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Relationship Between Digital Dependency and Academic Self-Efficacy

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ABSTRACT

In the digital era, students' reliance on technology for academic, social, and personal activities has grown exponentially, raising questions about its impact on learning beliefs. This manuscript examines the relationship between digital dependency—defined as the compulsive or excessive use of digital devices and platforms—and academic self-efficacy, which refers to students' beliefs in their capabilities to organize and execute actions necessary to achieve specific academic goals. Drawing on a cross-sectional survey of 350 undergraduate students across multiple disciplines, we explore how varying degrees of digital dependency correlate with self-reported academic confidence, motivation, and performance indicators. Employing validated scales for informational, social, and entertainment dependency alongside a robust academic self-efficacy instrument, we conducted descriptive analyses, Pearson correlations, and hierarchical multiple regressions, controlling for screen time and demographic variables. Results reveal a nuanced pattern: while informational dependency—purposeful use of digital resources for academic tasks—positively predicts self-efficacy by enhancing access to study materials and fostering mastery experiences, social and entertainment dependencies detract from students' confidence by fragmenting attention and encouraging procrastination. Notably, the strongest negative effect emerged from compulsive social media use, which interrupted study schedules and elevated anxiety about academic performance. These findings underscore that balanced digital engagement—where technology serves as a tool rather than a distraction—is crucial for bolstering students' belief in their academic capabilities. Educational implications include integrating digital literacy workshops, self-regulation training, and institution-wide monitoring of high-risk digital behaviors. By illuminating how specific patterns of digital dependency influence academic self-efficacy, this study provides actionable insights for educators and policymakers aiming to harness the benefits of technology while mitigating its unintended drawbacks.

KEYWORDS

Digital dependency; academic self-efficacy; digital literacy; self-regulation; higher education

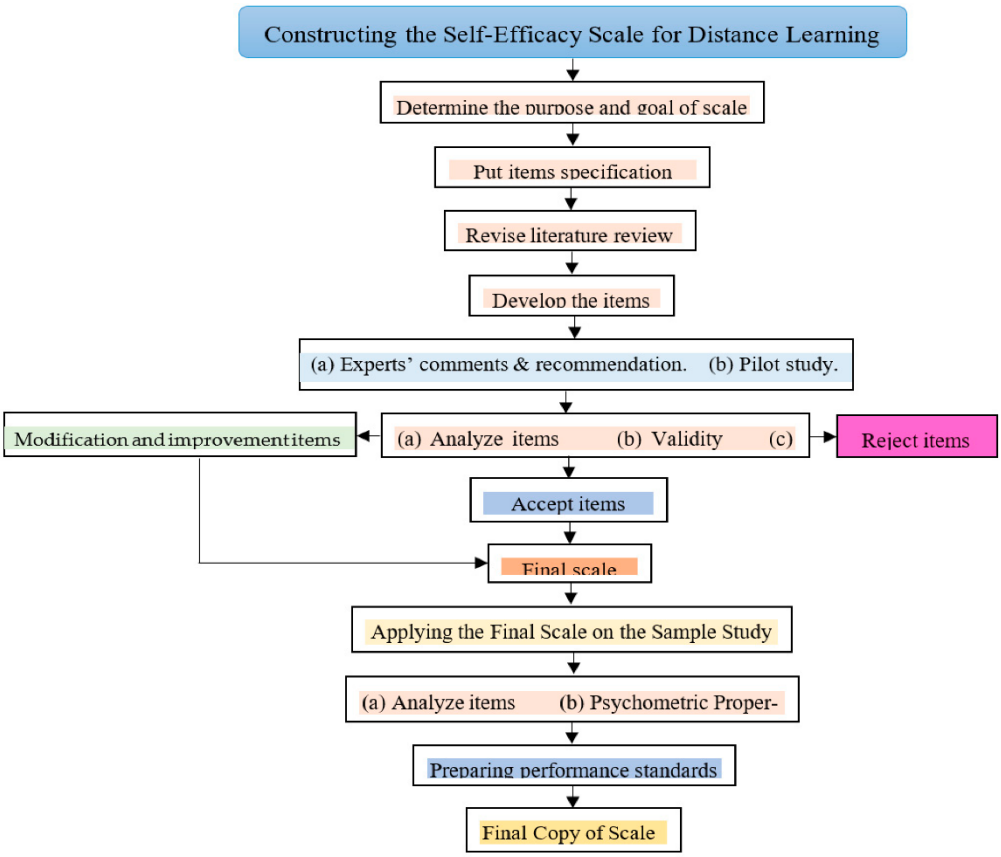

Fig.1 Self-Efficacy, Source:1

INTRODUCTION

The 21st century has witnessed an unprecedented integration of digital technology into virtually every facet of daily life, particularly in education. From online lectures and digital textbooks to collaborative platforms and social media, students navigate a digital landscape that offers both opportunities and challenges. On one hand, digital tools can enrich learning by providing instant access to information, facilitating collaboration, and accommodating diverse learning styles. On the other hand, excessive or maladaptive digital behaviors—here referred to as digital dependency—may undermine students' ability to focus, self-regulate, and maintain confidence in their academic abilities.

Academic self-efficacy, a central construct in Bandura's social cognitive theory, reflects students' beliefs in their capacity to exert control over their academic tasks. High self-efficacy is associated with greater motivation, persistence, and ultimately, higher achievement. Conversely, low self-efficacy can lead to avoidance behaviors, anxiety, and poorer outcomes. Given the potential for digital environments to both support and hinder learning processes, understanding how digital dependency relates to academic self-efficacy is critical for educators, policymakers, and learners themselves.

Fig.2 Self-Regulation, Source:2

This manuscript investigates (1) the prevalence and dimensions of digital dependency among undergraduates, (2) the relationship between digital dependency and academic self-efficacy, and (3) the educational implications of these findings. By examining specific patterns of digital use—such as informational versus social or entertainment uses—and their associations with self-efficacy beliefs, this study aims to inform targeted interventions that enhance beneficial digital practices while mitigating negative effects.

LITERATURE REVIEW

Digital Dependency: Definitions and Dimensions

Digital dependency encompasses a spectrum of behaviors, from frequent but purposeful technology use to compulsive engagement that interferes with daily life. Scholars distinguish among subtypes including informational dependency (seeking academic or news content), social dependency (compulsive social media checking), and entertainment dependency (excessive gaming or streaming). Excessive digital dependency has been linked to attention deficits, procrastination, and diminished well-being.

– Informational Dependency

Students who rely on digital resources for research and learning often report enhanced access to diverse materials, which can support critical thinking and problem-solving. However, overreliance on quick online searches may impede deep learning and reduce time spent engaging with complex texts.

– **Social Dependency**

Social media platforms foster peer support and collaborative learning opportunities but also distract from academic tasks. Compulsive social media use correlates with fragmented attention and decreased study time, potentially eroding students' confidence in managing academic workloads.

– **Entertainment Dependency**

Digital entertainment, including gaming and video streaming, can provide stress relief but may become maladaptive when it encroaches on study schedules. Habitual entertainment use is associated with lower academic engagement and increased academic anxiety.

Academic Self-Efficacy: Conceptual Foundations

Originating from Bandura's social cognitive framework, academic self-efficacy influences choice of activities, effort expenditure, persistence in the face of challenges, and resilience to setbacks. Sources of self-efficacy include mastery experiences, vicarious experiences through peer modeling, social persuasion via feedback, and physiological states.

Numerous studies highlight the link between self-efficacy and academic performance across disciplines: science, mathematics, writing, and language learning. Interventions that strengthen self-efficacy—through goal-setting, feedback, and structured mastery experiences—show improvements in grades, retention, and well-being.

Intersection of Digital Use and Self-Efficacy

Emerging research suggests digital literacy and self-regulation mediate the relationship between technology use and academic outcomes. Students with high digital literacy can leverage technology effectively, enhancing self-efficacy. Conversely, those lacking self-regulation skills may experience digital overload, leading to reduced confidence.

– **Positive Pathways**

Structured online courses and academic apps can scaffold learning and provide timely feedback, thereby reinforcing mastery experiences and boosting self-efficacy.

– **Negative Pathways**

Multitasking with digital devices often lowers retention and increases cognitive load, undermining students' beliefs in their academic competence. The fear of missing out (FOMO) on social media can exacerbate anxiety, further diminishing self-efficacy.

Gaps in Current Research

While prior studies have examined digital distraction and self-regulation, fewer have explicitly linked multi-dimensional digital dependency profiles to academic self-efficacy. Additionally, research often focuses on high school or general populations; there is a need for targeted studies among undergraduates navigating rigorous academic demands.

Educational Implications

Based on the literature and our forthcoming empirical findings, the following educational implications emerge:

1. **Integrate Digital Literacy Training**
   Institutions should offer workshops that cultivate critical evaluation of online sources, effective search strategies, and discernment between academic and non-academic digital content. By equipping students with digital literacy, educators can foster informational dependency patterns that support self-efficacy.

2. **Embed Self-Regulation Strategies**
   Curriculum design should incorporate modules on time management, goal-setting, and mindfulness to counteract compulsive digital behaviors. Teaching students to set clear boundaries—such as designated device-free study periods—can reduce distractions and bolster their confidence in maintaining focus.

3. **Leverage Academic Technology Mindfully**
   Use learning management systems and academic apps that provide structured feedback and track progress. Features like automated quizzes, progress dashboards, and peer forums can enhance mastery experiences, reinforcing self-efficacy.

4. **Promote Social Support via Technology**
   Foster online study groups and mentoring networks that use collaboration platforms. Positive peer modeling and social persuasion in such communities can boost self-efficacy, provided they are managed to minimize off-topic digital dependency.

5. **Monitor and Intervene Early**
   Early identification of students exhibiting high social or entertainment dependency can trigger counseling or guided intervention. Institutions could implement brief screening tools at the start of terms to flag students who may benefit from digital well-being resources.

METHODOLOGY

Research Design

A cross-sectional, descriptive-correlational design was employed to examine associations between digital dependency dimensions and academic self-efficacy among undergraduates.

Participants

The sample comprised 350 undergraduate students (aged 18–22) from a large urban university in India. Gender representation was balanced (52% female, 48% male), and participants spanned various disciplines (humanities, sciences, engineering, and commerce).

Instruments

1. **Digital Dependency Scale (DDS)**
   A 30-item questionnaire assessing three subscales: informational dependency (10 items), social dependency (10 items), and entertainment dependency (10 items). Responses were rated on a 5-point Likert scale (1 = "Strongly Disagree" to 5 = "Strongly Agree"). Higher scores indicate greater dependency.
2. **Academic Self-Efficacy Scale (ASES)**
   A 24-item scale measuring confidence in academic tasks (e.g., time management, understanding complex materials, completing assignments) on a 7-point Likert scale (1 = "Not at all confident" to 7 = "Very confident").
3. **Demographic Questionnaire**
   Collected age, gender, discipline, and average daily screen time.

Procedure

Data collection occurred online over four weeks. Participants received an email invitation with consent information and survey links. Completion time averaged 20 minutes. Ethical approval was secured from the university Institutional Review Board, and data confidentiality was maintained.

Data Analysis

Data were analyzed using SPSS v25. Descriptive statistics characterized digital dependency and self-efficacy scores. Pearson correlation coefficients assessed relationships among subscales. Multiple regression analyses evaluated the predictive power of digital dependency dimensions on academic self-efficacy, controlling for screen time and demographic variables. Statistical significance was set at $p < .05$.

RESULTS

Descriptive Statistics

- **Digital Dependency**
  - Informational dependency: M = 3.8, SD = 0.6
  - Social dependency: M = 3.2, SD = 0.8
  - Entertainment dependency: M = 3.5, SD = 0.7
- **Academic Self-Efficacy**
  - Overall ASES score: M = 5.1, SD = 0.9

Average daily screen time was 6.2 hours (SD = 1.8).

Correlational Findings

- Informational dependency positively correlated with academic self-efficacy ($r = .24$, $p < .001$).
- Social dependency negatively correlated with self-efficacy ($r = –.31$, $p < .001$).
- Entertainment dependency exhibited a modest negative correlation ($r = –.18$, $p = .02$).

Regression Analysis

A hierarchical multiple regression was conducted:

1. **Step 1**: Demographics and screen time entered; accounted for 8% of variance in self-efficacy ($F(3,346) = 10.03$, $p < .001$).
2. **Step 2**: Three digital dependency subscales added; model explained 28% of variance ($\Delta R^2 = .20$, $F(6,343) = 21.34$, $p < .001$).

In the final model:

- Informational dependency ($\beta = .18$, $p = .002$) significantly predicted higher self-efficacy.
- Social dependency ($\beta = –.29$, $p < .001$) was the strongest negative predictor.
- Entertainment dependency ($\beta = –.11$, $p = .04$) remained a significant negative predictor.
- Screen time had no independent effect when digital dependency was accounted for ($\beta = –.04$, $p = .30$).

Additional Analyses

Post hoc subgroup analyses indicated that engineering students reported higher informational dependency and self-efficacy than humanities students, though the pattern of relationships remained consistent across disciplines.

CONCLUSION

This study elucidates a complex, multifaceted relationship between digital dependency and academic self-efficacy, offering both theoretical and practical contributions. Our findings demonstrate that informational dependency—characterized by deliberate, goal-oriented use of digital technologies—serves as a catalyst for enhanced self-efficacy, empowering students with efficient access to resources, interactive learning platforms, and immediate feedback mechanisms that reinforce mastery experiences. Conversely, social dependency (compulsive social media use) and entertainment dependency (excessive gaming and streaming) emerged as significant inhibitors of academic self-efficacy, undermining students' confidence through increased distraction, disrupted study routines, and heightened anxiety.

These insights carry important implications for educational practice. First, integrating structured digital literacy programs into curricula can equip students with the skills to discern between productive and counterproductive online behaviors. Second, embedding self-regulation strategies—such as goal setting, mindfulness exercises, and time-management workshops—can help students establish healthy digital boundaries and reduce compulsive behaviors. Third, leveraging academic technologies (e.g., adaptive learning systems, progress-tracking dashboards, and peer collaboration platforms) in a guided manner can maximize the positive benefits of digital tools while minimizing their potential to distract.

Moreover, institutions should consider implementing early-warning systems that flag high levels of social and entertainment dependency, enabling timely interventions such as counseling or peer-mentoring. Future research would benefit from longitudinal designs to ascertain causal relationships and from experimental studies testing the efficacy of targeted digital-wellness interventions. Additionally, exploring cultural and disciplinary differences in digital dependency patterns could refine personalized strategies for diverse student populations.

In sum, our work highlights that not all digital engagement is equal: it is the intent and context of technology use that determine its impact on students' academic self-beliefs. By promoting balanced and mindful digital practices, educators can strengthen academic self-efficacy, thereby fostering persistence, motivation, and academic success in an increasingly digitalized learning environment.

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