Diversitas Journal
ISSN 2525-5215
Volume 10, Number 3 (Jul../Sep.. 2025) p. 1135 – 1145
https://diversitasjournal.com.br/diversitas_journal

Computer Technologies for Teaching and Self-directed Learning: Opportunities, Problems, and Coping Mechanisms

LASCANO, Elizabeth A. (1); YANGO, Divina M. (2)

(1) 0000-0002-9527-2388; Benguet State University, Philippines. e.lascano@bsu.edu.ph
(2) 0000-0002-2156-402X; Benguet State University, Philippines. d.yango@bsu.edu.ph

A B S T R A C T

The demand in the use of computer technologies in education was amplified when pandemic struck the world. Despite the opportunities derived from the use of these technologies, problems encountered can hamper the effectiveness of instruction and self-directed learning. With this, there is a need to look into the opportunities, problems, and coping strategies experienced by teachers and students. Respondents include 69 faculty members and 414 college students enrolled in various degree programs in a State University in the Philippines. The study used descriptive survey and correlational research design. The study reveals that both teachers and students highly use computer technologies (hardware/software) that benefited them. Consequentially, both teachers and students acknowledged that computer technologies pose problems. There is no significant correlation between the opportunities and problems for students, however, significant to highly significant correlations were noted for teachers. Faculty and students use varied coping strategies in addressing problems encountered and is highly effective. Associated with this, there is a high extent of influence of factors in the coping strategies of respondents. Support from experts, availability and accessibility of technology resources as well as exposure to learning development activities are very essential support to faculty and students in effectively dealing with the challenges encountered.

RESUMO

A demanda pelo uso de tecnologias computacionais na educação foi amplificada quando a pandemia atingiu o mundo. Apesar das oportunidades derivadas do uso dessas tecnologias, os problemas encontrados podem prejudicar a eficácia da instrução e da aprendizagem autodirigida. Com isso, há uma necessidade de analisar as oportunidades, os problemas e as estratégias de enfrentamento vivenciadas por professores e alunos. Os entrevistados incluem 69 membros do corpo docente e 414 estudantes universitários matriculados em vários programas de graduação em uma universidade estadual nas Filipinas. O estudo utilizou um levantamento descritivo e um delineamento de pesquisa correlacional. O estudo revela que tanto professores quanto alunos usam intensamente tecnologias computacionais (hardware/software) que os beneficiaram. Consequentemente, tanto professores quanto alunos reconheceram que as tecnologias computacionais apresentam problemas. Não há correlação significativa entre as oportunidades e os problemas para os alunos, no entanto, correlações significativas a altamente significativas foram observadas para os professores. Professores e alunos usam estratégias de enfrentamento variadas para lidar com os problemas encontrados e são altamente eficazes. Associado a isso, há um alto grau de influência de fatores nas estratégias de enfrentamento dos entrevistados. O suporte de especialistas, a disponibilidade e acessibilidade de recursos tecnológicos, bem como a exposição a atividades de desenvolvimento de aprendizagem são suporte essencial para que professores e alunos lidem efetivamente com os desafios encontrados.

ARTICLE INFORMATION

Article process:
Submitted: 03/29/2025
Approved: 07/04/2025
Published: 08/15/2025

Keywords:
Computer Technologies, Teaching, Learning, Opportunities and Problems; Coping Strategies

Keywords:
Tecnologia computação; Ensino e aprendizagem; Oportunidades e problemas; Estratégias de enfrentamento

DOI: 10.48017/dj.v10i3.3388

Introduction

Every school aims for high-quality instruction, which aligns with the goal of Sustainable Development for "quality education. " Achieving quality education requires teamwork among all school stakeholders; it is not just the responsibility of teachers and administrators. Effective school support systems must function well, including human resource management, student services, and ICT infrastructure, which is especially important in today's digital world. UNESCO encourages digital innovation to widen access to education, improve learning quality, build lifelong learning paths, and enhance management systems while focusing on digital literacy for teachers and students. The effective use of technology can enhance learning for both teachers and students, including those with special needs, according to Roth (2020). However, if problems with technology are not managed properly, they can negatively affect teaching and learning.

Teachers can use computer technology to gain insights into how students learn, which helps them apply the best teaching strategies. Students are eager to use modern technology to improve their skills in and out of school (McGee, 2018). Computers help students explore subjects beyond textbooks, improving their math and comprehension skills and preparing them for future careers. While the benefits of using computers in education are clear, there is ongoing debate about their overall impact on student outcomes (Barroso, 2018).

Research has highlighted various challenges school administrators, teachers, and students face while using computer technologies, such as technical issues, instructional hurdles, and health concerns. For example, Junaidi et al. (2020) identified five challenges teachers face in using ICT in English learning, including lack of IT knowledge and resources. Similarly, Siddiquah et al. (2017) found that students often use computers for recreation rather than academics and faced issues like slow computers and internet problems. Other studies have noted that teachers possess a positive attitude toward ICT but struggle with a lack of resources and training.

During the pandemic, distance teaching posed challenges for many teachers, who reported experiencing medium to high levels of stress, as noted in a survey by Klapproth et al. (2020). Schools in the Philippines are investing in ICT, but successful implementation depends on efficient use and education about managing technology use.

This paper aims to look into the possibilities, challenges, and coping strategies of teachers and students to bring out best practices in using computer technologies for teaching and self-directed learning. Determine the extent of use of computer technologies by the respondents for teaching and self-directed learning. Determine the extent of opportunities derived by the respondents in using computer technologies for teaching and self-directed learning. Determine the degree of seriousness of problems encountered by the respondents in using computer technologies for teaching and self-directed learning. Assess the correlation between extent of opportunities derived and extent of seriousness of problems encountered in

using computer technologies for teaching and self-directed learning. Determine the coping strategies of teachers and students in addressing problems encountered in using of computer technologies for teaching and self-directed learning. Assess the extent of effectiveness of coping strategies of the respondents in addressing problems encountered in using computer technologies for teaching and self-directed learning and Assess the extent of influence of factors in the coping strategies of teachers and students?

Methodology

Research Design

The descriptive survey design and correlational research design were used in the study. Survey questionnaire was used to determine the use of computer technologies; opportunities derived in using computer technologies; problems encountered; and coping strategies. On the other hand, correlational research design was used to determine the relationship between opportunities derived and problems encountered in using computer technologies for teaching and self-directed learning.

Respondents of the Study

Respondents of the study are composed of 69 faculty members and 414 students in a tertiary learning institution. The students are the first batch graduates of the Philippine K-12 curriculum. The curriculum came from the growing need to address issues impacted by globalization (Adarlo & Jackson, 2017) With this, there is longer exposure of respondents to basic education as well as exposure to lessons in relation to information technology.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics used in the study include weighted means and ranks. These are used to determine opportunities, challenges, and coping strategies in using of computer technologies for teaching and self-directed learning. Inferential statistics such as Pearson correlation was used to determine the relationship between opportunities derived and problems encountered in using computer technologies for teaching and self-directed learning.

Data Collection Procedure

Ethical considerations were observed before and during data collection. Before gathering the data, the researcher sought the approval from the concerned authority. Only those who were willing to participate were given questionnaires to accomplish. Respondents who were willing to be involved in the study participated in the answering of questionnaires. Responses from respondents were treated with utmost confidentiality. Instructions in accomplishing the questionnaires were provided. The researchers personally administered the questionnaires to the respondents.

Data Gathering Instrument

Questionnaires were used to gather data needed. There are two major parts of the questionnaire. Part I contains the opportunities and problems encountered in using computer

technologies for teaching and self-directed learning (study 1); and part II contains the coping strategies and extent of influence of factors affecting the coping strategies of the respondents (study 2). There are two different questionnaires prepared, one for the teachers and another one for the students. Questionnaires underwent validation by IT experts, health practitioners for the health-related aspect, faculty members, and students. Also, questionnaires were subjected to reliability testing before it was administered to the respondents. Results of the Chronbach's Alpha yielded to .92 for students' questionnaire and .84 for teachers' questionnaire.

Ethical consideration

The questionnaire was carefully crafted to include necessary items that will align to the opportunities, challenges and coping strategies in using computer technologies for teaching and self-directed learning. The items were based from various sources. The questionnaire's validity and reliability were ensured through content validity by the faculty, IT, and health experts. Reliability test was also sought to insure consistency of the items. Permission was acquired before gathering data. Also, participation in the student is voluntary. Only faculty members and students who are willing to be part of the study were given questionnaires to answer. Participants were informed that their identity will be kept confidential and that their responses would only be used for this research and that their participation will be of utmost importance in realizing the objectives of the study, thereby, promoting more productive use of computer technology for teaching and self-directed learning.

Discussion of Results

Using computer technology can improve student engagement and collaboration in education. It helps teachers organize information, manage data, and track student progress efficiently. Understanding the use of technology by teachers and students is essential to explore its opportunities.

Extent of Use of Computer Technologies for Teaching and Self-Directed Learning

Table 1 shows that teachers regularly use specific hardware and software tools. Laptops and printers are the most commonly used devices. Teachers frequently use laptops for creating syllabi, lessons, reports, and research, and most teachers own laptops both at school and home. Laptops are important for their mobility and contribute to their productivity. In the University, there are few desktop computers available for faculty use. Printers are also essential as they allow teachers to create hard copies of their work. However, tablets are rarely used by teachers since their smartphones serve a similar purpose, and they prefer only essential gadgets for teaching.

Students frequently use specific hardware and software in their daily activities, particularly smart phones, laptops, and desktop computers. Smart phones are carried around for convenience and are used for communication, taking photos, and accessing various services

due to their multifunctional capabilities. Laptops and desktops are also essential for school tasks like creating reports, presentations, and conducting research, making these devices important for students.

The relationship between hardware and software is crucial since both are interconnected. Mobile phones have evolved from simple communication tools to multifunctional devices with cameras, internet access, and basic computing functions. The development of mobile technology has had a positive impact (De Meester et al., 2020) on improving accessibility and quality of learning. Accessibility is one of the most important elements in education, especially in developing countries or remote areas of the world.

Teachers frequently use software like MS Word, search engines, and PowerPoint. MS Word is particularly important for preparing lessons and reports. Search engines help teachers efficiently find information for research and teaching, while PowerPoint enhances lectures by making them more engaging compared to traditional materials. Teachers generally do not create blogs or play games due to their busy schedules and other responsibilities.

In contrast, students prioritize social networking sites, search engines, and Microsoft Word, especially when they have internet access. Platforms like Facebook allow students to stay connected with friends and family. They also use search engines for assignments and personal information. According to Alhadabi & Karpinski (2020), students now can access course materials and educational content through mobile devices and computers.

Blogs and tablets are less utilized by students, as they find blogging creatively demanding and opt for smart phones over tablets due to their smaller size and portability, which suits their lifestyle better.

Extent of Opportunities Derived in Using Computer Technologies for Teaching and Self-Directed Learning

Teaching

Computer technologies can significantly enhance education by helping teachers create instructional materials and offering new ways for students to learn and work together. The worldwide Internet and connected devices have opened up many opportunities for teaching and self-directed learning.

Teachers see great potential in using computer technologies, with a high opportunity for improving their productivity. The most notable benefit is the efficient and accurate computation of grades, as technology allows for quick data input and results calculation, saving teachers time for other tasks. Technology also streamlines lesson and exam preparation, making work easier and faster. It encourages teachers' creativity and productivity, allowing them more time to think of innovative teaching strategies.

Teachers see monitoring students' tasks as important but find it challenging due to technology limitations and their own knowledge. They may focus on how students approach

tasks. However, by tracking recorded scores and using tools like Excel, teachers can effectively monitor student performance.

Self-Directed Learning

Students see computer technology as a valuable tool for learning. They believe it is beneficial, offering many advantages that support their education. Key benefits include extended learning opportunities, improved research skills, and increased motivation and creativity. Through using technology, students enhance their ability to access and search for information, which boosts their knowledge and understanding, and encourages innovative thinking.

The text discusses three key areas where technology has a high opportunity in learning: giving students control over their education, enabling online learning, and enhancing communication skills. While students appreciate technology, they still prefer in-person classes with teachers and classmates. Technology does not alter individual learning styles, as students maintain their preferred methods of learning. Finally, students focus on improving communication skills through traditional speaking and writing, regardless of technology.

Problems Encountered in Using Computer Technologies for Teaching and Self-Directed Learning

Both teachers and students recognize the high risks of using computer technologies. The top concern for both groups is health-related issues, followed by technical and teaching/learning concerns. Teachers first note eyestrain as their main health issue due to screen time, while students rank shoulder and arm pain highest. Students face these pains sooner because they often use their arms and shoulders more, leading to fatigue. Other issues include elbow, wrist, neck pain, and headaches.

Both teachers and students see many serious problems with using computer technology for teaching and learning. The most significant issue is slow and unreliable internet connections. This infrastructure problem is recognized as a national difficulty, but improvements are being made slowly. However, lack of budget and priority hampers progress. Other issues include problems with privacy, security, and potential data loss. People are advised to be cautious with their personal data, which affects both teachers and students.

Teachers view abnormal behavior in applications, like misformatted documents, as moderately serious, while students rate it as highly serious. This suggests students need more support and guidance to troubleshoot these technical issues, whereas teachers can often manage on their own.

In terms of learning, both groups see several problems as highly serious. Teachers admit that reliance on computers and the internet can lead to issues like loss of instruction time and exposure to inaccurate information. These concerns highlight the risk of depending heavily on technology, as it can waste valuable teaching time and lead to misinformation. While

teachers are familiar with technology and see some issues as moderate, students face challenges like distractions from social media, excessive reliance on online resources, and the same misinformation problems. This indicates that students struggle to focus on their learning due to accessible distractions and dependency on the internet.

Correlation Between Opportunities Derived and Seriousness of Problems Encountered in Using Computer Technologies for Teaching and Self- Directed Learning

The table indicates a strong link between opportunities gained and problems faced using computer technologies in technical and teaching areas. In technical areas, more opportunities relate to fewer problems, while in teaching areas, more opportunities lead to more problems. The null hypothesis is rejected for teaching but accepted for health-related opportunities. The table shows no significant correlation between opportunities and problems in using computer technologies for self-directed learning, so the null hypothesis is accepted.

Coping Strategies in Addressing Problems Encountered in Using Computer Technologies for Teaching and Self-Directed Learning

While there are many benefits to using ICT for teaching and learning, teachers and students also face challenges. It is important to address these challenges to improve the quality of education. This study examines coping strategies used by teachers and students to deal with problems related to computer technologies for teaching and self-directed learning. Problems can be technical, instructional, or health-related, and strategies are grouped according to teaching and self-directed learning.

Coping Strategies along Teaching

Using information and communications technology in teaching can help achieve learning goals effectively, but there are challenges that teachers and learners must address. These challenges include technical issues, instructional needs, and health concerns.

Teachers often seek help from colleagues or technicians when facing technical problems and need training in troubleshooting to handle minor issues independently. Instructionally, teachers prepare alternative activities if initial ICT plans fail and use various technologies to support learning. Health-wise, teachers take breaks, position their computers comfortably, and adjust monitor heights to reduce strain.

Teachers use different methods to solve issues with computer technologies. They are creative and resourceful. They also prioritize their health with helpful strategies.

Coping Strategies along Self-directed Learning

Coping strategies of students are discussed. When facing technical problems, students search the internet, ask peers, and consult user manuals. For learning issues, they verify online information, follow internet ethics, and explore new computer strategies. To handle health-

related concerns, they adjust computer positions for comfort and take regular breaks to prevent prolonged usage.

Research shows that students seek help not only from peers but also use the internet and user manuals for technical issues during self-directed learning. They validate online sources, which is a good practice. Similar to teachers, students adopt ergonomic practices to reduce strain while learning. According to Bettany-Saltikov, et al (2019), postural interventions with on-screen reminders during lessons reduce discomfort severity and lower the frequency of musculoskeletal problems.

Effectiveness of Coping Strategies by the Respondents in Addressing Problems Encountered in Using Computer Technologies

Effectiveness of Coping Strategies along Teaching

The effectiveness of coping strategies teachers use for problems with computer technologies in teaching is presented in table 8. Overall, the findings indicate that these strategies are highly effective, reflecting strong practices among teachers. Key strategies include calling a computer technician for repairs, seeking help from colleagues, and conducting internet searches for problem solutions. Having a school technician available is very helpful, as not all teachers can perform basic troubleshooting during classes. When technicians are unavailable, teachers can still seek support from peers or use the internet. It is important for teachers to be resourceful and flexible in overcoming challenges, while also improving their own troubleshooting skills to reduce reliance on technical support services.

Coping strategies for instruction-related problems include using various technologies in teaching, demonstrating proper internet ethics, and preparing alternative activities if the initial plan using ICT fails. Teachers show flexibility in their methods, especially during situations like a pandemic, by adapting teaching modalities to meet student needs. Both digital resources and printed materials support flexible learning. Teachers use digital tools ethically and are prepared with alternative tasks when necessary.

For health-related concerns, effective strategies include positioning devices comfortably, taking regular breaks, and adjusting screens to reduce glare. These practices help prevent health issues and promote productivity.

Overall, the most effective coping strategies address instruction-related problems, followed by those related to health, while strategies for technical issues need improvement, as teachers have shown they can manage these challenges without affecting instruction.

Effectiveness of Coping Strategies along Self-directed learning

The effectiveness of students' coping strategies in dealing with problems using computer technologies for self-directed learning is shown in table 9. The results indicate that students' practices are highly effective. For technical issues, effective practices include asking colleagues for help, searching the internet for solutions, and consulting user manuals. For

learning issues, effective strategies are verifying web information reliability, using proper internet ethics, and exploring new learning strategies. For health-related issues, effective practices involve comfortable computer placement, taking breaks, using ergonomic keyboards, and adjusting screens to reduce glare. Coping strategies for health-related problems are most effective, followed by learning-related, and lastly technical-related problems.

Influence of Factors Affecting the Coping Strategies

Table 10 shows that the factors significantly affect how teachers cope with challenges in using computer technologies in teaching. Teachers report that expert advice, demonstrations, and help guides greatly influence their coping strategies.

Table 11 shows the major factors affecting student coping strategies. The most influential include consulting experts, learning from YouTube, and asking friends and classmates. Students often seek help from teachers and IT staff and utilize online resources. Other influential factors include asking classmates and friends, using help guides, informal observation, and Facebook inquiries.

Conclusions and Recommendation

Conclusions

Teachers and students highly make use of computer technologies as an advantage in their teaching and learning. Nevertheless, both teachers and students acknowledged that they encounter problems. In the study, there is no relation in the opportunities derived from problems encountered along learning, however, significant to highly significant relation is present along teaching. Teachers and students use varied coping strategies to problems encountered and both respondents accepted it as very effective. Effective ways of coping with problems encountered for teaching and learning require self-initiative and school-initiative. Self-initiative includes asking help from experts for technical assistance and conducting research. School initiatives include conduct of training to teachers and students on coping strategies, demonstrations, and provision of help-guide.

Recommendations

Schools are encouraged to conduct regular enhancement activities like retooling and training for teachers and students in the use of computer technologies for teaching and learning. Provision of digital or printed help-guide in addressing problems in using computer technologies is of great help to teachers and students. Teachers and students may tap experts and conduct research to discover more productive and reliable ways of addressing problems encountered in using computer technologies. Integrating lessons on good practices in dealing with computer technology-related problems may be incorporated in the teacher and student development learning contents and to be demonstrated by both teachers and students. Teachers and students are encouraged to explore other hardware and software that are beneficial to teaching and learning with the AI presence. Proper use of technology alleviates problems about health thus discipline in using technology and following simple exercises can

help reduce health risks. The university is encouraged to prioritize the improvement of internet connection as this a common problem among teachers and students.

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