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Smartphone Usage among University Students during the Covid-19 pandemic: A Study

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Smartphone Usage among University Students during the Covid-19 pandemic: A Study

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Abstract

The unusual lockdown due to the Covid-19 pandemic has exploded globally, revealing the whole population and touching all areas in our lives: education, work, politics, entertainment, economy, markets, etc. Online teaching and learning during pandemics have exposed students to technology, ultimately resulting in ingesting of digital media. In this favour, the research aims to determine the use of smartphones among university students during the Covid-19 Pandemic. Therefore, this study aims to examine the use of smartphones by university students during the Covid-19 pandemic. This study collected 165 respondents from Babasaheb Bhimrao Ambedkar University (A central university), Lucknow. This study used survey techniques, questionnaire tools and stratified random sampling techniques for collecting data. Data screening, factor analysis and reliability tests were conducted to confirm the validity and reliability of the instruments, further mean value was calculated, then t-test and ANOVA test were carried out to check the stated hypotheses. Factor analysis yielded three factors, i.e., improved learning, sharing information and access to materials. The findings suggested that gender has a significant difference with improved learning (p=0.050) and respondent's age has a substantial difference with access to materials (p=0.022).

Keywords: smartphone usage, mobile learning, university students, Covid-19, pandemic

Introduction

At present, mobile learning (m-learning) has become an overall learning system for education, notably higher education, worldwide because of its multi-functionality characteristic and efficiency (Biswas, Roy, & Roy, 2020). Nowadays, smartphones have become a part of every person's life. Globally, people all over the world have adopted the modern practice of changing their lifestyles. Smartphone usage has increased drastically as its functionality helps not only in daily life but also in serving multiple tasks. Communication through smartphones helps connect people worldwide, but it acts as the most significant and fastest broadcaster of information exchange. Smartphones are slowly replacing personal computers because of their capacity and portability. Smartphones are now capable of fulfilling functions of both computers and telephones and thus providing opportunities such as instant access to desired information, ensuring information sharing, games, shopping, video chat and short messages, e-mail, music, video, or films. Smartphones offer easy access to the web and other applications which can also be downloaded and stored in it.

Growing technological and scientific progress and the global intelligent mobile devices infiltration have had countless influences on living, communication and how human relationships happened arbitrated over technology (Herrera-Mendoza, 2017). In today's era, technology is endorsing a necessary revolution amongst all arenas: information, marketplaces, work, entertainment, communication and education (Pérez-Escoda & Ruiz, 2020). We are by now living in a linked culture transmuted in the last 20 years fundamentally by mobile communications and the Internet. The Covid-19 pandemic has hugely affected the education system of the world. Several countries have locked their educational institutes to decrease the spread of this virus, which has become the reason for several challenges (Naciri, Baba, Achbani, & Kharbach, 2020). During pandemic days, university students are extensively engaged in using smartphones to learn and complete their courses. Its usage among students has increased due to its functionality which helps in completing their academic purposes, as smartphones easily promote collaborative and different types of learning through their wireless connection to the internet. Smartphones are viewed as handheldcomputers rather than standard devices because of their powerful computing ability and largememory size (Biswas, Roy, & Roy, 2020).

Research objectives

The objectives of the study are:
- To examine the factors that motivate students to use smartphones.
- To examine the significant difference between improved learning, sharing information and access to materials with demographic variables.

Research questions

Following research questions guided this study:
RQ1. What are the various factors that motivate students to use smartphones?
RQ2. To improved learning, sharing information and access to materials have a significant difference with demographic variables.

Research hypothesis

H1. There is a significant relationship between demographic variables and motives for smartphone usage among university students during the Covid-19 pandemic

Literature Review

The fast growth of technology has developed electronic devices such as a smartphone that the function does not limit only to messaging but allows long-distance communication. A smartphone can be called a minicomputer as the features and functions provided are like a computer in its mini form and handy (Rambitan, 2015). Smartphone has made the young generation so occupied with its technology that it became a trademark of the young age (Skierkowski & Wood, 2012). Students are dependent on the advanced touchscreen technology where just by touch, the application on a smartphone can be used at any moment with the accessibility of internet all day long. The use of smartphones affects people and societies in various forms as it is used in a various context such as learning, working, and communication.

Smartphone has made life more convenient with multiple features that can help users manage most of their daily work just by a click. It enables users to communicate faster and easier and obtain various information through online resources (Al-Hunaiyyan, A.Alhajri, & Al-Sharhan, 2018).

The smartphone enables students to access educational materials anytime from anywhere (David & Roberts, 2020; Al-Hunaiyyan, A.Alhajri, & Al-Sharhan, 2018). Learning through mobile phones is a new learning method (Biswas, Roy, & Roy, 2020). Mobile learning is convenient for educational drives through mobile devices (Kinash, Brand, & Mathew, 2012). Further, mobile learning acts as a vital part of education in teaching and learning activities (Klassen et al., 2013; Kinash, Brand, & Mathew, 2012; Saadeh, et al., 2021). Currently, learning online is not a choice but mandatory for each university student to follow up for their higher pace of knowledge (Saadeh, et al., 2021). In the present situation, smartphones benefit students from the major crisis of learning and study gaps (Naciri, Baba, Achbani, & Kharbach, 2020). Globally, the explosion of smartphones and their related devices has significantly transformed teaching and learning in developed nations are not the exception (Tagoe, 2014).

Mobile learning is omnipresent, moveable, mixed, private, cooperative, concerted, and prompt (Mehdipour & Zerehkafi, 2013; Ozdamli & Cavus, 2011), it is reflecting as moveable as a student can use it anytime, anyplace (Jun & Zhi-yi, 2010; Cavus & Uzunboylu, 2009), it is ubiquitous because it changes the classroom pattern from the traditional classroom to anytime and anywhere education (Jun & Zhi-yi, 2010; Cavus & Uzunboylu, 2009). Learning through smartphone is intermingled (Alshahrani & Ally, 2016), guarantee the face-to-face interaction (Verduyn, Schulte-Strathaus, Kross, & Hülsheger, 2021) and easy admission to online interaction (Ocak, 2010), interactive (Verduyn, Schulte-Strathaus, Kross, & Hülsheger, 2021; Cavus & Uzunboylu, 2009), collaborative as it forms cooperative learning events (Uzunboylu, Cavus, & Ercag, 2009), immediate, it permits immediate admission to learning resources and educational training (Eteokleous & Ktoridou, 2009) and it permits students to cooperate with their colleagues, pursuit information, discover and pursuit locations (Wilmer, Sherman, & Chein, 2017; Chen, Sivo, Seilhamer, & Sugar, 2014). Dashti & Aldashti (2018) studies found that 80.3% of the respondents were positive toward using mobile devices as a learning device and they opinion that mobile learning improves their knowledge of the English language. Further, smartphone usage help students access educational resources. A smartphone is extensively used for education (Biswas, Roy, & Roy, 2020; Naciri, Baba, Achbani, & Kharbach, 2020).

Methodology

The study consisted of 165 respondents collected from Babasaheb Bhimrao Ambedkar University (A central university), Lucknow. After thorough research of past literature (Jesse, 2015; Tejedor, Cervi, Pérez-Escoda, & Tusa, 2020; Chen, et al., 2017; Biswas, Roy, & Roy, 2020), a research instrument was developed on smartphone usage among university students during the Covid-19 pandemic. The survey technique and questionnaire tool were selected for directing this study. The designated questionnaire consists of 21 variables related to smartphone usage among university students during the Covid-19 pandemic. A five-point Likert scale was preferred for all the variables, with a value of 1 - strongly agree, 2 - agree, 3 - neutral, 4 - disagree, and 5 - strongly disagree. Constructed on Connelly (Cronbach, 1951), a sample size of 10% was assembled to test the validity. Consequently, a pilot study was directed by a collection

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of data from 50 respondents. The study used MS Excel and SPSS 22 for analysis. The respondents for this project were designated by engaging a stratified random sampling technique. From this study, 64.8% of the respondents were male, 35.2% were female, 45.5% of the respondents belong to the 23-25 years age group, 28.5% constitute 26 & above years and 26.1% belong to 20-22 years age group.

Data analysis and findings

Factor analysis was employed to determine the main factors; further independent sample t-test and a One-way ANOVA test were conducted to determine the main factors for using smartphone usage among university students during the Covid-19 pandemic. The vital purpose of using a smartphone is presented in Table 1. The mean value of twenty-one variables was calculated and it was found that "a smartphone is the best possible support to learn anytime and anywhere" was the most prominent with a mean value of 4 (M=4) and ranked as first. The slightest reason for using a smartphone was "High internet charge of a mobile network can affect my learning," with a mean value of 4 (M=4) and ranked as twenty-first.

Table1: Reason for using a smartphone by university students' during Covid-19 pandemic

Reason for smartphone usage	Mean	Rank
A smartphone is the best possible support to learn anytime and anywhere	2.44	1
A smartphone makes it easier to access study materials	2.08	2
Smartphone learning is a faster way to get feedback	2.05	3
During this pandemic, smartphones are benefitting those who are willing to learn something	2.02	4
Smartphone learning helps me to learn in different ways and provide various learning fields	1.89	5
A smartphone helps me to solve a study-related problem	1.88	6
A smartphone makes it easier to find relevant information about my studies	1.85	7
The use of social media through smartphones helps in educational fulfillment	1.82	8
Gathering information or knowledge from a smartphone has become basic needs	1.81	9
Learning through smartphone help to compensate the study period lost during a pandemic	1.81	10
Lectures and study material can be shared using a smartphone	1.74	11
Learning through smartphones helps to enhance my motivation to finish my studies	1.73	12
Using smartphones helps to improve knowledge in my field of study	1.73	13
During COVID-19 smartphone acts as a learning companion	1.72	14
Smartphone learning helps to improve the interactivity between student and teacher	1.70	15
A smartphone use is far more common among university students for learning	1.68	16
A smartphone is a flexible device to learn faster and easier way	1.61	17
The use of social media through smartphones helps to strengthen communication with others	1.57	18
A smartphone helps to improve my study skills	1.54	19
The screen size of my smartphone does not affect my learning	1.53	20
High internet charge of a mobile network can affect my learning	1.47	21

Factor analysis of smartphone usage among university students

A factor analysis (using principal component analysis) was employed to categorize the factors persuading university students to use smartphones. A total of 165 respondents was collected to rated their opinion with 21 variables. The 21 items were factor analysed through principal component analysis after determining the relevance of factor study using Bartlett's test of sphericity (significant at 0.05 level) and Kaiser-Meyer-Olkin (KMO) statistic (>0.6). Factor loading of 0.4 and above with an eigenvalue more significant than 1 was considered for this study, it was then rotated using varimax rotation with Kaiser Normalization. For this project, eigenvalues and scree plots were considered to control the number of factors. Significantly three factors were established (Table 2). Items appropriate to factors for which no workable clarification could be institute or deficient explanatory power in illuminating the reasons for using smartphones among university students were dropped.

The factor analyses produced three factors, which were reduced, explaining 54.86 % of the total variance. Cronbach's alpha value was measured to contract that the variable for each factor was internally associated. The Cronbach's alpha value for this study was found to have an acceptable value, more significant than 0.70 (a>0.70) (Gaur & Gaur, 2009). The data analysis recognized three factors and labelled them as, 'improved learning', 'sharing information' and 'access to materials'. Out of the different reasons for using smartphones among university students, 'improved learning' with nine items is the main purpose of using a smartphone, having 10.349 eigenvalues, 49.279 % of the variance with 0.929 Cronbach's alpha value.

Table 2: Factor analysis of smartphone usage among university students during the Covid-19 pandemic

Factors	Factor Loading	Eigenvalues	% of Variance	Cronbach's alpha
Improved learning		10.349	49.279	0.929
IL1	0.814			
IL2	0.740			
IL3	0.737			
IL4	0.666			
IL5	0.654			
IL6	0.648			
IL7	0.619			
IL8	0.588			
IL9	0.549			
Sharing Information		1.866	8.884	0.901
SI1	0.800			
SI2	0.752			
SI3	0.743			
SI4	0.705			
SI5	0.679			
SI6	0.671			

SI7	0.630			
SI8	0.564			
Access to materials		1.173	5.585	0.731
AM1	0.694			
AM2	0.639			
AM3	0.623			
AM6	0.585			

Purpose of using a smartphone by university students during the COVID-19 pandemic against demographics

The researcher attempts to categorize the factors that have a significant statistical difference concerning using a smartphone by university students during the Covid-19 pandemic concerning demographic profile at a significant difference of 5%. Tables 3 & 4 illustrate the results of the independent sample t-test and analysis of variance (ANOVA) against demographics, i.e., gender and age of the respondents. Table 3 expressed the independent sample t-test result of gender to use smartphones during the Covid-19 pandemic. The outcome from the analysis indicates that "improved learning" (t=-3.958, p=0.05) has a significant difference with gender. Whereas, 'sharing information' (t=-1.765, p=0.675) and 'access to materials' (t=-4.766, p=0.623) does not show a significant difference with gender. Table 4 presents the mean difference in reasons for using smartphones among university students during the Covid-19 pandemic. It was found that 'access to materials' has a significant difference with the age of the respondents (F=3.926, p=0.022), whereas 'improved learning' (F=2.336, p=0.100) and 'sharing information' (F=0.332, p=0.718) does not show a statistically significant difference.

Table 3. Variation in using smartphones based on gender

	Male (mean)	Female (mean)	*t*-value	*p*-value
Improved learning	12.4496	15.7567	-3.958	0.050
Sharing Information	12.8879	14.0905	-1.765	0.675
Access to materials	5.6308	7.3879	-4.766	0.623

Table 4. Variation in using smartphones based on age

	Age	Mean	F-value	*p*-value
Improved Learning	20-22	14.5013	2.336	0.100
	23-25	13.9615		
	26 & above	12.2411		
Sharing Information	20-22	13.7355	0.332	0.718
	23-25	13.0783		
	26 & above	13.2926		
Access to materials	20-22	6.8023	3.926	0.022
	23-25	6.4200		
	26 & above	5.4681		

Results and discussions

At present smartphone has been playing an imperative role in students' daily life particularly for their educational resolution (Rahman, 2014; Shimray, Keerti, & Ramaiah, 2015), abundance and availability of smartphone are paving the way of teaching and learning (Al-Hunaiyyan, Al-Sharhan, & Alhajri, 2017) particularly in an unanticipated state such as Covid-19 pandemic. This study focused on 'improved learning', 'sharing information' and 'access to materials' as the reasons for using smartphones among university students during the Covid-19 pandemic. This study supports Saadeh, et al. (2021) findings regarding significant association with smartphone usage to improved learning with gender. Biswas, Roy, & Roy (2020) advocate that students use smartphones for various purposes during the Covid-19 pandemic. It was found that 'at this pandemic time, high internet charge of a mobile network can affect my learning' (m=4.28) and 'the use of social media helps to strengthen the communication with others' (m=4.03) are the two prominent reasons for using smartphones during Covid-19 pandemic (Biswas, Roy, & Roy, 2020). Whereas, in this study 'a smartphone is the best possible support to learn anytime and anywhere (m=2.44) and 'a smartphone makes easier to access study materials' (m=2.08) are the two most prominent reasons for using smartphone and rank as first and second respectively.

A study conducted by Bowman, Levine, Waite, & Gendron (2010) found that smartphone use amongst college students is becoming progressively predominant even in classrooms. Conferring to the cognitive theory of multimedia education and learning, off-task multitasking while learning (e.g., texting and social media use) could hinder a student's information processing, thus dropping learning performance (Kuznekoff & Titsworth, 2013), smartphone addiction reduced academic grade (Lepp, Barkley, & Karpinski, 2015). This study disagrees with Bowman, Levine, Waite, & Gendron (2010); Kuznekoff & Titsworth (2013); Lepp, Barkley, & Karpinski (2015) findings and proposed that smartphones help students to accomplish their academic work by using smartphones. One of the probable reasons is that because of the Covid-19 pandemic, both teachers and students are forced to impart and learn via smartphones. Constructed on the outcome of this investigation and conclusions of associated prevailing studies directed by Biswas, Roy, & Roy (2020); Lepp, Barkley, & Karpinski (2015) and Rahman (2014), it can be concluded that learning via smartphones is a suitable instrument to guarantee regular studying of university students during unforeseen state like Covid-19 pandemic.

Conclusion and recommendation

Information communication technologies, particularly smartphone usage, have increased sharply during the Covid-19 pandemic times. The prime purpose of this study is to determine the various factors that lead university students to use a smartphone during the Covid-19 pandemic. Also, to determine the significant relationship between demographic variables and factors leading to the use of smartphones among students. This study presents that the majority (64.8%) of the respondents were male and 23-25 years age group constituted about one-fourth (28.5%) of the respondents. The findings suggested that gender has a significant difference with improved learning (p=0.050) and the respondent's age has a substantial difference with access to materials (p=0.022). This study is confined to Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, India. The policymakers and educational institutions must integrate information communication technology, particularly smartphones, in the teaching and learning process. Future researchers can incorporate other variables such as ease of use, academic output

and cover more significant number of respondents. Also, a comparative study can be carried out between different universities.

References

Al-Hunaiyyan, A., A.Alhajri, R., & Al-Sharhan, S. (2018). Perceptions and challenges of mobile learning in Kuwait. *Journal of King Saud University - Computer and Information Sciences, 30*(2), 279-289. doi:https://doi.org/10.1016/j.jksuci.2016.12.001

Al-Hunaiyyan, A., Al-Sharhan, S., & Alhajri, R. (2017). A New Mobile Learning Model in the Context of the Smart Classrooms Environment: A Holistic Approach. *International Journal of Interactive Mobile Technologies, 11*(3), 39-56.

Alshahrani, K., & Ally, M. (2016). *Transforming Education in the Gulf Region: Emerging Learning Technologies and Innovative Pedagogy for the 21st Century.* Landon: Routledge. doi:https://doi.org/10.4324/9781315621586

Biswas, B., Roy, S. K., & Roy, F. (2020). Students Perception of Mobile Learning during COVID-19 in Bangladesh: University Student Perspective. *Aquademia, 4*(2), 1-9. doi:https://doi.org/10.29333/aquademia/8443

Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. *Computers & Education, 54*(4), 927-931. doi:https://doi.org/10.1016/j.compedu.2009.09.024

Cavus, N., & Uzunboylu, H. (2009). Improving critical thinking skills in mobile learning. *Procedia - Social and Behavioral Sciences, 1*(1), 434-438. doi:https://doi.org/10.1016/j.sbspro.2009.01.078

Chen, B., Liu, F., Ding, S., Ying, X., Wang, L., & Wen, Y. (2017). Gender differences in factors associated with smartphone addiction: a cross sectional study among medical college students. *BMC Psychiatry, 17*(341), 1-9. doi:DOI 10.1186/s12888-017-1503-z

Chen, B., Sivo, S., Seilhamer, R., & Sugar, A. (2014). User Acceptance of Mobile Technology: A Campus-Wide Implementation of Blackboard's Mobile™ Learn Application. *Journal of Educational Computing Research, 49*(3), 327-343. doi:https://doi.org/10.2190/EC.49.3.c

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334.

Dashti, F., & Aldashti, A. (2018). EFL College Students' Attitudes towards Mobile Learning. *International Education Studies, 8*(8), 13-20. doi:10.5539/ies.v8n8p13

David, M. E., & Roberts, J. A. (2020). Developing and Testing a Scale Designed to Measure Perceived Phubbing. *Int. J. Environ. Res. Public Health, 17*(21), 1-15. doi:https://doi.org/10.3390/ijerph17218152

Eteokleous, N., & Ktoridou, D. (2009). Investigating Mobile Devices Integration in Higher Education in Cyprus: Faculty Perspectives. *International Journal of Interactive Mobile Technologies (iJIM), 3*(1), 38-48.

Gaur, A. S., & Gaur, S. S. (2009). *Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS.* New Delhi: SAGE Publications India Pvt Ltd.

Herrera-Mendoza, K. M. (2017). Motivation of youth students with use of cell phones/Motivación de jóvenes universitarios hacia el uso de teléfonos celulares. *Encuentros, 15*(1), 91-105. doi:http://dx.doi.org/10.15665/re.v15i1.631

Jesse, G. R. (2015). Smartphone and App Usage Among College Students: Using Smartphones Effectively for Social and Educational Needs. *2015 Proceedings of the EDSIG Conference Conference on Information Systems and Computing Education* (pp. 1-13). Wilmington: Information Systems & Computing Academic Professionals.

Jun, Y., & Zhi-yi, H. (2010). Learning anywhere anytime with mobile devices. *2010 International Conference on Artificial Intelligence and Education (ICAIE)* (pp. 768-771). Hangzhou: IEEE. doi:10.1109/ICAIE.2010.5641054

Kinash, S., Brand, J., & Mathew, T. (2012). Challenging mobile learning discourse through research: Student perceptions of Blackboard Mobile Learn and iPads. *Australasian Journal of Educational Technology, 28*(4), 639-655. doi:https://doi.org/10.14742/ajet.832

Kuznekoff, J. H., & Titsworth, S. (2013). The Impact of Mobile Phone Usage on Student Learning. *Communication Education, 62*(3), 233-252. doi:https://doi.org/10.1080/03634523.2013.767917

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2015). The Relationship Between Cell Phone Use and Academic Performance in a Sample of U.S. College Students. *5*(1), 1-9. doi:https://doi.org/10.1177/2158244015573169

Mehdipour, Y., & Zerehkafi, H. (2013). Mobile Learning for Education: Benefits and Challenges. *International Journal of Computational Engineering Research, 3*(6), 93-101.

Naciri, A., Baba, M. A., Achbani, A., & Kharbach, A. (2020). Mobile Learning in Higher Education: Unavoidable Alternative during COVID-19. *Aquademia, 4*(1), 1-2. doi:https://doi.org/10.29333/aquademia/8227

Ocak, M. A. (2010). Blend or not to blend a study investigating faculty members perceptions of blended teaching. *World Journal on Educational Technology, 3*(30), 196-210.

Ozdamli, F., & Cavus, N. (2011). Basic elements and characteristics of mobile learning. *Procedia - Social and Behavioral Sciences, 28*, 937-942. doi:https://doi.org/10.1016/j.sbspro.2011.11.173

Pérez-Escoda, A., & Ruiz, R. G. (2020). Communication and Education in a digital and connected world. *Communication and Education in a digital and connected world , 18*(2), 1-15. doi:https://doi.org/10.7195/ri14.v18i2.1580

Rahman, A. (2014). The Awareness and Usage of Mobile Phone among. *Journal of Business Studies, 35*(3), 17-30.

Rambitan, V. M. (2015). The Effect of Smartphone on Students' Critical Thinking Skill in Relation to the Concept of Biodiversity. *American Journal of Educational Research, 3*(2), 243-249. doi:10.12691/education-3-2-18

Saadeh, H., Fayez, R. Q., Refaei, A. A., Shewaikani, N., Khawaldah, H., Abu-Shanab, S., & Al-Hussaini, M. (2021). Smartphone Use Among University Students During COVID-19 Quarantine: An Ethical Trigger. *Front. Public Health, 9*, 1-11. doi:https://doi.org/10.3389/fpubh.2021.600134

Shimray, S. R., Keerti, C., & Ramaiah, C. K. (2015). An overview of mobile reading habits. *DESIDOC Journal of Library & Information Technology, 35*(5), 343-354.

Skierkowski, D., & Wood, R. M. (2012). To text or not to text? The importance of text messaging among college-aged youth. *Computers in Human Behavior, 28*(2), 744–756. doi:https://doi.org/10.1016/j.chb.2011.11.023

Tagoe, M. A. (2014). Making Real the Dream of Education for All Through Open Schooling and Open Universities in Ghana. *SAGE Open*, 1–12. doi:https://doi.org/10.1177/2158244014559022

Tejedor, S., Cervi, L., Pérez-Escoda, A., & Tusa, F. (2020). Smartphone usage among students during COVID-19 pandemic in Spain, Italy and Ecuador. *TEEM'20* (pp. 571-576). Spain: ACM. doi:https://doi.org/10.1145/3434780.3436587

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education, 52*(2), 381-389. doi:https://doi.org/10.1016/j.compedu.2008.09.008

Verduyn, P., Schulte-Strathaus, J. C., Kross, E., & Hülsheger, U. R. (2021). When do smartphones displace face-to-face interactions and what to do about it? *Computers in Human Behavior, 114*, 1-8. doi:https://doi.org/10.1016/j.chb.2020.106550

Wilmer, H. H., Sherman, L. E., & Chein, J. M. (2017). Smartphones and Cognition: A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. *Frontiers in Psychology, 8*(605), 1-16. doi:10.3389/fpsyg.2017.00605

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