but the impact on their skill improvement might not have been as significant as those who strongly agreed.

Overall, the data suggests that a substantial portion of the participants recognized the positive impact of the COVID-19 pandemic on their digital skills. However, it is important to consider that individual experiences and circumstances may vary, leading to differing perceptions of the pandemic's influence on digital proficiency.

Working Status During Pandemic:



Based on the provided data on people's agreement that COVID-19 has helped them improve their digital skills, categorized by their working status during the pandemic, we can draw the following conclusions:

Continued Working in the Same Pre-Pandemic Job (82.6%): A significant majority of respondents who continued working in the same pre-pandemic job reported agreement that COVID-19 has helped them improve their digital skills. This can be attributed to the fact that individuals in this category likely had to adapt to remote work environments, relying heavily on digital devices and technologies to perform their job responsibilities. The increased reliance on digital tools and platforms likely facilitated the development and enhancement of their digital skills.

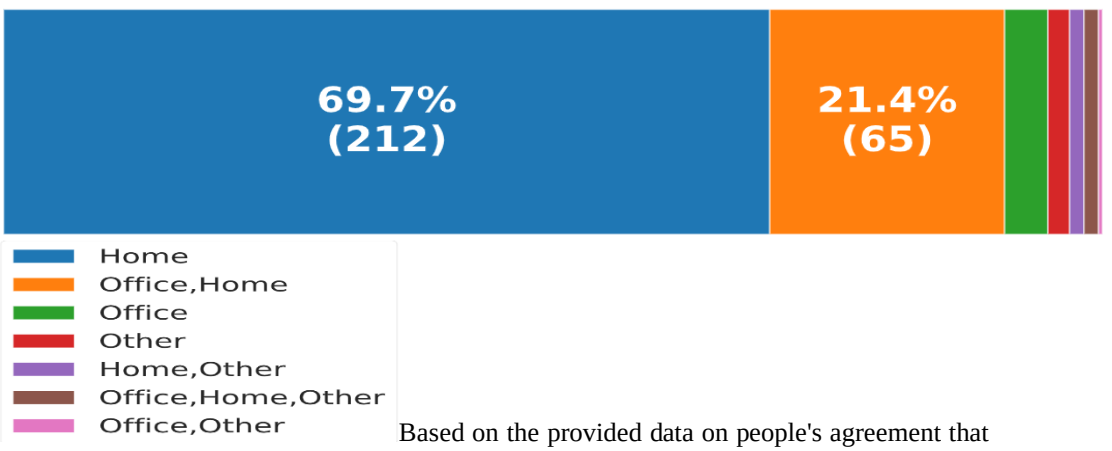
Continued Working but Changed Jobs (12.5%): A smaller proportion of participants who continued working but changed jobs during the pandemic expressed agreement that COVID-

19 has contributed to improving their digital skills. This could be attributed to the possibility that job changes may have involved a transition to roles that require different sets of digital skills or increased usage of specific digital devices. The experience gained in adapting to new work environments and requirements likely led to the reported improvement in digital skills.

Laid Off or Chose Not to Work During the Pandemic (remaining percentage): Participants who were laid off or decided not to work during the pandemic likely had fewer opportunities to develop their digital skills compared to those who continued working. Therefore, it's expected that the agreement on COVID-19 helping them improve their digital skills would be lower in this category.

Overall, the data suggests that individuals who were actively working during the pandemic, regardless of job changes, were more likely to perceive an improvement in their digital skills. This can be attributed to the increased reliance on digital devices and technology for remote work and the need to adapt to new work environments. However, it's important to note that the conclusions are based on the provided data and general observations, and individual experiences and circumstances may vary.

Working Location:



Based on the provided data on people's agreement that COVID-19 has helped them improve their digital skills, categorized by their working locations during the pandemic, we can draw the following conclusions:

Working from Home (69.7%): The majority of respondents who worked from home during the pandemic expressed agreement that COVID-19 has helped them improve their digital skills. This can be attributed to the fact that working from home necessitates the use of digital devices and technologies for communication, collaboration, and remote work tasks. The increased reliance on digital tools in a home environment likely provided opportunities for individuals to develop and enhance their digital skills.

Working from Both Office and Home (21.4%): A smaller proportion of participants who worked both from the office and home reported agreement that COVID-19 has contributed to improving their digital skills. This could be due to a more limited exposure to remote work and a potentially lower reliance on digital devices and technologies compared to those who worked predominantly from home. However, the agreement rate is still notable, suggesting that individuals in this category also experienced some digital skills improvement.

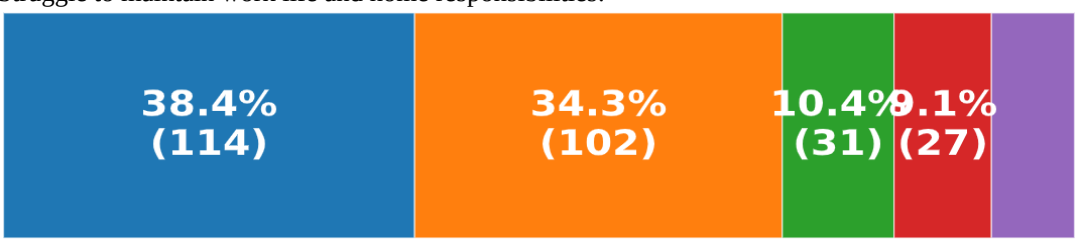
Working from Office (5%): Participants who worked exclusively from the office during the

pandemic expressed a relatively lower agreement that COVID-19 has helped them improve their digital skills. This can be attributed to the fact that the transition to remote work and the increased reliance on digital devices and technologies were likely less prominent for individuals in this category. The lower agreement rate reflects the limited exposure to remote work and the potential for less digital skills development compared to those who worked from home.

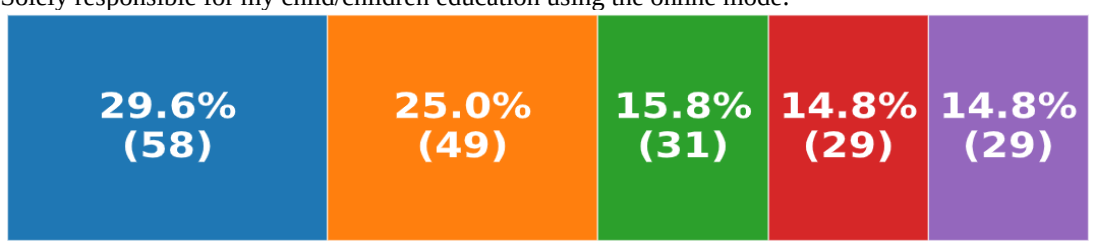
Overall, the data suggests that individuals who worked from home during the pandemic were more likely to perceive an improvement in their digital skills. This can be attributed to the increased reliance on digital devices and technologies for remote work and the extended exposure to a digital work environment. However, it's important to note that the conclusions are based on the provided data and general observations, and individual experiences and circumstances may vary.

Effect of Pandemic on Volunteers Daily Life:

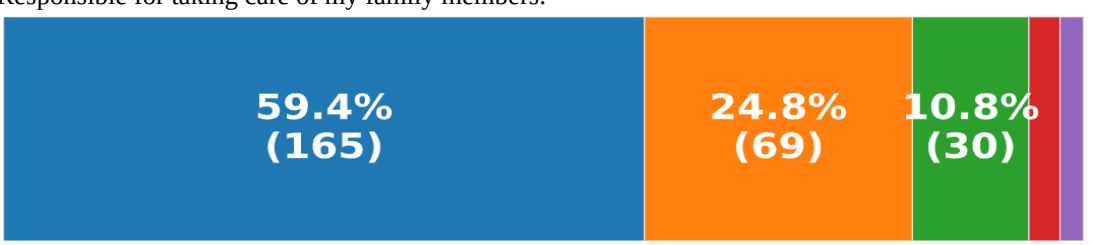
Struggle to maintain work life and home responsibilities:



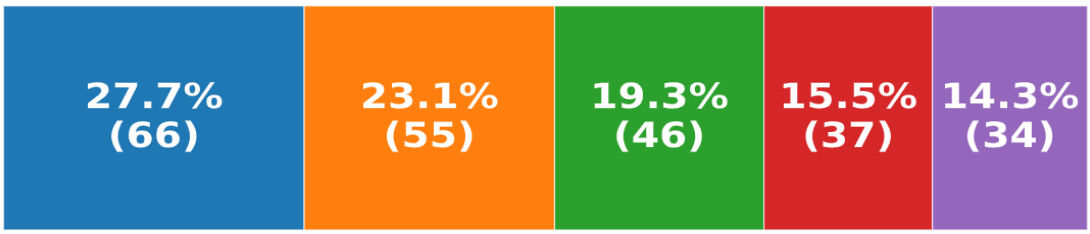
Solely responsible for my child/children education using the online mode:



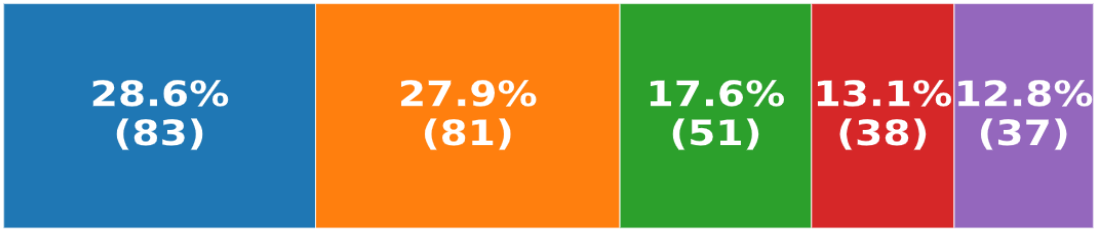
Responsible for taking care of my family members:



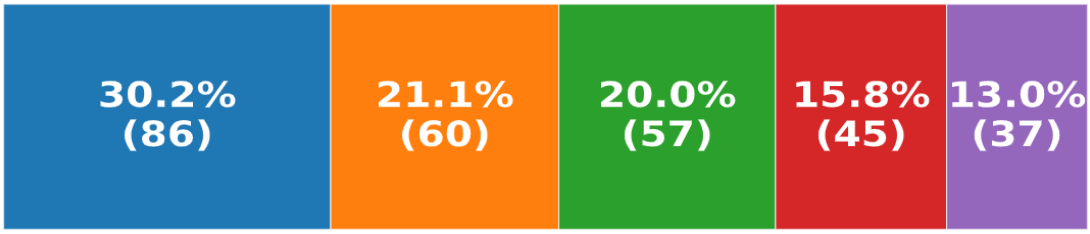
Share my digital devices with others:



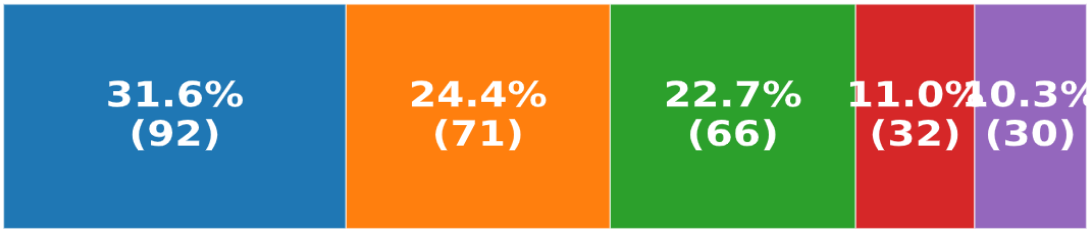
No time for myself, still continue working hard:



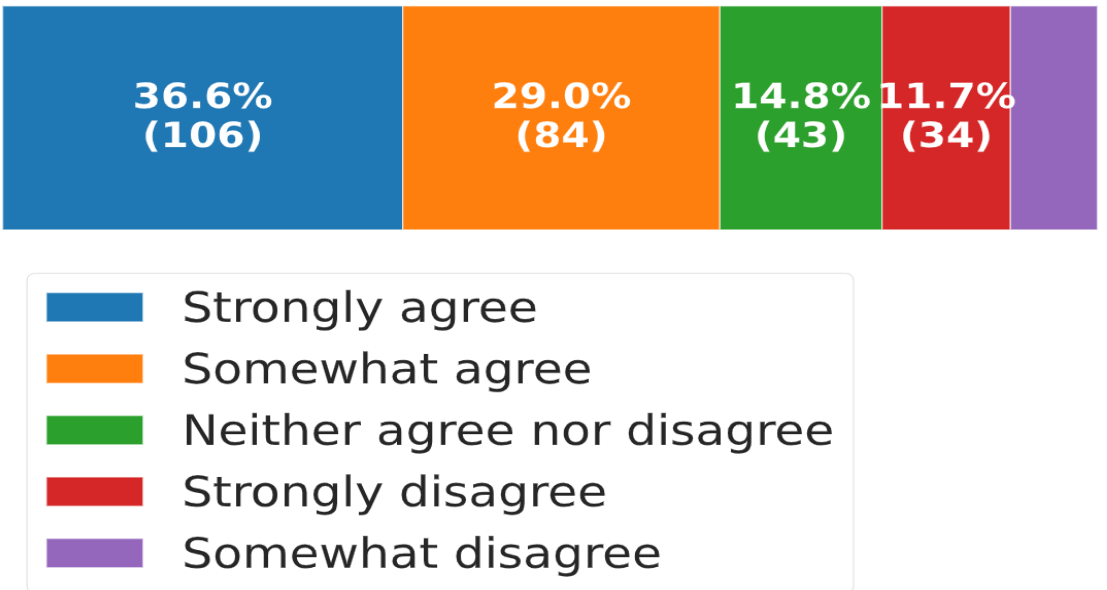
Life hasn't changed much:



Worked more efficiently during the pandemic thanks to digital technology:



Spend more time with my family:



Based on the provided data regarding the effects of the pandemic on volunteers' daily lives and their agreement on COVID-19 helping them improve their digital skills, we can draw the following conclusions:

Struggle to Maintain Work-Life and Home Responsibilities: A significant portion of respondents (72.7% combined) agreed that they faced challenges in balancing work-life and home responsibilities during the pandemic. This suggests that the pandemic has caused disruptions in managing work and personal obligations, which could be attributed to the shift to remote work, increased caregiving responsibilities, and blurred boundaries between work and home life.

Sole Responsibility for Child/Children's Education Using Online Mode: Around 54.6% of participants agreed that they were solely responsible for their child/children's education using online modes during the pandemic. This indicates that many individuals had to adapt to the new role of being their child's primary educator, likely due to school closures and the shift to remote learning. The reliance on digital devices and technologies for education further emphasizes the importance of improving digital skills.

Responsibility for Taking Care of Family Members: A majority of respondents (84.2% combined) agreed that they were responsible for taking care of their family members during the pandemic. This indicates the increased caregiving responsibilities individuals had to undertake, potentially due to health concerns, limited access to external support, or other pandemic-related factors.

Sharing Digital Devices with Others: About 50.8% of participants agreed that they shared their digital devices with others. This suggests that access to digital devices might have been limited, leading to sharing arrangements within households or among family members. Sharing devices can impact personal usage and potentially hinder the opportunity for continuous digital skill development.

No Time for Oneself, Still Working Hard: Approximately 56.5% of respondents agreed that they had no time for themselves but continued working hard during the pandemic. This

reflects the heightened demands on individuals' time and energy, potentially caused by increased workloads, caregiving responsibilities, or the blurring of boundaries between work and personal life.

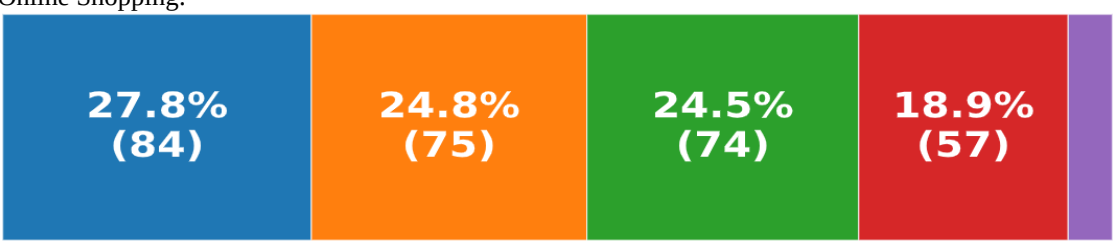
Life Hasn't Changed Much: A significant proportion of participants (51.3% combined) agreed that their lives hadn't changed much during the pandemic. This could indicate that some individuals experienced relatively fewer disruptions or changes in their daily routines, potentially due to factors like job stability, limited impact on their work, or a lack of significant changes in their living situations.

Improved Efficiency Due to Digital Technology: A majority of respondents (55.9% combined) agreed that they worked more efficiently during the pandemic thanks to digital technology. This highlights the positive impact of digital devices and technologies in facilitating work and productivity, potentially through remote collaboration, access to information, and streamlined communication.

Increased Time Spent with Family: Around 65.6% of participants agreed that they spent more time with their family during the pandemic. This suggests that the shift to remote work and reduced social activities provided an opportunity for individuals to prioritize and engage in more family time.

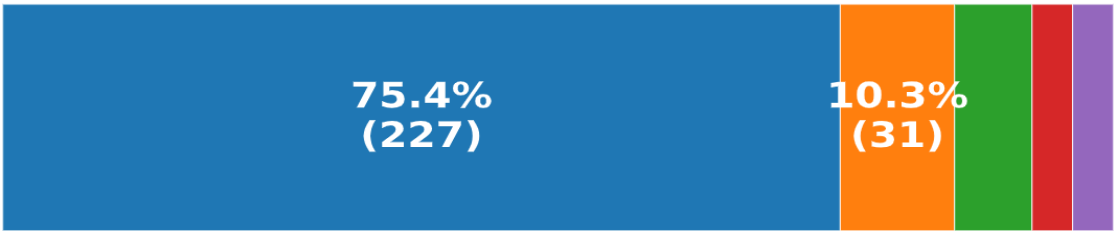
Purpose behind using Digital Devices daily:

Online Shopping:



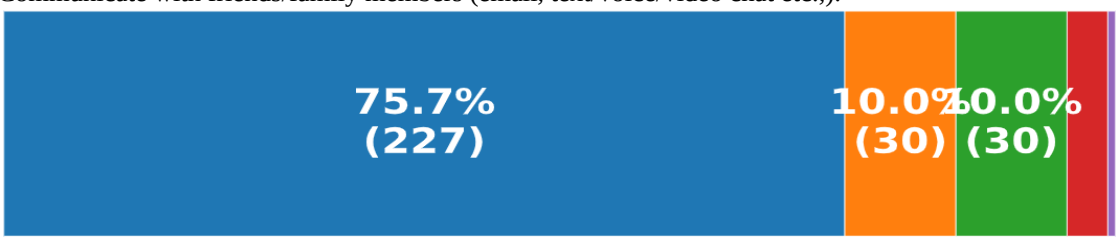
Entertainment (watch movies, listen to music, game playing):

News reading/watching, listening to podcasts:

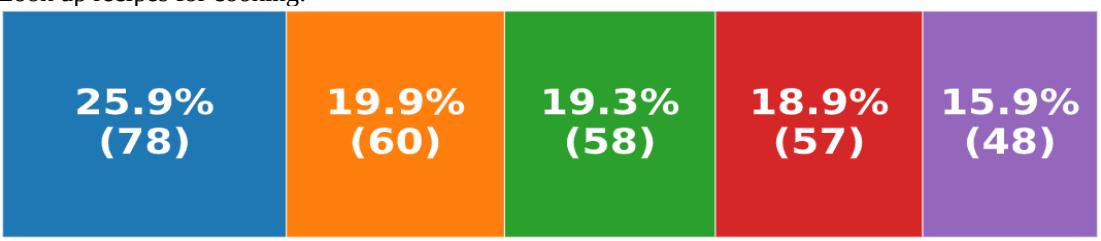


Check Covid19 related information:

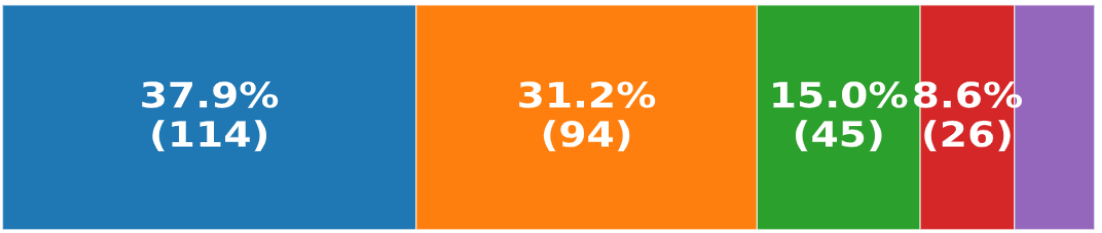
Communicate with friends/family members (email, text/voice/video chat etc.,):



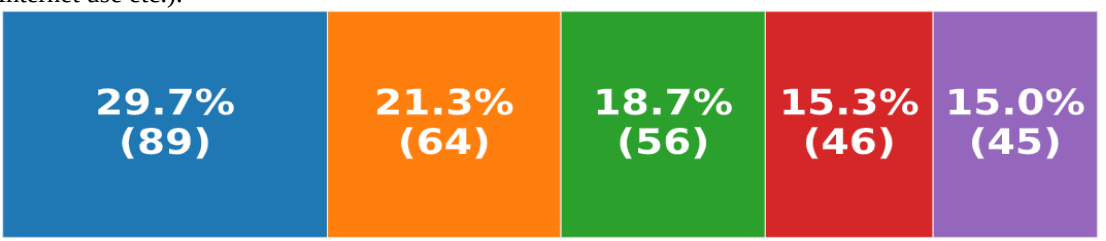
Look up recipes for cooking:



Help children with online schooling, homework and other activities:

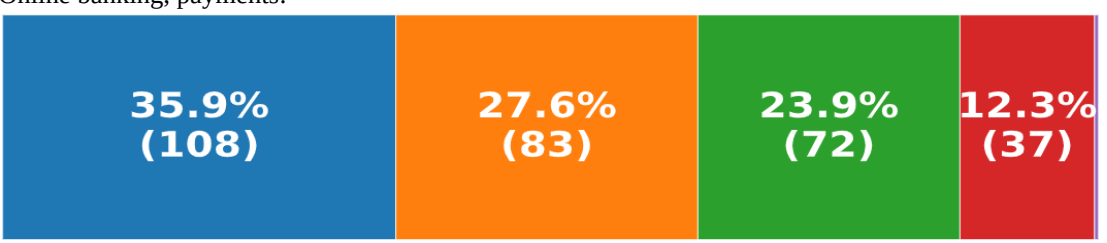


Help other family members with various reasons (movie watching with elders, help with Internet use etc.):

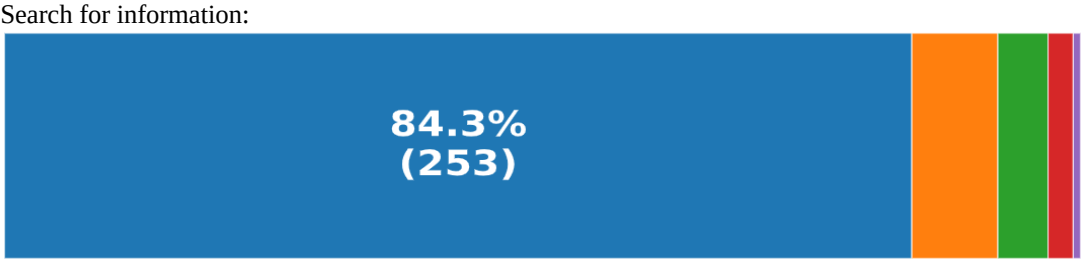


Visit social media sites:

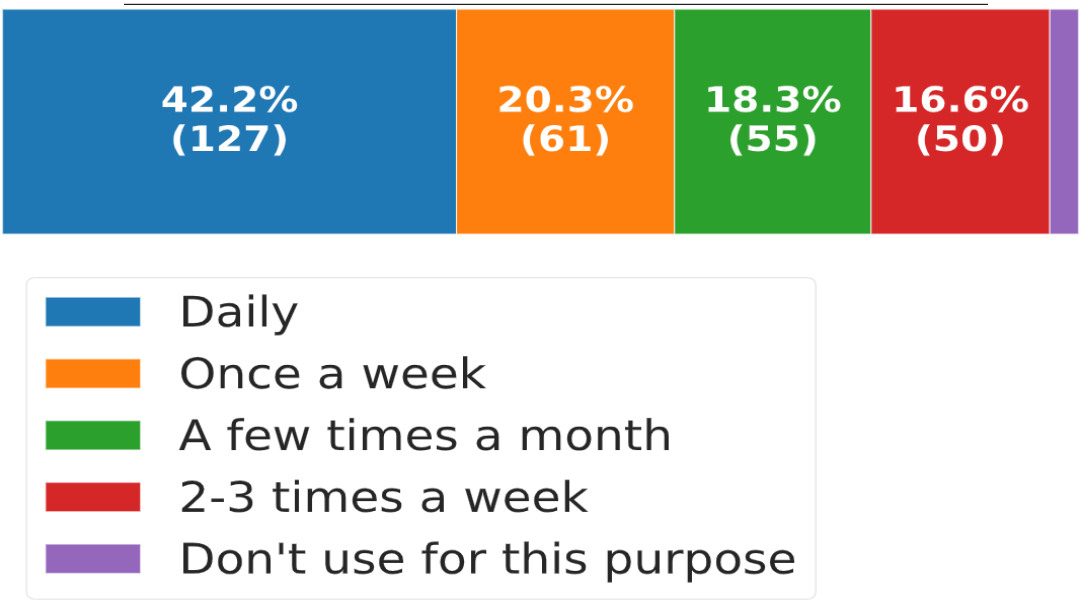
Online banking, payments:



Search for information:



Learn new skills:



Based on the data provided on the purpose of using digital devices during the pandemic, we can draw the following conclusions:

Online Shopping: The majority of participants (27.8%) reported using digital devices for online shopping on a daily basis. This indicates that online shopping has become an essential part of people's lives during the pandemic, likely due to the restrictions on physical retail and the convenience and safety offered by online platforms. The significant percentages reported for once a week (24.8%) and a few times a month (24.5%) suggest that online shopping is a popular and frequent activity for a large portion of the participants.

Entertainment: The data shows that a significant number of participants (58.5%) use digital devices for entertainment purposes on a daily basis. This finding is consistent with the increased reliance on digital platforms for accessing movies, TV shows, music, and other forms of entertainment during the pandemic. The percentages reported for once a week (16.6%) and a few times a month (12.3%) also indicate that entertainment remains a regular activity for a considerable portion of the participants.

News Reading/Watching, Listening to Podcasts: The majority of participants (75.4%) reported using digital devices on a daily basis to consume news, watch news videos, or listen to podcasts. This suggests that digital platforms have played a crucial role in keeping people informed during the pandemic, providing convenient access to news and information. The lower percentages reported for once a week (10.3%) and a few times a month (7.5%) indicate that staying updated with news and podcasts is more prevalent on a daily basis.

Check COVID-19 Related Information: The data shows that a significant number of participants (58.5%) use digital devices to check COVID-19 related information on a daily basis. This indicates the importance of digital platforms in accessing vital information, updates, and guidelines related to the pandemic. The percentages reported for once a week (13.2%) and a few times a month (12.3%) suggest that participants also rely on digital sources for periodic updates on the pandemic.

Communicate with Friends/Family Members: The majority of participants (75.7%) reported

using digital devices on a daily basis to communicate with friends and family members through email, text, voice, or video chat. This emphasizes the crucial role of digital communication tools in maintaining social connections during periods of physical distancing and lockdowns. The lower percentages reported for once a week (10%) and a few times a month (10%) indicate that daily communication is more common among the participants.

Look Up Recipes for Cooking: Participants reported varying frequencies of using digital devices to look up recipes for cooking. The highest percentage reported was for a few times a month (19.3%), followed closely by once a week (19.9%) and 2-3 times a week (18.9%). This indicates that digital devices have become a valuable resource for culinary inspiration and guidance during the pandemic, but the frequency of usage may vary among participants based on their cooking habits and preferences.

Help Children with Online Schooling, Homework, and Other Activities: Participants reported engaging in helping their children with online schooling, homework, and other activities at different frequencies. The highest percentage reported was for once a week (31.2%), followed by daily (37.9%) and a few times a month (15%). This highlights the significant role of digital devices in facilitating remote learning and supporting children's educational needs during the pandemic.

Help Other Family Members with Various Reasons: Participants reported using digital devices to assist other family members for various reasons, such as movie watching with elders or helping with internet use. The reported frequencies were relatively consistent, with the highest percentage for once a week (21.3%), followed by daily (29.7%) and a few times a month (18.7%). This suggests that digital devices have been instrumental in facilitating intergenerational activities and providing support within families during the pandemic.

Visit Social Media Sites: The majority of participants (62.1%) reported visiting social media sites on a daily basis. This finding aligns with the increased need for social connection and information sharing during periods of physical distancing. The percentages reported for once a week (13.3%) and a few times a month (12%) indicate that daily usage is more prevalent among participants.

Online Banking, Payments: Participants reported using digital devices for online banking and payments at varying frequencies. The highest reported percentage was for once a week (27.6%), followed by daily (35.9%) and a few times a month (23.9%). This highlights the reliance on digital platforms for financial transactions and the convenience offered by online banking services.

Search for Information: The data indicates that the majority of participants (84.3%) use digital devices on a daily basis to search for information. This emphasizes the critical role of digital search engines in fulfilling information needs during the pandemic. The relatively low percentages reported for once a week (7%) and a few times a month (4%) suggest that information-seeking is a regular and frequent activity for a significant portion of the participants.

Learn New Skills: Participants reported varying frequencies of using digital devices to learn new skills. The highest percentage reported was for daily (42.2%), followed by once a week (20.3%) and a few times a month (18.3%). This highlights the role of digital platforms in facilitating online learning opportunities and personal development during the pandemic.

In conclusion, the data suggests that digital devices have played a pivotal role in various

aspects of people's lives during the COVID-19 pandemic. They have enabled activities such as online shopping, entertainment, accessing news and COVID-19 related information, communication with friends and family, recipe lookup, online schooling support, assistance to other family members, social media engagement, online banking, information search, and skill acquisition. The high percentages reported for daily usage in many categories highlight the increased reliance on digital devices for daily activities and the integration of digital technology into people's lives during the pandemic.

Below is %distribution of peoples' opinion on the following statements.

1) I am using social media too much
Strongly Agree = 27%
Neither Agree nor Disagree = 13%
Strongly Disagree = 12%
Somewhat Disagree = 11%
Somewhat Agree = 32%
Not Applicable = 2%

2) I am getting addicted to digital games, online or offline
Strongly Agree = 8%
Neither Agree nor Disagree = 10%
Strongly Disagree = 35%
Somewhat Disagree = 12%
Somewhat Agree = 7%
Not Applicable = 24%

3) I have to help others to use digital technology
Strongly Agree = 14%
Neither Agree nor Disagree = 17%
Strongly Disagree = 5%
Somewhat Disagree = 7%
Somewhat Agree = 45%
Not Applicable = 8%

4) I have to learn lots of new skills and digital applications these days
Strongly Agree = 24%
Neither Agree nor Disagree = 18%
Strongly Disagree = 8%
Somewhat Disagree = 8%

Somewhat Agree = 35%
Not Applicable = 3%

5) I am watching movies online too much
Strongly Agree = 15%
Neither Agree nor Disagree = 16%
Strongly Disagree = 21%
Somewhat Disagree = 10%
Somewhat Agree = 26%
Not Applicable = 7%

6) I am spending too much time communicating/chatting with others online
Strongly Agree = 21%
Neither Agree nor Disagree = 20%
Strongly Disagree = 12%
Somewhat Disagree = 14%
Somewhat Agree = 29%
Not Applicable = 0%

7) I developed new hobbies thanks to digital technology
Strongly Agree = 16%
Neither Agree nor Disagree = 20%
Strongly Disagree = 12%
Somewhat Disagree = 11%
Somewhat Agree = 31%
Not Applicable = 7%

8) I am balancing my online and offline time well
Strongly Agree = 15%
Neither Agree nor Disagree = 21%
Strongly Disagree = 14%
Somewhat Disagree = 18%
Somewhat Agree = 28%
Not Applicable = 1%

9) I have good self-regulation with usage of digital technology
Strongly Agree = 21%
Neither Agree nor Disagree = 18%
Strongly Disagree = 8%
Somewhat Disagree = 16%
Somewhat Agree = 32%
Not Applicable = 1%

10) Digital technology is offering me flexibility to manage my work and home duties
Strongly Agree = 27%
Neither Agree nor Disagree = 14%
Strongly Disagree = 7%
Somewhat Disagree = 8%
Somewhat Agree = 41%
Not Applicable = 1%

11) Having digital device at my fingertips is beneficial in my life during pandemic

Strongly Agree = 52%
Neither Agree nor Disagree = 7%
Strongly Disagree = 1%
Somewhat Disagree = 3%
Somewhat Agree = 34%
Not Applicable = 0%

Conclusions -
Social Media Usage:
A significant portion of the participants (27%) strongly agreed that they were using social media too much.
The majority of respondents (32%) somewhat agreed with this statement, indicating a general tendency towards excessive social media usage.
The combined percentage of strongly agree and somewhat agree indicates that a significant number of people (59%) felt they were using social media excessively.
However, it's worth noting that a considerable portion neither agreed nor disagreed (13%), suggesting some uncertainty or variability in the respondents' perception of their social media usage.
Digital Game Addiction:
The data shows that a small percentage of participants (8%) strongly agreed that they were getting addicted to digital games.
The majority of respondents (35%) strongly disagreed with this statement.
Overall, a relatively low percentage (15%) either somewhat or strongly agreed that they were becoming addicted to digital games.
The high percentage of "Not Applicable" (24%) indicates that a significant portion of participants did not consider themselves addicted to digital games.
Helping Others with Digital Technology:
The data indicates that a considerable number of participants (45%) somewhat agreed that they had to help others use digital technology.
A significant portion neither agreed nor disagreed (17%), suggesting some variability in participants' experiences with assisting others.
The relatively low percentage of strongly agree responses (14%) suggests that while some individuals are helping others with digital technology, it may not be a widespread experience among all participants.
Learning New Skills and Applications:
The data reveals that a considerable number of participants (35%) somewhat agreed that they had to learn lots of new skills and digital applications during the pandemic.
A substantial portion neither agreed nor disagreed (18%), indicating some variability in the participants' experiences.
The combined percentage of strongly agree and somewhat agree (59%) suggests that a majority of participants faced the need to acquire new digital skills and knowledge during the pandemic.
Online Movie Consumption:
The data shows that a significant percentage of participants (41%) either somewhat or strongly agreed that they were watching movies online too much.
The combined percentage of strongly agree and somewhat agree (41%) indicates a tendency towards excessive online movie consumption among a significant number of participants.
It's worth noting that a considerable portion neither agreed nor disagreed (16%), suggesting some variability in participants' opinions regarding their movie-watching habits.
Online Communication:
A substantial portion of participants (29%) somewhat agreed that they were spending too much time communicating or chatting with others online.

The combined percentage of somewhat agree and strongly agree (50%) indicates that a significant number of participants felt they were spending excessive time on online communication.
Notably, no participants marked "Not Applicable" for this statement, suggesting that all respondents engaged in some form of online communication.
Development of New Hobbies:
The data indicates that a significant number of participants (31%) somewhat agreed that they developed new hobbies thanks to digital technology.
A substantial portion neither agreed nor disagreed (20%), indicating some variability in participants' experiences with developing hobbies.
The combined percentage of somewhat agree and strongly agree (47%) suggests that a majority of participants found digital technology beneficial in exploring new hobbies during the pandemic.
Balancing Online and Offline Time:
The data reveals that a significant portion of participants (43%) either somewhat or strongly disagreed that they were balancing their online and offline time well.
Only 15% strongly agreed with this statement, indicating that a relatively small percentage of participants felt they were effectively managing their online and offline activities.
The relatively high percentage of neither agree nor disagree (21%) suggests some uncertainty or variability in participants' ability to balance their time.
Self-regulation with Digital Technology:
The data shows that a significant number of participants (53%) either somewhat or strongly agreed that they had good self-regulation with the usage of digital technology.
The combined percentage of somewhat agree and strongly agree (53%) indicates that a majority of participants felt they had control over their digital technology usage.
The relatively low percentage of strongly disagree responses (8%) further supports the notion that participants generally had a sense of self-regulation.
Flexibility in Managing Work and Home Duties:
The data indicates that a significant number of participants (68%) either somewhat or strongly agreed that digital technology offered them flexibility in managing their work and home duties.
Only a small percentage strongly disagreed (7%) with this statement.
The high combined percentage of somewhat agree and strongly agree responses suggests that a majority of participants found digital technology beneficial in balancing their work and home responsibilities.
Benefits of Having Digital Devices:
The data reveals that a large majority of participants (86%) either somewhat or strongly agreed that having digital devices at their fingertips was beneficial in their lives during the pandemic.
A negligible percentage (1%) strongly disagreed with this statement.
The high combined percentage of strongly agree and somewhat agree responses indicates that participants overwhelmingly recognized the advantages of digital devices during the pandemic.
Overall, the survey results suggest that while there are concerns about excessive social media usage and online communication, participants generally acknowledge the benefits of digital technology in their lives during the pandemic. Many participants reported the need to learn new skills and applications, but also found flexibility in managing work and home duties through digital technology. Additionally, a significant number of participants developed new hobbies and demonstrated self-regulation with the usage of digital devices.

Following is the %distribution of peoples' agreement on the following problems they might have faced.
I have encountered challenges in the following areas during the pandemic:
1) Remembering passwords and login information
Strongly Agree = 13%
Neither Agree nor Disagree = 11%
Strongly Disagree = 24%
Somewhat Disagree = 22%
Somewhat Agree = 25%
Not Applicable = 2%

2) Connecting various digital devices to the Internet
Strongly Agree = 10%
Neither Agree nor Disagree = 12%
Strongly Disagree = 27%
Somewhat Disagree = 29%
Somewhat Agree = 17%
Not Applicable = 2%

3) Finding ways to pay for online connection
Strongly Agree = 6%
Neither Agree nor Disagree = 12%
Strongly Disagree = 33%
Somewhat Disagree = 31%
Somewhat Agree = 13%
Not Applicable = 2%

4) Sharing digital devices to fulfill my work and family needs
Strongly Agree = 12%
Neither Agree nor Disagree = 15%
Strongly Disagree = 25%
Somewhat Disagree = 28%
Somewhat Agree = 15%
Not Applicable = 2%

5) Finding my own workspace at home when working
Strongly Agree = 23%
Neither Agree nor Disagree = 11%
Strongly Disagree = 20%
Somewhat Disagree = 16%
Somewhat Agree = 25%
Not Applicable = 2%

6) Focusing on work when working from home
Strongly Agree = 22%
Neither Agree nor Disagree = 11%
Strongly Disagree = 15%
Somewhat Disagree = 16%
Somewhat Agree = 31%

Not Applicable = 2%

7) Protecting my devices from virus and cyber attacks
Strongly Agree = 14%
Neither Agree nor Disagree = 14%
Strongly Disagree = 18%
Somewhat Disagree = 26%
Somewhat Agree = 23%
Not Applicable = 2%

8) Protecting my personal privacy
Strongly Agree = 20%
Neither Agree nor Disagree = 17%
Strongly Disagree = 18%
Somewhat Disagree = 22%
Somewhat Agree = 19%
Not Applicable = 2%

9) Keeping up with knowledge and skills to use digital devices, online services
Strongly Agree = 14%
Neither Agree nor Disagree = 16%
Strongly Disagree = 22%
Somewhat Disagree = 22%
Somewhat Agree = 20%
Not Applicable = 2%

10) Learning technology to fulfill my job duties
Strongly Agree = 18%
Neither Agree nor Disagree = 16%
Strongly Disagree = 20%
Somewhat Disagree = 23%
Somewhat Agree = 19%
Not Applicable = 2%

11) Making sure my child/ren attend online school
Strongly Agree = 24%
Neither Agree nor Disagree = 12%
Strongly Disagree = 19%
Somewhat Disagree = 20%
Somewhat Agree = 20%
Not Applicable = 3%

12) Receiving offensive message/comments (negative, harmful, false, or mean content) online is a challenge
Strongly Agree = 20%
Neither Agree nor Disagree = 16%
Strongly Disagree = 21%
Somewhat Disagree = 27%
Somewhat Agree = 10%
Not Applicable = 2%

Conclusion -

we analyzed the responses regarding the challenges faced by participants during the pandemic:

Remembering Passwords and Login Information:

A significant percentage of participants (38%) either somewhat or strongly agreed that they encountered challenges in remembering passwords and login information.

The combined percentage of somewhat agree and strongly agree responses (38%) suggests that a substantial number of participants struggled with this aspect of digital technology.

The relatively high percentage of neither agree nor disagree (11%) and somewhat disagree (22%) indicates some variability in participants' experiences with password management.

Connecting Various Digital Devices to the Internet:

The data reveals that a considerable number of participants (39%) either somewhat or strongly agreed that they faced challenges in connecting various digital devices to the internet.

A relatively high percentage of strongly disagree responses (27%) suggests that a significant number of participants did not encounter difficulties in this area.

However, the combined percentage of somewhat agree and strongly agree (27%) indicates that a substantial portion of participants did experience challenges with device connectivity.

Finding Ways to Pay for Online Connection:

The data shows that a significant percentage of participants (44%) either somewhat or strongly disagreed that they faced challenges in finding ways to pay for online connection.

A relatively small percentage strongly agreed (6%) that they encountered difficulties in this aspect.

The high combined percentage of somewhat disagree and strongly disagree (64%) suggests that the majority of participants did not face significant challenges with paying for their online connection.

Sharing Digital Devices to Fulfill Work and Family Needs:

The data indicates that a considerable number of participants (27%) either somewhat or strongly agreed that they encountered challenges in sharing digital devices to fulfill their work and family needs.

The combined percentage of somewhat disagree and strongly disagree (53%) suggests that a majority of participants did not face significant difficulties in this area.

It's worth noting that a considerable portion neither agreed nor disagreed (15%), indicating some variability in participants' experiences with device sharing.

Finding Own Workspace at Home When Working:

A significant number of participants (48%) either somewhat or strongly agreed that they faced challenges in finding their own workspace at home when working.

The combined percentage of somewhat agree and strongly agree (48%) indicates that a substantial portion of participants struggled with creating a dedicated workspace.

It's worth noting that a relatively high percentage of strongly disagree responses (20%) suggests that a significant number of participants did not encounter difficulties in this area.

Focusing on Work When Working from Home:

The data reveals that a considerable number of participants (53%) either somewhat or strongly agreed that they encountered challenges in focusing on work when working from home.

The combined percentage of somewhat disagree and strongly disagree (31%) suggests that a significant portion of participants did not face significant difficulties in maintaining focus.

However, the high percentage of somewhat agree responses (31%) indicates that a substantial number of participants did struggle with maintaining focus while working from home.

Protecting Devices from Virus and Cyber Attacks:

The data indicates that a significant number of participants (37%) either somewhat or

strongly agreed that they faced challenges in protecting their devices from virus and cyber attacks.
The combined percentage of somewhat agree and strongly agree (37%) suggests that a substantial portion of participants experienced difficulties in this aspect.
The relatively high percentage of somewhat disagree responses (26%) suggests that a significant number of participants did not encounter significant challenges in device protection.
Protecting Personal Privacy:
A considerable number of participants (39%) either somewhat or strongly agreed that they encountered challenges in protecting their personal privacy.
The combined percentage of somewhat agree and strongly agree (39%) indicates that a significant portion of participants felt that their privacy was at risk.
It's worth noting that a relatively high percentage of strongly disagree responses (18%) suggests that a significant number of participants did not face significant difficulties in protecting their personal privacy.
Keeping up with Knowledge and Skills to Use Digital Devices and Online Services:
The data shows that a significant percentage of participants (42%) either somewhat or strongly disagreed that they faced challenges in keeping up with knowledge and skills to use digital devices and online services.
The combined percentage of somewhat disagree and strongly disagree (42%) suggests that a majority of participants did not encounter significant difficulties in this area.
However, it's worth noting that a substantial portion neither agreed nor disagreed (16%), indicating some variability in participants' experiences with acquiring digital skills.
Learning Technology to Fulfill Job Duties:
A significant number of participants (41%) either somewhat or strongly disagreed that they faced challenges in learning technology to fulfill their job duties.
The combined percentage of somewhat disagree and strongly disagree (41%) suggests that a majority of participants did not encounter significant difficulties in this area.
It's worth noting that a considerable portion neither agreed nor disagreed (16%), indicating some variability in participants' experiences with learning technology for work.
Ensuring Child's Attendance in Online School:
The data indicates that a considerable number of participants (44%) either somewhat or strongly agreed that they encountered challenges in ensuring their child's attendance in online school.
The combined percentage of somewhat disagree and strongly disagree (39%) suggests that a significant portion of participants did not face significant difficulties in this area.
The relatively high percentage of neither agree nor disagree responses (12%) indicates some variability in participants' experiences with ensuring their child's online school attendance.
Dealing with Offensive Messages/Comments Online:
A significant number of participants (30%) either somewhat or strongly agreed that they encountered challenges in dealing with offensive messages or comments online.
The combined percentage of somewhat agree and strongly agree (30%) suggests that a substantial portion of participants faced difficulties in this aspect.
However, the high percentage of somewhat disagree responses (27%) indicates that a significant number of participants did not encounter significant challenges in dealing with offensive content.
Overall, the survey results indicate that participants faced various challenges during the pandemic in areas such as remembering passwords, connecting devices to the internet, finding workspaces, focusing on work, protecting devices and personal privacy, and dealing with offensive online content. However, it's important to note that there was variability in participants' experiences, and a significant number did not encounter significant difficulties in these areas.

Cross Dependence Analysis using Chi-Square Test

Introduction:

The following section presents the results of a cross-dependence analysis conducted on the data obtained from a survey exploring the usage of digital devices during the COVID-19 pandemic. The purpose of this analysis is to investigate the potential relationships between different features, such as age group, gender, and type of device used. The chi-square test was employed to assess the statistical significance of these relationships. The code snippet used for the analysis is provided below.

Code :

```
#CHI-SQUARED TEST
import pandas as pd
import numpy as np
col1 = 0
col2 = 1
df = pd.read_csv('/content/Data.csv')
tf = pd.read_csv('/content/tabulated_chi_square.csv')
X1 = df.iloc[1:,col1]
var1 = X1.value_counts()
X2 = df.iloc[1:,col2]
var2 = X2.value_counts()
dof = (len(var1)-1)*(len(var2)-1) #degree of freedom
sf = 0.05 #significance level
print(var1)
print(var2)
#2d dictionary
obs_val = {}
for index1 in var1.index:
  temp = {}
  for index2 in var2.index:
    temp[index2]=0
  obs_val[index1] = temp
for index, row in df.iterrows():
  if index == 0 or str(row[col1]) == 'nan' or str(row[col2]) == 'nan':
    continue
  obs_val[row[col1]][row[col2]] += 1

expected_val = {}
cnt = {}
for index2 in var2.index:
  cnt[index2] = 0
for index2 in var2.index:
  for v in obs_val.values():
    cnt[index2] += v[index2]
obs_val['total'] = cnt
print(obs_val)
grand_total = sum(obs_val['total'].values())
for k1, v1 in obs_val.items():
  temp = {}
  if v1 == 'total':
    continue
  for k2, v2 in v1.items():
    temp[k2] = sum(v1.values())*obs_val['total'][k2]/grand_total
  expected_val[k1] = temp
print(expected_val)

chi_square = 0.0
for k1, v1 in expected_val.items():
  for k2, v2 in v1.items():
    obs = obs_val[k1][k2]
    exp = v1[k2]
    chi_square += (obs - exp)**2/exp
print(f"calculated values of χ2 is {chi_square}")
critical = tf.at[dof-1,str(sf)]
print(f"critical value of χ2 is {critical}")
if(chi_square > critical) :
  print("we reject Null hypothesis and accept alternate hypothesis")
  print(f"Alternate Hypothesis : There's a significant relationship between '{var1.name}' and
'{var2.name}'")
else :
  print("Null Hypothesis Accepted")
```

Results and Interpretation:

The chi-square test was applied to assess the cross-dependence between different features in the survey data. The calculated value of $\chi 2$ was compared to the critical value obtained from the chi-square.

1) Association between Age Group and Work Status:

calculated values of $\chi 2$ is 9.434454113957386
critical value of $\chi 2$ is 5.991
we reject Null hypothesis and accept alternate hypothesis
Alternate Hypothesis : There's a significant relationship between age group and work status.
Reason : Different age groups may be at varying stages of their careers. Younger age groups, such as those in the 18-24 or 25-34 range, might be in the early stages of their professional journey and have a higher likelihood of being currently employed. Conversely, older age groups, such as those in the 55-64 or 65-74 range, might be closer to retirement age and therefore have a higher likelihood of not being currently employed.

2) Association between Age Group and Martial Status:
calculated values of $\chi 2$ is 78.29645280106793
critical value of $\chi 2$ is 24.996
we reject Null hypothesis and accept alternate hypothesis
Alternate Hypothesis : There's a significant relationship between Age Group and Martial Status.
The significant relationship between age group and marital status can be attributed to factors such as life stage and societal norms, socioeconomic influences, cultural and generational influences, individual relationship goals, and divorce or relationship dissolution rates. Younger age groups may have a higher prevalence of being unmarried due to focusing on education, career development, or personal priorities, while older age groups might be more likely to be married or in long-term relationships based on financial stability, cultural expectations, and generational attitudes towards marriage. These factors contribute to the observed relationship between age group and marital status in the survey data.

3) Association between Gender and Work Status
calculated values of $\chi 2$ is 9.434454113957386
critical value of $\chi 2$ is 5.991we reject Null hypothesis and accept alternate hypothesis
Alternate Hypothesis : There's a significant relationship between Work Status and Gender
This finding indicates that gender plays a role in determining individuals' work status. It implies that there may be differences in employment rates or types of employment between genders. Further analysis would be needed to explore the specific nature of this relationship, including factors such as gender disparities in the labor market, societal expectations, and individual choices and circumstances. Understanding the relationship between gender and work status can inform efforts to address gender inequalities in employment opportunities and outcomes.

4) Association between Work Status and no. of Children
calculated values of $\chi 2$ is 1.0614976002296608
critical value of $\chi 2$ is 11.07
Null Hypothesis Accepted
Individuals' work status is not determined or influenced by the number of children they have. Other factors such as personal choices, economic circumstances, or societal support systems may play a more prominent role in determining individuals' employment status regardless of their parental responsibilities.

Discussion

The study's outcomes contribute to our understanding of the impact of the COVID-19 pandemic on digital device usage and its cultural nuances. The findings can inform policymakers, businesses, and technology developers on how to better accommodate the evolving needs and expectations of users from different countries. Moreover, the study's insights may guide future research exploring the implications of prolonged remote work and the integration of digital technology into everyday life.

The findings from the survey provide valuable insights into various demographic factors and their potential influence on the usage of digital devices among individuals working from home during the COVID-19 pandemic. The discussion will focus on the age group, employment status, gender ratio, marital status, graduation status, and the number of children in a household.

Regarding the age group distribution, the results indicate that individuals in their mid-30s to mid-40s were the most active participants in the survey. This age group may exhibit higher digital device usage and a greater interest in the topic, potentially due to their familiarity with technology and the need for work-related digital tools. However, caution should be exercised when interpreting findings related to the 18-24 and 65-74 age groups due to the smaller sample sizes, indicating potential challenges in recruiting participants from these age brackets.

The employment status data suggests that the majority of participants were currently employed, while a smaller portion reported temporary unemployment. This reflects the impact of the pandemic on the job market, with some individuals experiencing job loss or career transitions. It is essential to consider the employment status of participants as it may influence their access to and usage of digital devices in the context of remote work.

The gender ratio reveals a significant disparity, with males comprising the majority of participants. This gender imbalance calls for further investigation into potential variations in device usage, work patterns, and challenges faced during remote work. Future research should aim to address this gender disparity to ensure inclusive digital solutions and a comprehensive understanding of the experiences of individuals working from home during the pandemic.

The marital status distribution highlights the presence of diverse marital statuses among individuals working from home. Understanding these demographics can provide insights into how different relationship dynamics may influence device usage, work-life balance, and the challenges faced during remote work. It emphasizes the importance of considering marital status as a relevant factor in developing targeted strategies and support systems for individuals utilizing digital devices while working from home.

The educational attainment of the participants revealed a higher percentage of graduate and postgraduate degree holders in the sample. This suggests that the participants primarily consisted of individuals with higher levels of education and potentially higher-skilled occupations. However, it is crucial to recognize that these findings are limited to the specific sample and may not be representative of the entire population. Education levels may influence participants' knowledge and skills related to digital devices, impacting their usage patterns and preferences.

The number of children in a household presents important considerations for device usage and work-life balance during the pandemic. Participants reported varying numbers of children, which can significantly impact the utilization of digital devices for both work and educational purposes. Understanding the

dynamics of device usage and work-life balance in households with different numbers of children is crucial for developing targeted interventions and policies to support individuals managing both professional and parental responsibilities during remote work.

The results obtained from the cross-dependence analysis shed light on the relationships between various factors, such as age group, gender, and work status, and their implications on the survey conducted.

The findings of this analysis provide valuable insights into the impact of the pandemic on the use of DCT across different cultures. The significant relationship between age group and work status highlights the varying stages of individuals' careers and their employment status. Younger age groups, such as those in the 18-24 or 25-34 range, are more likely to be currently employed, whereas older age groups, such as those in the 55-64 or 65-74 range, have a higher likelihood of not being currently employed due to nearing retirement age. These results suggest that the pandemic has influenced employment dynamics differently across age groups, with implications for workforce composition and career progression.

Moreover, the observed relationship between age group and marital status emphasizes the influence of life stage, societal norms, and cultural factors on individuals' marital status. Younger age groups may have a higher prevalence of being unmarried due to focusing on education, career development, or personal priorities, while older age groups might be more likely to be married or in long-term relationships based on financial stability, cultural expectations, and generational attitudes towards marriage. These findings indicate that the pandemic has not only impacted work dynamics but also the personal lives and relationship statuses of individuals in different age groups.

Additionally, the significant relationship between gender and work status suggests that gender plays a role in determining individuals' employment outcomes during the pandemic. This finding highlights potential gender disparities in employment rates or types of employment, which may arise from various factors such as gender biases, societal expectations, and structural inequalities in the labor market. Understanding the relationship between gender and work status is crucial for addressing gender inequalities and promoting equal employment opportunities and outcomes.

However, the analysis did not find a significant relationship between work status and the number of children individuals have. This implies that work status is not strongly influenced by the parental responsibilities of individuals during the pandemic. Other factors, such as personal choices, economic circumstances, or societal support systems, might have a more prominent role in determining individuals' employment status regardless of their parental responsibilities. These results highlight the complex interplay of factors affecting work-life balance and employment dynamics during challenging times.

Overall, this study contributes to the understanding of how people in different countries use digital devices, including during work-from-home environments, in their daily lives during the COVID-19 pandemic. The results underscore the importance of considering demographic factors, such as age and gender, in examining the impact of the pandemic on individuals' work status and personal lives. By identifying these relationships, policymakers and organizations can develop targeted interventions and strategies to address the unique needs and challenges faced by different age groups and genders in the digital era.

Conclusion

The survey findings shed light on several demographic factors that can influence the usage patterns of digital devices among individuals working from home during the COVID-19 pandemic. The age group distribution highlights the participation of individuals in their mid-30s to mid-40s, indicating potentially higher digital device usage and interest in the topic. Employment status data reflects the impact of the pandemic on job markets, with some individuals experiencing temporary unemployment.

The significant gender disparity observed in the survey emphasizes the need for further investigation into potential variations in device usage, work patterns, and challenges faced during remote work. Marital status demographics underscore the importance of considering relationship dynamics when developing strategies and support systems for individuals working from home.

The educational attainment of participants indicates a higher percentage of graduate and postgraduate degree holders, suggesting potential variations in knowledge and skills related to digital devices. Finally, the presence of children in households highlights the need to consider the varying needs and challenges faced by individuals with different numbers of children when designing interventions and policies.

Overall, these findings provide valuable insights into the diverse factors that shape the usage of digital devices during the pandemic. Understanding the influence of these demographic factors can inform the development of inclusive digital solutions and targeted support systems for individuals working from home, facilitating a better work-life balance and enhanced productivity in remote work environments.