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**Research Paper**

# Internet Multitasking and Problem-Solving Ability: A Correlational Study Among College and University Students in Sikkim

Sagnik Chakraborty[1]*

## ABSTRACT

Multitasking is becoming ever more prevalent in learning contexts, so it is essential to know about its cognitive influence. While there is evidence that multitasking degrades executive function, others propose that its influence is context dependent. The current study investigated the association between internet multitasking and problem-solving capacity among 361 Sikkim college and university students (189 males, 172 females), with gender differences. Internet multitasking was measured with the 5-item Internet Multitasking Scale (Reinecke et al., 2016), which had high reliability ($\alpha$ = .84), and problem-solving was quantified with the 35-item Problem-Solving Inventory (Heppner & Peterson, 1982), which also had high reliability ($\alpha$ = .90). On this problem-solving scale, higher scores represent lower functional ability. Scores indicated that men did ever so marginally better at multitasking (M = 26.7) and problem-solving (M = 117) compared to women (M = 23.4 and 113, respectively). There was a large positive correlation (Spearman's $\rho$ = 0.672, $p < .001$) indicating that there was more multitasking related to poorer functional problem-solving ability. There were gender differences on internet multitasking ($p$ = 0.046), but not for problem-solving ($p$ = 0.250). Regression analysis confirmed that internet multitasking significantly predicted problem-solving scores ($\beta$ = 0.505, $p < .001$) with 25.5% of variance accounted for ($R^2$ = 0.255). Excessive multitasking may disable effective problem-solving. Future studies should investigate the relationship longitudinally, and educational institutions should promote reflective technology use to enable the cognitive potential of students.

***Keywords:*** *Internet Multitasking, Problem-Solving Ability, Media multitasking, Problem-Solving Inventory, Gender Differences, Cognitive Functioning*

In today's generation there is an easy access to internet and therefore the number of internet users are increasing day by day, people are being more committed towards internet-based activity and are spending more time being online (Wellman & Haythornthwaite, 2002). People using internet for extended period, isolating themselves from the external world and focusing only on internet rather than broader life events can cause internet addiction (Weinstein & Lejoyeux, 2010). Research conducted in nineteen Indian states indicates that Internet Addiction affects between 19.9% and 40.7% of the population. Furthermore, an estimated 20% to 40% of college students in India may be

[1]BSc Psychology, Department of Psychology, Sikkim University
*Corresponding Author

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vulnerable to developing Internet Addiction (Joseph et al., 2021). Specific cognitive abilities like Attention span, memory retention and decision-making ability can get significantly impaired due to excessive internet usage (Keyan & Isa, 2023). Excess internet use for entertainment can affect the problem-solving styles of university students as Ekinci (2014) finds that students who indulge in excessive usage of internet for entertainment either avoid a problem or may approach a problem impulsively.

As defined by Byrne and Murray (2005) attention switching and working memory capacity may influence insight problem solving skill, and in the same way the idea of internet multitasking entails divided attention. Samson and Costello (2015) characterize internet multitasking as the ability to do several online tasks at the same time, like web browsing, email checking, or social media chat, while other tasks, frequently unrelated, are being undertaken at the same time. The rapid switching between task can degrade a person's capacity to concentrate and execute intricate activities effectively, resulting in poorer cognitive functioning. Therefore, based on the definition of internet multitasking, it can be well comprehended that it is one of the extremely common activity today's youths are involved in. Mayer (1992) explained problem-solving capability as intellectual potential to recognize, identify, and conquer hindrances in the way of goal attainment. It both entails cognitive and metacognitive abilities, including assessing possible strategies, tracking progress, and reconfiguring approaches as needed. Good problem solvers not only know how to recognize solutions but also how to apply critical thinking to work through intricate situations. Much of the past research into multitasking has primarily been devoted to the overall capability of multitasking, paying little attention to the particular dynamics of internet multitasking and its implications on problem-solving skills.

While research has explored multitasking in some contexts, e.g., at work or traditional schooling environments, they are not typically demarcated into types of multitasking or address the particular context of multitasking today in the internet age. The literature gap highlights the necessity of specific research that explores the connection between internet multitasking and problem-solving capacity, especially among college and university students increasingly engaged in digital spaces. This study seeks to fill this gap and present more nuanced findings on the impact of internet multitasking on the cognitive ability of students in educational environments. The higher education institutions in Sikkim are increasingly dependent on the internet for learning, and hence assessing the impact of internet multitasking on higher-order cognitive abilities can be an effective means of gaining insights into better teaching approaches, enhancing student performance, and developing improved learning habits. The purpose of this research is to examine the interaction between technology use and cognitive abilities, presenting possible solutions to maximize learning spaces in the age of technology. Conducting this research among college and university students is significant since increasingly more digital technologies and social media are incorporated into their scholarly and personal activities.

As illustrated by Aslan and Polat (2024), overuse of social media can harm such important cognitive functions as problem-solving skill, which in turn affects academic self-efficacy and achievement. This age group is also especially vulnerable since they are at a critical stage of increased scholastic pressure, identity formation, and extensive use of virtual media. Focusing on this cohort, the present research provides informative insight into how internet multitasking behaviour is connected to problem-solving ability, identifying potential cognitive and academic consequences. It is paramount that teachers, psychologists, and

policymakers become educated about these dynamics in order to enable the implementation of specific interventions to promote healthier online behaviours and improved cognitive and academic functioning in young adults. Similarly, this study will aim to explore the possibility of gender differences in the impact that internet multitasking has on problem-solving ability. Despite the existence of known gender differences in cognitive processing, little research has been performed to explore how these differences are manifest when multitasking and accessing the internet (Voyer, Voyer, & Bryden, 1995). It is important to establish whether or not males and females respond differently to internet multitasking, as such a discovery can be used to inform the creation of gender-specific interventions or cognitive optimization techniques for either gender. Considering these gendered views, the study will provide a qualitative examination of the impact of multitasking on young adults and establish the need to create specialized means to cope with the differential needs of diverse populations (Bray & Cudeck, 2000).

## METHOD

### *Aims and Objectives*

The study has two major aims i.e. firstly, to examine the relationship between Internet multitasking and Problem-solving ability and secondly, to find out the gender differences in both Internet multitasking and Problem-solving ability.

### *Hypotheses*

- H1 – There is a positive correlation between Internet multitasking and Problem-solving ability among college and university students in Sikkim.
- H2 – There is a significant gender difference in Internet multitasking among college and university students in Sikkim.
- H3 – There is a significant gender difference in Problem solving ability among college and university students in Sikkim.

### *Participants*

The study includes 361 students (189 male and 172 female) aged between 18 to 35 years, pursuing studies in different colleges and universities in Sikkim. The purposive sampling method will be used to sample participants since it enables the conscious selection of those who fit specific criteria that are pertinent to the research goals. This age group is selected because it is a time when people tend to be very active in academic activities and online use, and thus they are best suited for studying the impact of internet multitasking on problem-solving skills. As the study involves purposive sampling technique, it has some inclusion and exclusion criteria.

### *Inclusion criteria*

- Age Range: Participants were required to be between 19 and 35 years old.
- Enrollment Status: Participants had to be currently enrolled in a college or university in Sikkim.
- Gender Identification: Only individuals who identified as either male or female were eligible.
- Language Proficiency: Participants needed to have proficiency in English.
- Health Status: Individuals with a history of neurological, psychological, or emotional disorders were excluded.

- Justification: This criterion is supported by Luria and Tsvetkova (2017), who emphasized that brain impairments and related conditions can negatively affect problem-solving abilities.

***Exclusion criteria***

- Age Exclusion: Individuals under 19 or over 35 years of age were excluded.
- Enrollment Status: Participants not enrolled in any college or university in Sikkim were excluded.
- Gender Identity: Those who identified with a gender other than male or female were not included.
- Language Proficiency: Participants lacking proficiency in English were excluded.
- Health Conditions: Individuals diagnosed with neurological, psychological, or emotional disorders were also excluded.

## Materials

***Internet multitasking***

To assess internet multitasking, a 5 item Internet Multitasking Questionnaire was used, a validated instrument developed by (Reinecke et al., 2016) with the value of Cronbach's Alpha being .84, CR = .86 and established construct validity. The scale involves 5-point rating scale ranging from 0 (never) to 4 (very frequently). A higher score indicates a higher level of internet multitasking.

***Problem-solving ability***

To assess problem-solving ability, a 35 item Problem-Solving Inventory was used, a validated instrument developed by (Heppner and Peterson, 1982) with the value of Cronbach's Alpha being .90 and having an established concurrent and construct validity. The scale consists of three different subscales i.e. Problem-solving confidence, Approach-Avoidance and Personal control. All items are scored on a six-point Likert scale ranging from 1 = Strongly agree to 6 = Strongly disagree. The total score ranges from 32 to 192. Lower score in each subscale and in overall scale is considered to be functional.

## Design

The study follows correlational research design.

## Procedure

The data was collected from 361 students (189 male and 172 female) of age group 19 to 35 years. The data was collected by taking an informed consent and it was collected online as a study done by Gosling and Mason (2015) says that the data collected online is as relevant as the data collected offline. A google form was developed that comprised of all the questions from the two scale. After collection of data, further analysis was conducted in Jamovi.

## Data analysis

After the data collection, correlation was performed to examine the relationship between two variables, independent sample t test was performed to understand the gender differences in both the variables and regression analysis was done to understand the strength of the effect of independent variable on the dependent variable. This statistical analysis was performed in Jamovi.

**Ethics**

Informed consent, confidentiality, anonymity, minimal or no risks, data security. The study was conducted in adherence to the guidelines of the Ethical committee (Department of Psychology).

## RESULTS

***Table 1: Group Descriptives***

| | Group | N | Mean | Median | SD |
|---|---|---|---|---|---|
| **Total Internet Multitasking** | Female | 172 | 23.4 | 19.5 | 16.4 |
| | Male | 189 | 26.7 | 20.0 | 16.1 |
| **Total Problem Solving** | Female | 172 | 113.2 | 112.5 | 30.8 |
| | Male | 189 | 116.7 | 120.0 | 27.1 |

Table 1 presents the group descriptives for two variables—Total Internet Multitasking and Total Problem-Solving Ability—based on gender (female and male), with sample sizes (N = 361, Male = 189, Female = 172). For Internet multitasking, males reported a slightly higher mean (*M = 26.7, SD = 16.1*) than females (*M = 23.4, SD = 16.4*), indicating marginally greater engagement in multitasking online. Moreover, males showed a slightly higher mean score in problem-solving ability (*M = 116.7, SD = 27.1*) compared to females (*M = 113.2, SD = 30.8*). However, the differences between the groups appear minimal, as both the mean values and standard deviations are closely aligned across genders. This suggests relatively comparable levels of both internet multitasking and problem-solving ability between male and female participants in the sample.

***Table 2: Correlation Matrix***

| | | Total Internet Multitasking | | Total Problem Solving |
|---|---|---|---|---|
| **Total Internet Multitasking** | Spearman's rho | — | | |
| | df | — | | |
| | p-value | — | | |
| **Total Problem Solving** | Spearman's rho | 0.672 | *** | — |
| | df | 359 | | — |
| | p-value | < .001 | | — |

*Note.* * p < .05, ** p < .01, *** p < .001

The table 2 presents the Pearson correlation coefficients between Total Internet Multitasking, and Total Problem-Solving Ability among 361 participants. Notably, moderate positive correlation was observed between Total Internet Multitasking and Total Problem-Solving Ability (Spearman's $\rho = 0.672$, $p < .001$).

*Table 3: Independent Samples T-Test*

| | | Statistic | p | Mean difference |
|---|---|---|---|---|
| **Total Internet Multitasking** | Mann-Whitney U | 14277 | 0.046 | -2.00 |
| **Total Problem Solving** | Mann-Whitney U | 15115 | 0.250 | -4.00 |

Table 3, A Mann-Whitney U test was conducted to examine gender differences in Internet Multitasking and Problem-Solving ability. The results revealed that there were significant gender differences in Internet Multitasking as indicated by the p-value of 0.046 ($p$<.05), whereas there were no significant gender differences in Problem-solving ability as indicated by the p-value of 0.250.

*Table 4: Regression Coefficients of Internet Multitasking on Problem-Solving Ability*

| Variable | B | β | SE | t | p |
|---|---|---|---|---|---|
| **Constant** | 92.50*** | – | 2.42 | 38.2 | <.001*** |
| **Total Internet Multitasking** | 0.90*** | .51 | 0.08 | 11.1 | <.001*** |
| $R^2$ | .255 | | | | |

*Note.* $N$ = 361.
***$p$ < .001.

Table 4 shows the impact of Internet Multitasking on Problem-Solving ability among College and University students in Sikkim. The $R^2$ value of .255 revealed that the predictor variable explained 25.5% variance in the outcome variable with $F$ (1, 359) = 123, $p$ <.001. The findings revealed that internet multitasking positively predicted problem-solving ability (β =.51, $p$<.001).

## DISCUSSION

The results point towards a moderate positive correlation between internet multitasking and problem-solving capacity (Spearman's ρ = 0.672, $p$ < .001) in Sikkim college and university students. Because the Problem-Solving Inventory employs an inverse score, lower score signifies superior problem-solving capacity. Hence, greater activity in internet multitasking is linked with inferior problem-solving capacity. This confirms the alternative hypothesis that there is a positive significant correlation between problem-solving capacity and internet multitasking, rejecting the null hypothesis. These findings agree with earlier studies. For instance, Ekinci (2014) established that high internet use was significantly associated with avoidant and impulsive styles of problem-solving among university students. Ibili and Emin (2017) also noted a negative correlation between problem-solving capacity and entertainment-oriented internet use among teachers. In addition, a study conducted by Aslan and Polat (2024), which included 419 Bingöl University students, examined social media addiction, depression, loneliness, life satisfaction, and problem-solving in relation to academic performance. According to their results, higher academic self-efficacy, life satisfaction, and problem-solving ability were associated with lower levels of social media

addiction and depression, and these dimensions positively contributed to academic performance.

The Mann-Whitney U test that was carried out to determine gender variations in internet multitasking came up with a statistically significant finding ($U = 14277$, $p = 0.046$. $p<.05$), which shows that male and female Sikkim college and university students vary significantly in internet multitasking levels. Since the mean rank difference stands at -2.00, the results from the data indicate that males are more likely to be engaged more in internet multitasking than females. This result supports the alternate hypothesis (H2), that there is a significant gender difference in internet multitasking among college and university students in Sikkim. This result is consistent with research studies such as Stoet et al. (2013) and Szameitat and Hayati (2019), who concluded that women have stronger multitasking tendencies and place greater importance on multitasking. However, other research, such as that of Lui et al. (2020), indicates more differential results, wherein men showed better concurrent multitasking ability, whereas women engaged in multitasking activities like listening to music and surfing the internet more.

Conversely, the Mann-Whitney U test carried out to assess gender difference in problem-solving ability yielded no statistically significant difference ($U = 15115$, $p = 0.250$), despite the fact that a mean rank difference of -4.00 was shown. This result indicates that both male and female students in the sample has no difference in problem-solving ability and thus the alternate hypothesis (H3), which hypothesized a significant difference in problem-solving capacity between genders, is negated. These results conform to the earlier research conducted by Miller and Crouch (1991), Jakhar (2019), and Hirsh et al. (2019), all of whom reported no significant gender-based disparities in problem-solving ability across various populations and contexts. This implies that although gender may influence certain computer-related tasks such as multitasking, it has no influence on general cognitive processes such as problem-solving in contemporary learning environments.

The regression test also further supports the results by proving that internet multitasking is a strong predictor of problem-solving competence. The unstandardized regression slope ($B = 0.90$, $SE = 0.08$, $p < .001$) and standardized slope ($\beta = .51$) demonstrate a moderate positive correlation between problem-solving scores and internet multitasking. Since the Problem-Solving Inventory is scored via reverse scoring, higher scores indicate less problem-solving competence. This indicates that higher multitasking is correlated with worse problem-solving performance. As the model has an $R^2$ value of 0.255, it predicts around 25.5% of problem-solving capacity variance, emphasizing an effective influence of multitasking behavior on cognitive function. This is consistent with research by Ekinci (2014) and Ibili & Emin (2017), who both indicated the harmful effects of high or entertainment-oriented internet use on problem-solving styles and capacities. Therefore, the regression analysis supports the cognitive expense of excessive levels of multitasking for students, supporting the wider implications of digital activity on educational and mental performance.

Despite various successful findings, few limitations of the study should be acknowledged. Firstly, the study relied solely on self-report measures which are vulnerable to social desirability bias and may not accurately reflect actual multitasking performance or cognitive ability. Objective measures such as behavioural multitasking tasks, experimental designs assessing problem-solving ability, neuropsychological tests, or EEG-based assessments could provide more reliable data. Additionally, the sample was restricted to students in

Sikkim, limiting the generalizability of the findings to broader populations. It would be beneficial for the future research to have large sample size, encompassing longitudinal studies and a broader demographic range to better understand the real-world implications of digital multitasking on cognition and behaviour. Additionally, future research can focus on conduction of sub scale analysis (Problem-solving inventory) for an in depth understanding of the variable in relation to other variables.

## CONCLUSION

The research substantiates that internet multitasking affects problem-solving capacity among university and college students. It defines multitasking as a behavior factor that places intellectual tension. It proves that more multitasking results in less functional problem-solving efficiency. It indicates that differences in gender occur in multitasking but not in intellect. The research proves that multitasking activity does not boost cognitive functioning. It separates digital multitasking as a strong predictor of cognitive inefficiency. It suggests that habitual digital switching interferes with sustained attention. It frames multitasking as an impediment to academic performance and mental concentration. It recommends that educational settings need disciplined digital usage. It suggests the creation of awareness programs to deal with multitasking behavior among students. It stresses the need to incorporate cognitive self-regulation skills into academic curriculum. It suggests that subsequent studies incorporate experimental designs, neuropsychological measures, and longitudinal designs. It suggests incorporating multiple age groups and educational levels to enhance generalizability. It asks for policy-level interventions to reduce long-term cognitive consequences of digital multitasking.

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***Conflict of Interest***

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