THE IMPACT OF TECHNOLOGY ON EDUCATION AND THE DEVELOPMENT OF EDUCATIONAL METHODS

O IMPACTO DA TECNOLOGIA NA EDUCAÇÃO E O DESENVOLVIMENTO DE MÉTODOS EDUCACIONAIS

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ABSTRACT

The surge in Internet-connected mobile devices and media availability has heightened students' fascination with technology. This has prompted considerable attention from the research community toward understanding the correlation between media/technology usage and academic performance, along with metrics such as student engagement and self-initiated learning. Improving students' self-regulation abilities is preferable to prohibiting or restricting technology use if lack of self-control and technology-enabled multitasking behavior are indicators of academic achievement. Additionally, a specific sort of media and technology has been the focus of the majority of studies in literature. The precise influence of diverse media types on academic success remains ambiguous, necessitating further investigation into the impact of various media consumption and technological practices on academic achievement. This quantitative research endeavors to scrutinize the correlation between academic success and the utilization of media and technology among university students. Additionally, it seeks to delve into the association between student engagement, self-directed learning, and their consequential impact.

Keywords: Self Directed Learning, Education, Work Engagement, Academic Performance.

RESUMO

O aumento dos dispositivos móveis conectados à Internet e da disponibilidade de mídia aumentou o fascínio dos estudantes pela tecnologia. Isto despertou uma atenção considerável da comunidade de investigação para a compreensão da correlação entre a utilização de meios de comunicação/tecnologia e o desempenho académico, juntamente com métricas como o envolvimento dos alunos e a aprendizagem auto-iniciada. Melhorar as capacidades de autorregulação dos alunos é preferível a proibir ou restringir o uso da tecnologia se a falta de autocontrole e o comportamento multitarefa possibilitado pela tecnologia forem indicadores de desempenho acadêmico. Além disso, um tipo específico de mídia e tecnologia tem sido o foco da maioria dos estudos na literatura. A influência precisa dos diversos tipos de meios de comunicação no sucesso académico permanece ambígua, sendo necessária uma investigação mais aprofundada sobre o impacto do consumo de vários meios de comunicação e das práticas tecnológicas no desempenho académico. Esta pesquisa quantitativa procura examinar a correlação entre o sucesso

acadêmico e a utilização de mídia e tecnologia entre estudantes universitários. Além disso, procura aprofundar a associação entre o envolvimento dos alunos, a aprendizagem autodirigida e o seu impacto consequente.

Palavras-chave: Aprendizagem Autodirigida, Educação, Engajamento no trabalho, Performance acadêmica.

Introduction

At the core of the United Nations' sustainable development agenda for 2030 lies the pivotal objective of ensuring quality education for all, and promoting inclusivity and equity. Digital technologies have become essential in promoting sustainable social well-being, with education playing a vital role in this endeavor. Information technology has greatly facilitated the dissemination of collective knowledge, acting as a catalyst for educational advancements. Integrating innovative technology-based learning tools, such as mobile devices, smartboards, MOOCs (Massive Open Online Courses), tablets, laptops, simulations, dynamic visualizations, and virtual laboratories, provides a robust framework for globally accessible and high-quality learning experiences (JAVAID, 2020: DREIMANE, 2020: SEALE, 221). Educational technology companies persistently strive to develop innovative solutions to broaden educational access, particularly for individuals lacking adequate facilities. As a learning tool, social media has evolved significantly (REIMANE, 2020). Beyond their capacity to facilitate information dissemination anytime and anywhere, social media platforms offer exceptional networking opportunities for fostering social interactions and potentially discovering new career prospects (ARAÚJO, 2021: BÜYÜKBAYKAL, 2015).

Conventional classroom methods often lack immediacy in learning environments, swift evaluations, and sustained engagement, shortcomings effectively addressed by digital learning tools and technology. The unparalleled efficiencies offered by these technologies surpass traditional methodologies. As smartphones and wireless devices gain widespread popularity, integrating technology into classroom settings becomes a logical step for schools and educational institutions. The adaptability and unobtrusive nature of contemporary

technology significantly enhance learning experiences for the upcoming generation. Yet, initial implementation may pose a challenge (VAKALIUK, 2021: CAVAS, 2009). Implementing an online classroom calendar displaying schedules for classes, assignments, field trips, speaker events, exams, and breaks would facilitate better student planning (BILETSKA, 2021: DUDAR, 2021).

Digital technologies wield a profound influence on agricultural practices, poised to revolutionize farming methodologies in developed nations by reducing reliance on pesticides and significantly optimizing water usage. The COVID-19 pandemic, alongside concepts of lockdown and quarantine, has permeated global consciousness, signaling the havoc caused by the coronavirus outbreak. During this crisis period, digital technologies have been instrumental in upholding the educational system and facilitating remote learning for students from their residences (KOSARETSKY, 2022: KOSTOPOULOS, 2022). The incorporation of technology within education provides students with a heightened and immersive learning encounter, fostering continuous interest in subjects without disruptions. Incorporating projectors, computers, and advanced technical equipment into classrooms has the potential to infuse learning with fascination and entertainment for students. Through tasks integrating technology resources, oral presentations, and group engagement, classroom learning can evolve to become more dynamic and interactive, transcending beyond traditional verbal communication (GURUNATH, 2022: NKOMO, 2021: BILOTTA, 2021: CAMILLERI, 2022). The adoption of digital learning offers multifaceted benefits, ranging from reducing environmental impact by minimizing paper usage to enhancing research efficiency, thereby cutting costs and maximizing resource utilization. This approach not only fosters sustainability but also extends the reach and impact for both educators and learners. As technology becomes omnipresent in modern society, the ongoing digital revolution has permeated the educational landscape, swiftly revolutionizing the learning process. This transformation is anticipated to make education more cost-effective and accessible, significantly altering the educational paradigm.

Need for Digital Technologies in Education

The rising worldwide development of schooling has highlighted the vital significance of advanced innovations in working with online stages for leading classes, sharing assets, directing evaluations, and overseeing scholastic foundations extensively. At first, there was a proactive reception of these stages, yet the Coronavirus pandemic sped up the progress to web-based showing techniques, fundamentally helping exceptionally created countries. However, this shift also presented significant challenges for developing countries, which faced obstacles in effectively implementing and accessing digital education resources. This global crisis emphasizes the urgency of international integration within education systems, with digital technologies instrumental in nurturing critical skills essential for professional competence, including problem-solving, structured thinking, and adeptness with processes, preparing students for an increasingly unpredictable future reliant on technology. Educational resources and digital tools significantly enhance classroom dynamics, making the teaching-learning process more engaging and adaptable. Moreover, they grant educational institutions greater flexibility to tailor curricula based on individual student needs.

Incorporating technology into the classroom setting holds the potential to significantly enhance children's engagement in learning processes. Given the familiarity of youngsters with electronic gadgets, integrating technology undoubtedly aids in capturing their interest and boosting their participation levels. The utilization of projectors, computers, and advanced technical tools fosters a captivating and entertaining learning environment, encouraging dynamic engagement among students.

Usage of Technology, Self-Directed Learning and Student Engagement

Due to students' extensive use of technology in many spheres, higher education institutions have integrated technology into their infrastructure and instruction. Technology presents students with a variety of tools that are quite useful. They may use these tools to exchange notes, participate in various discussion forums, and access a variety of other resources that aid in a thorough understanding

of a subject topic. Students are in constant contact with one another and with the faculty as a result of these technologies. When kids are willing to work hard in their academics, there is student involvement. Self-directed learning is the capacity to decide what to study, when to study it, and how long to study it.

Problem Statement & Objectives

The results of past studies are similar. An examination of the literature reveals that there is a substantial and ongoing interest among researchers in analyzing the use of technology as well as its outcomes and impacts on student academic attainment. The literature makes it clear that the outcomes are ambiguous and inconsistent. While reviewing the literature, various gaps were discovered. Regarding the effects of technology use on self-directed learning, there is a dearth of empirical data. While there is plenty of concentrates on understudy support in the homeroom and understudy commitment with mechanical devices, little has been finished on how the two connect. Research has been done on the use of a single or a few technologies, but not on the use of a diversity of technologies. Today's students are surrounded by a multitude of technologies, and they have access to these technologies whenever and wherever they want, thanks to contemporary technology like smartphones. This study aims to explore the correlation between technology usage and academic performance. Alongside this association, the research also scrutinized two other pertinent and interconnected variables.

Proposed System

A research design is the conceptual framework for the study that a researcher is considering. It helps give the research direction and gives the researcher guidance when collecting data. As a result, the phase that follows the formulation of the hypotheses is considered to be of utmost importance. It lays out in great detail how the acquired data will be used to test the hypothesis. Below is a summary of the research design in its entirety, as seen in Table 1. Management students from the Island were potential respondents for this study. The researcher has contacted numerous management colleges on the Island, including but not limited to St.

Xavier's College, Jagan Institutes of Management Studies, and International School of Informatics and Management Technical Campus (IIIM). A pilot study using a 60-person sample has been conducted. The main study's sample size was 343 respondents. Both a field visit and an online survey were used to collect data.

Sample and Data Collection

Management students from the Island served as the study's respondents. The sampling method used was a straightforward random sampling method. With this method, each population item has an equal chance and likelihood of being chosen for the sample. The choice is solely based on chance or probability. As a result, it is also referred to as the "technique of chances." The list of students provided by various departments of management colleges and institutes was used to create a sample frame, which was then used to collect the sample for the current study. Each name on the list is given a number. Finally, a sample frame was created by selecting random numbers.

Table 1 – Sources of Data Collection

Particulars	Total Collection of Data	Out of collected Data- Data used for analysis
Online Survey	243	240
Field visiting	100	100
Total	343	340

Source: Authors results.

Out of the total responses gathered, some were incomplete. The average values for the missed responses were used to ensure bias-free research. The data was prepared for statistical analysis after managing the missing data. Even though missing data were dealt with, certain responses could not be used in statistical analysis because they were irreverent and produced a significant outlier. As a result, only 340 of the 343 responses were used for the main study.

Data Analysis Tools

The full description of each of the four statistical techniques is provided below.

Descriptive Statistics

It helps provide succinct summaries of the samples. They act as the basis for all types of quantitative data analysis. In other words, it only discusses the accuracy of the data or its implications. It expertly separates a lot of data. In descriptive statistics, central tendency measures like the mean, median, and mode are frequently utilized. In descriptive statistics, metrics that measure central tendency, variability, or dispersion are used. However, when quantifying variability, the key issue is the data's dispersion. Measuring central tendency favors, the median or average values of data sets.

Multiple Linear Regressions

It gives experiences into the degree to which the reliant variable is affected by the autonomous factors and decides the meaning of these impacts. Be that as it may, before applying various direct relapses, a few presumptions should be fulfilled. A direct relationship, right off the bat, ought to exist between the free and subordinate factors. Furthermore, the reliant variable ought to be estimated on a ceaseless scale, like a proportion or span, to guarantee similarity with the relapse model. Additionally, the predictor variables should have measurement units that fall into the categories of ordinal, interval, or ratio scales. Lastly, the number of observations or replies should exceed the number of predictor variables being examined to ensure statistical robustness. Adhering to these assumptions is crucial for the accurate and reliable interpretation of the results obtained from multiple linear regression analysis. By verifying the aforementioned premises, it was possible to determine the relationship between independent variables.

Conceptual Framework with Hypothesis

Based on a comprehensive review of previous literature, the study's objectives, and preliminary pilot investigations, various variables of interest have been identified, culminating in the formulation of several hypotheses:

Hypothesis 1 suggests a noteworthy association between Information and Communication Technology (ICT) usage and student engagement, whereas the null hypothesis indicates no such substantial relationship. Hypothesis 2 posits a significant correlation between ICT utilization and Self-Directed Learning (SDL), in contrast to the null hypothesis indicating no significant link. Similarly, Hypothesis 3 suggests a notable association between ICT usage and academic performance, while the null hypothesis opposes any significant relationship. Hypothesis 4 posits that there is a significant relationship between student engagement and self-directed learning (SDL), whereas the null hypothesis assumes no substantial connection between the two. Hypothesis 5 proposes a significant correlation between SDL and academic performance, contradicting the null hypothesis, which suggests no noteworthy relationship. Moreover, Speculation 6 proposes a huge relationship between the utilization of data and correspondence innovation (ICT) and SDL, intervened by understudy commitment, while the invalid theory contends against any critical relationship. At long last, Speculation 7 proposes a critical connection between ICT use and scholastic execution, intervened by SDL, while the invalid speculation questions any huge relationship between ICT use and scholarly execution through SDL. These hypotheses provide a framework for investigating the potential interplay between student engagement, SDL, ICT use, and academic performance, shedding light on the complex relationships within the educational context.

Conceptual Framework

The use of ICT in education has increased significantly as education has become more widely available to people around the world. It is reported that the availability of ICT-enabled tools has improved self-directed learning. A thorough review of the literature revealed that online education, easier access to technology,

individualized learning possibilities, and new information sources have all changed the environment for self-directed learning. The primary aim of this study is to explore the utilization and influence of Information and Communication Technologies (ICT) on the academic performance of post-graduate MBA students. This investigation encompasses the examination of Academic Achievement (AP), Self-Directed Learning (SDL), and Student Engagement (SE) as dependent variables. Academic performance, and subsequently scrutinizing the correlations between these variables, a conceptual framework has been formulated. This framework draws upon an extensive review of literature in the field.

Figure 1 – Conceptual Model to Predict the Relationships
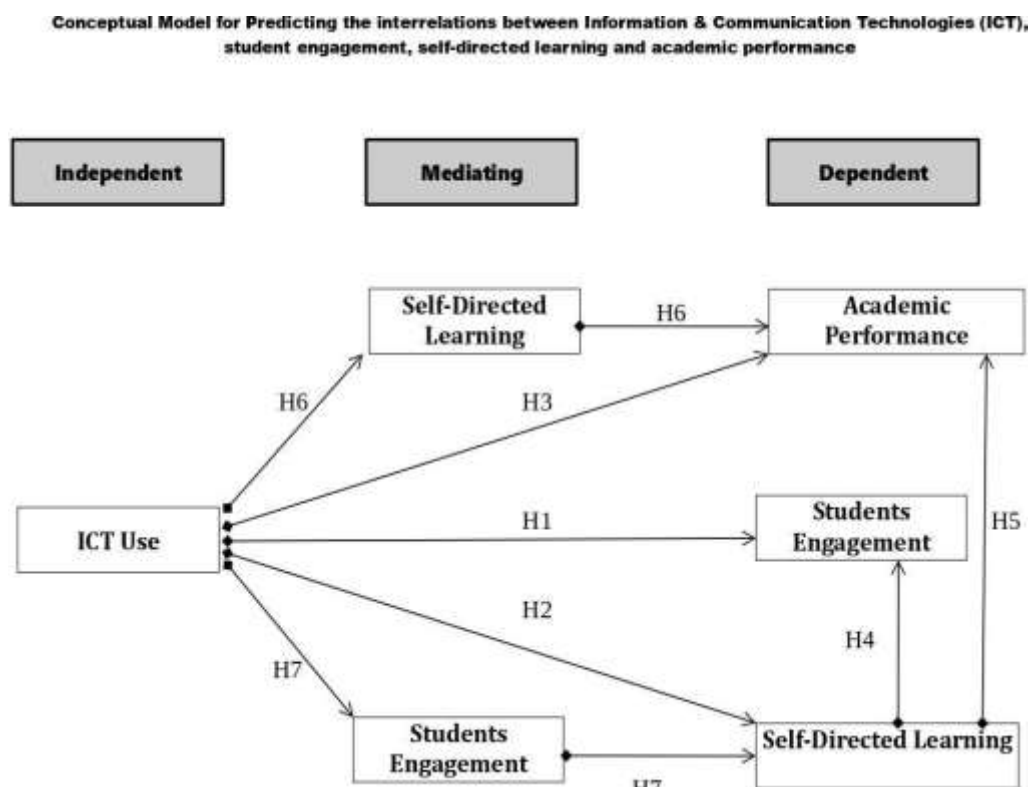
Source: Authors results.

Theoretical concepts strongly support the intricate connections between Information and Communication Technologies (ICT) as a free factor and its associations with understudy commitment, independent learning (SDL), and scholastic accomplishments, laying out the basic system of the hypothetical model proposed. Based on these concepts, study hypotheses (H1, H2, and H3) have been

formulated, with ICT serving as the independent variable and student engagement, SDL, and academic success as dependent variables. This research model aims to explore the direct relationship between student engagement and SDL behavior, seeking a deeper understanding of their association and implications for academic performance and achievement. The model's hypothesis (H5) is reflected by the presumption that SDL and academic achievement are strongly correlated. Additionally, it is thought that student engagement and learning (SDL) have an impact on students' general academic performance and achievement.

Information & Communication Technology (ICT)

Information technology (IT) is referred to as ICT, and its definition is rather broader. ICT is frequently used to refer to the fusion of many communication-related technologies. All such convergent technologies, such as the merging of telephone, Internet, and audiovisual networks (ISPs), exemplify ICT. In the context of the present study, Information and Communication Innovation (ICT) is characterized as an exhaustive correspondence framework incorporating different advances, including the web, remote organizations, telephones, PCs, programming, middleware, videoconferencing, person-to-person communication stages, and different media applications and administrations. By employing ICT, users can leverage the capabilities of these technologies to enhance communication, collaboration, and information management in various contexts, thereby influencing their engagement, learning, and academic outcomes.

Self-Directed Learning

Self-directed learning is the skill of a person or a learning approach that enables learners to take control of their learning process. Self-directed learners typically diagnose their own learning needs, select their learning objectives, devise their learning strategies, and evaluate their learning performances and outcomes. This is described as a model that demonstrates how individuals take ownership and initiative to establish their objectives and plans of action to achieve their learning requirements. By using their teaching or learning techniques, the students take the

initiative to tutor themselves. The possibility that adult learners can self-direct their learning is increased by this style of learning, which is made up of a variety of characteristics, values, and interests
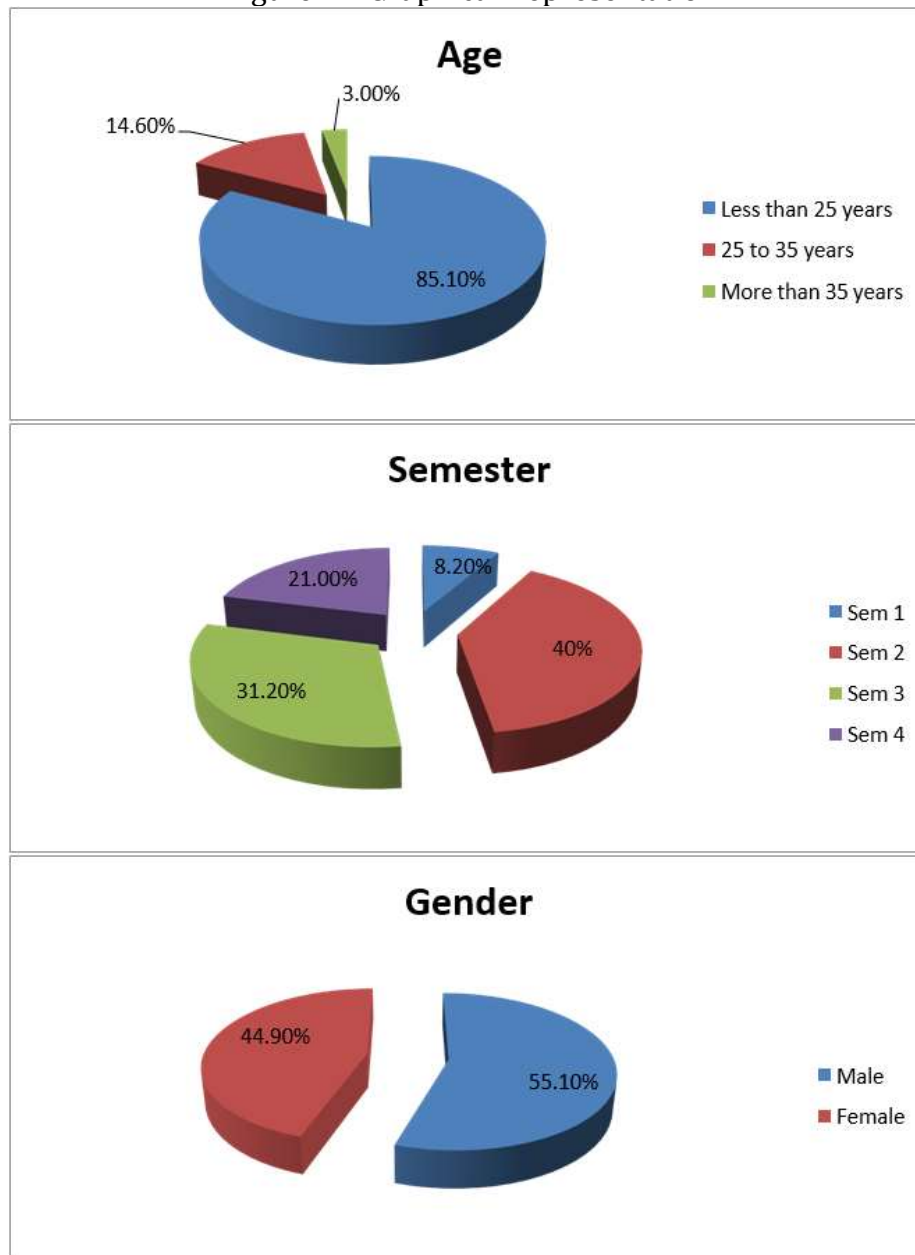
Results

The hypothesis was put to the test using multiple linear regression analysis and Pearson correlation. The results indicate that a few presumptions must be verified before running the aforementioned statistical test, and the results indicate that these assumptions were satisfied. The sample for a study was created using a simple random sampling procedure. Participants were studying for an MBA or another type of professional degree in management at business schools on the Island. During the autumn semester of 2019–2020, data were collected using both a paper-based approach and a Google. 343 management students make up the total sample size of the current study. Information on the participants' demographics may be found in Table 2. Male students made up the bulk of survey respondents (n = 189, 55.1%), while female students made up the remaining participants (n = 154, 44.9%). Students under the age of 25 make up the bulk of the student body (n = 292, or 85.1%), followed by those between the ages of 25 and 35 (n = 50, or 14.6%). The bulk of students (n = 136, or 39.7%), followed by the third semester (n = 107, or 31.2%), come from the second semester. The remaining students are from the first and fourth semesters, respectively (n = 28, 8.2 percent, and n = 72, 21.0 percent).

Table 2 – Distribution of participants by gender, age, and semester of study

Variable	Frequency	Percentage
Gender		
Male	189	55.1
Female	154	44.9
Age Range		
25 years or less	292	85.1
Age range between 25 to 35 years	50	14.6
35 years or more	1	.3
Semester		
I	28	8.2
II	136	39.7
III	107	31.2
IV	72	21.0
Total	343	100.0

Source: Authors results.

Figure 2 – Graphical Representation

Source: Authors results.

The details regarding the average daily computer and Internet usage of the participants are presented in Tables 3 and 4, respectively. Table 3 shows that students spend a variety of amounts of time online and using computers daily. The majority of participants (n = 108, 31.5%) claimed to use computers on average for 5.0 to 6.0 hours each day. The following group of students uses computers between 0.5 and 1.5 hours per day (n = 74, 21.6%), 2.0 to 3.0 hours per day (n = 65, 19.0%),

6.5 hours or more per day (n = 43, 12.5%), and 3.5 to 4.5 hours per day (n = 31, 9.0%). Only 22 out of the total participants, or 6.4%, do not use computers.

Table 3 – Average Daily Usage of Computers

Variable	Time Interval	Frequency	Percentage
Average time per day spent on a computer	0.5 – 1.5	74	21.6
	2.0 – 3.0	65	19.0
	3.5 – 4.5	31	9.0
	5.0 – 6.0	108	31.5
	6.5 and above	43	12.5
	NA or Other	22	6.4
	Total	**343**	**100**

Source: Authors results.

Figure 3 – Graphical Representation of table 3
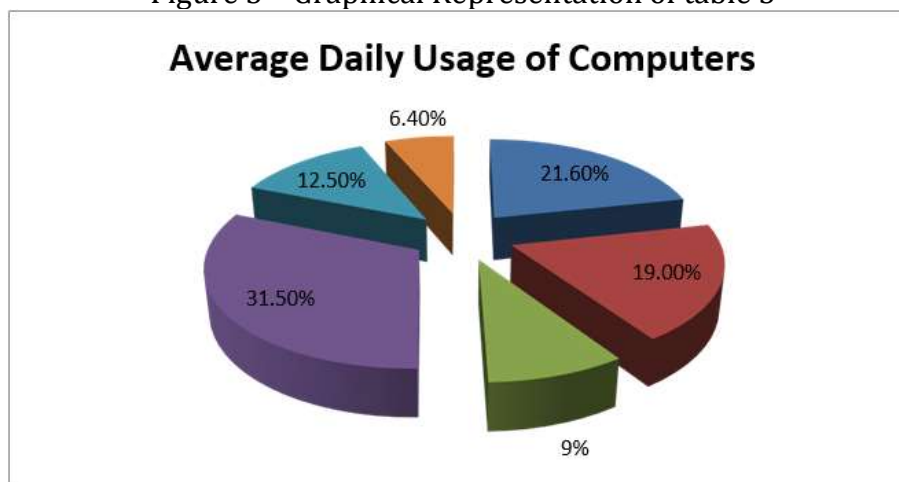
Source: Authors results.

Table 4 provides details on typical daily Internet usage. Table 4 shows that the majority of respondents (n = 141, 41.1%) use the internet for 6.5 hours or more every day, with the next-highest percentage (n = 114, 33.2%) using it for 5 to 6 hours every day. The remaining students (n = 88, 25.7%) spend two to three hours every day online on average.

Table 4 – Average Daily usage of the Internet

Factors	Duration	Repetition or Frequency	% age
Usage of the Internet on a daily basis	2-3 hour	88	25.7
	5 – 6 hours	114	33.2
	6.5 or more	141	41.1
	Total	**343**	**100**

Source: Authors results.

Discussion

The current review investigated the connections between innovation use, understudy commitment, independent learning (SDL), and scholastic accomplishment among undergrad college understudies. The discoveries demonstrated that while there is a powerless by and large connection between innovation use and scholarly execution, it fills in as an indicator of both understudy contribution and independent learning. This suggests that technology use plays a role in facilitating student engagement and fostering self-directed learning behaviors. Although the impact on academic performance may be limited, the study highlights the importance of technology in promoting active student participation and independent learning strategies. These findings contribute to the understanding of the complex dynamics between technology use, student engagement, SDL, and academic success in the context of undergraduate education. However, a review of the technology use sub-sets reveals that while Facebook friends, social media use, and media sharing were all favorable predictors of academic success, making phone calls and watching TV were bad predictors. These results are consistent with studies showing a beneficial correlation between technology use and student engagement. Findings from the study reveal a reciprocal association between technology use and academic performance. Although the general utilization of technology showcases a negative yet statistically insignificant connection with academic achievement, notable positive correlations have surfaced

concerning certain specific types of technology, such as social media use. Table 5, which is displayed below, offers descriptive information on the students' involvement and self-directed learning, as well as their usage of various media and technology.

Table 5 – Levels of media and innovation use, understudy contribution, independent learning, and scholarly accomplishment among understudies enlightening insights

Variable	M	S. D
Academic achievement	1.76	.492
MTUAS	6.32	1.07
Surfing of Internet	6.57	1.45
Sharing Media files	5.72	2.09
Usage of Smartphone	6.95	1.50
Messaging through Mail	6.69	1.29
Playing video games	5.10	2.43
Social media usage	5.98	1.87
SELF-DIRECTED LEARNING	2.10	.50
Perception	10.39	2.88
Activities for Learning	8.4	2.42
Assessment	10.52	3.22
STUDENT ENGAGEMENT	3.46	.70

Source: Authors results.

Following the conceptual framework outlined for this study, hypotheses were formulated to examine the correlations between variables. The results of the hypothesis testing are summarized as follows:

The review's speculations intended to analyze the connections between ICT use, understudy commitment, independent learning (SDL), and scholarly execution. The discoveries uncovered a few significant affiliations. First and foremost, a barely critical negative connection was found between ICT use and understudy commitment (r = - .146**, p < .01). Secondly, a negligible negative relationship was observed between ICT use and SDL (-.045). Additionally, a weak negative correlation was identified between technology use and academic performance. Furthermore, the investigation into student engagement and SDL indicated a significant negative association (r = -.264**, p < .01). On the other hand, a significant positive correlation was observed between SDL and academic achievement (r = .132*, p < .05). However, the hypothesized relationships between ICT use, SDL, and academic performance mediated by student engagement were not supported by the data (*Reference X*). These findings provide valuable insights into the complex interplay between ICT use, student engagement, SDL, and academic outcomes, highlighting the need for further exploration and understanding of these relationships in educational settings. Nonetheless, strong connections were evident between SDL's learning methodologies and academic performance (r=.132, p<.05), along with the intensity of engagement (r=.129, p<.05).

Conclusion

The purpose of the current study was to investigate the association between technology use and academic success, self-directed learning (SDL), and student involvement among management students in the Island. To make sure there would be no issues using the data's high quality for analysis, the validity and dependability of the data were evaluated before doing any statistical test. The following is a list of some of the study's key conclusions. In light of this study, educators should focus more on the effective application of technology in the classroom. Three separate

multiple regression analyses were conducted to examine this hypothesis, revealing that technology use significantly forecasted academic achievement, autonomous learning, and engagement. The study's implications suggest the necessity for experimental validation of a technology use model before its implementation in pedagogical approaches and academic settings. This proactive approach not only mitigates unfavorable outcomes but also contributes. Prior research underscores the notion that while technology integrations may have a confined impact on enhancing student engagement, the incorporation of technology in academics and the learning process fosters students' knowledge acquisition, cultivates active and engaged learning, and concurrently encourages a greater sense of responsibility toward their education.

REFERENCES

ARAÚJO, A. C. D., KNIJNIK, J., & OVENS, A. P. How does physical education and health respond to the growing influence in media and digital technologies? An analysis of curriculum in Brazil, Australia and New Zealand. **Journal of Curriculum Studies**, 53(4), 563-577, 2021.

BILETSKA, I. O., PALADIEVA, A. F., AVCHINNIKOVA, H. D., & KAZAK, Y. Y. The use of modern technologies by foreign language teachers: developing digital skills. **Linguistics and Culture Review,** 5(S2), 16-27, 2021.

BILOTTA, E., BERTACCHINI, F., GABRIELE, L., GIGLIO, S., PANTANO, P. S., & ROMITA, T. Industry 4.0 technologies in tourism education: Nurturing students to think with technology. **Journal of Hospitality, Leisure, Sport & Tourism Education**, 29, 100275, 2021.

BÜYÜKBAYKAL, C.I. Communication technologies and education in the information age, **Procedia-Social and Behavioral Sciences** 174, 636–640, 2015.

CAMILLERI, M. A., & CAMILLERI, A. C. The acceptance of learning management systems and video conferencing technologies: Lessons learned from COVID-19. **Technology, Knowledge and Learning,** 27(4), 1311-1333, 2022.

CAVAS, B., CAVAS, P., KARAOGLAN, B., & KISLA, T. A Study on Science Teachers' Attitudes Toward Information and Communications Technologies in

Education. **Online Submission,** 8(2), 2009.

DREIMANE, S., & UPENIEKS, R. Intersection of serious games and learning motivation for medical education: A literature review. **International Journal of Smart Education and Urban Society (IJSEUS),** 11(3), 42-51, 2020.

DUDAR, V. L., RIZNYK, V. V., KOTSUR, V. V., PECHENIZKA, S. S., & KOVTUN, O. A. Use of modern technologies and digital tools in the context of distance and mixed learning. **Linguistics and Culture Review**, 5(S2), 733-750, 2021.

GURUNATH, R., & SAMANTA, D. A novel approach for semantic web application in online education based on steganography. **International Journal of Web-Based Learning and Teaching Technologies (IJWLTT),** 17(4), 1-13, 2022.

JAVAID, M., HALEEM, A., VAISHYA, R., BAHL, S., SUMAN, R., & VAISH, A. Industry 4.0 technologies and their applications in fighting COVID-19 pandemic. **Diabetes & Metabolic Syndrome: Clinical Research & Reviews**, 14(4), 419-422, 2020.

KOSARETSKY, S., ZAIR-BEK, S., KERSHA, Y., & ZVYAGINTSEV, R. General education in Russia during COVID-19: Readiness, policy response, and lessons learned. Primary and secondary education during Covid-19: **Disruptions to educational opportunity during a pandemic,** 227-261, 2022.

KOSTOPOULOS, G., & KOTSIANTIS, S. Exploiting semi-supervised learning in the education field: A critical survey. **Advances in Machine Learning/Deep Learning-based Technologies: Selected Papers in Honour of Professor Nikolaos G. Bourbakis**–Vol. 2, 79-94, 2022.

NKOMO, L. M., DANIEL, B. K., & BUTSON, R. J. Synthesis of student engagement with digital technologies: a systematic review of the literature. **International Journal of Educational Technology in Higher Education,** 18, 1-26, 2021.

SEALE, J., COLWELL, C., COUGHLAN, T., HEIMAN, T., KASPI-TSAHOR, D., & OLENIK-SHEMESH, D. 'Dreaming in colour': disabled higher education students' perspectives on improving design practices that would enable them to benefit from their use of technologies. **Education and Information Technologies**, 26, 1687-1719, 2021.

VAKALIUK, T. A., SPIRIN, O. M., LOBANCHYKOVA, N. M., MARTSEVA, L. A., NOVITSKA, I. V., & KONTSEDAILO, V. V. Features of distance learning of cloud technologies for the organization educational process in quarantine. In **Journal of physics: Conference series** (Vol. 1840, No. 1, p. 012051). IOP Publishing, 2021.