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Acceptance of Technology and Academic Writing: Analyze in Perspective of Theoretical Models

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Abstract[1]

This paper studies the factors that contribute to students' acceptance in improving their technical and academic writing skills by applying digital technology. The study also focuses on identifying the available digital technology that can improve students' technical and academic writing performance. The study analyzes students' acceptance of technology in academic writing from various theoretical models that stem from socio-psychological disciplines. Analyzing different well validated theoretical models established in sociology, psychology, and information technology, this study seeks to better understand the factors that may contribute to students' acceptance to improve their writing skills. The ultimate goal of this study is to develop a theoretical framework to address the gaps in knowledge existing in current literature about different contributing factors and their level of significance on students' motivation for improving writing skills and adopting digital technology for that purpose. Given the persistent limited writing performance and low motivation of learning academic and technical writing among the students, especially in the computer technology programs, this study is significant. The conceptual framework developed in this study can be the foundation for future empirical research extending the body of knowledge in the area of academic writing while applying digital technology in the higher education institutions.

Keywords: *Theoretical Models, Writing Tools, Academic and Technical Writing, Accessibility, Interface Usability, Perceived Value, Attitude.*

1. Introduction

The goal of this study is the improvement of students' academic and technical writing proficiencies, especially in the computer technology programs such as Cyber Security

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and Information Technology. The study focuses on how the incorporation of innovative digital technology can help to improve students' academic and technical writing skills. For that purpose, the study aimed to find the factors that affect students' acceptance of using innovative digital technology for improvement of their academic writing.

Writing is one of the basic components of literacy that is used on an everyday basis to communicate what and how people think and feel. With fast advancement of innovative technology, the writing opportunities and practices with digital technology have proliferated. Having ever evolving digital tools and apps in writing can encourage students to become more involved in academic and technical writing, which can increase their writing skills. These expanded possibilities make a renewed vision of learning writing using digital technology an even more urgent issue (Freedman et al., 2016). In many higher academic and research institutions the advanced innovative technology is becoming popular in academic writing due to its contribution to better learning, research, and education (Iqbal et al., 2021).

Using digital technologies can be significantly beneficial for students' academic writing improvement (Purcell, 2013). Research findings show that digital tools and apps should be part of writing in class to support students because they could be more apt to write using tools. By integrating digital technology, instructors can provide more opportunities and strategies to increase students' abilities of more professional and academic writing. Therefore, it is important to show the students that writing can be an interesting learning process by giving them the right tools and strategies to use while writing (Sandolo, 2010).

The new technologies have changed the nature of the writing process itself as well as the ways writing can be learned and taught. In parallel to the innovative technological development, writing has become a major field of learning at all levels of higher academic education across disciplines, including computer technology programs. The development of new technologies in writing is at least partially driven by the need for individualized learning of writing skills in the high number of disciplines involved.

The academic writing in higher education is strongly influenced by the disciplinary differences as well as by the significant diversity of purposes, procedures, and skills involved in students' writing across the disciplines (Strobla et. al., 2019).

There are many challenges instructors face in teaching academic writing, especially in writing intensive classes in computer technology programs. That challenge comes not only from students' lack of writing skills, but also from their attitude that they don't need to learn writing because their academic discipline and career are technology related. Students in technology programs have a lack of understanding that learning academic and technical writing is vital in their professional fields. Students' writing skill sets is one of the core accreditation criteria approved by the Accreditation Board for Engineering and Technology (ABET) for undergraduate Cyber Security and Information Technology programs. Therefore, proficiency in academic and technical writing is required in classes, especially in writing intensive classes in these programs. Yet, there are many students who are reluctant to improve their writing skills using innovative digital technologies because they believe that writing is not necessary in their future career in the technology industry.

Consequently, this study focuses on how to incorporate digital technology to enhance students' writing assignments in class. What factors may contribute to their effort to enhance writing skills and accept innovative technology. For that purpose, by analyzing different theoretical models, this study seeks to better understand the factors that may contribute to students' intention to improve their writing skills and how the digital tools can help students to be more engaged in academic and technical writing, especially in computer technology programs. In this context, the ultimate goal of this study is to develop a theoretical framework that addresses the gaps in knowledge existing in literature about different contributing factors and their level of significance on students' motivation for improving writing skills and adopting digital technology for that purpose.

2. Importance of Using Technology in Learning Writing

There are several factors that encourage use of digital technology in academic writing. These factors especially relate to students, learning process, delivery methods, invention of new technologies, etc. Therefore, these important factors need to be taken into consideration before designing and developing writing-intensive classes.

2.1. Changed Learning Process and Student Population

Innovative technologies are more effective and significantly powerful tools that facilitate students' concept building. Students' academic performance enhances when they accept technology-mediated academic writing (Iqbal et al., 2021). Research on English academic writing programs in blended learning settings in higher education shows that using tools in academic writing has a positive relationship with the self-regulated learning techniques (Han et al., 2021).

Students' academic and research activities can be improved by technology because it can significantly help to generate diversified learning strategies (Iqbal et al., 2021). Digital technology has changed the learning process itself by enabling: 1) New access points to knowledge using e-books and cloud computing, 2) Real-time information sharing that includes just-in-time searches along with perpetual and pervasive access to online resources including social media. Web 2.0 tools such as blogs, wikis, social media, and content-sharing sites are examples of new user-centric information infrastructure. The Web 2.0 technology emphasizes interactive participation and understanding in learning. It encourages focused conversation on topics and facilitates innovative explorations, experimentations, and purposeful tinkering.

Academic writing, which predominantly involves the process of preparing a research paper for the development of a thesis, requires complex cognitive processes that need the effective development of self-regulated learning strategies. It has been well established that technology-mediated self-regulated learning plays an increasingly

significant role in the learning process, providing students more personalized pre-class preparation, after-class practice, or discussion via online platforms and tools that support numerous resources focusing on the individual learner. Thus, technology changes the writing process from paper-based to online, and subsequently influences the development of cognitive strategies in writing (Han et al., 2021).

Furthermore, new kinds of learners are emerging in the digital environment. The majority of students are in the generation who have grown up and live in the world of digital technology. These students are more self-directed and less top-down oriented. They are better organized to capture new information inputs relying on feedback and response.

2.2. Importance of Interaction and Collaboration in Learning

Innovative technology develops student presentation, writing, searching, concept development, critical thinking, citation, and referencing skills. Thus, technology-based learning has emerged as a new form of learning process that empowers students' level of cognition through collaboration among students, teachers, and researchers (Iqbal et al., 2021). More students are inclined to collaboration and interaction than instructor-centered learning. Innovative digital technology can enhance interaction between instructor and students, providing more quality instruction in writing classes. Research findings suggest that collaborative work enhances the quality of the work (Williams & Beam, 2019). The types of human-computer interaction supported in technology enhanced learning and instruction can be learner-instructor, learner-learner (collaboration or peer instruction), or learner-content interactions (Strobla et. al., 2019). The use of technology during writing instruction and related activities encourages interaction and collaboration between instructor and students as well as among peer students in class. Increased interaction and collaboration can be the by-product of using technology in writing, and supports students' literacy learning (Williams & Beam, 2019).

With the emergence of the internet, the interactivity of the writing environments increased allowing more communication, feedback and collaboration among writers. The recent developments of cloud computing, offers writers linguistic help online through various kinds of automated text evaluation. This innovation connects writing technology with writing provision in the form of personalized instructional process focusing on linguistic support, automated feedback, and intelligent tutoring (Strobla et. al., 2019).

3. Developing Writing-Intensive Classes Embedded with the Digital Technology

3.1. Writing Course Content and Design

Instructional design strategies need to ensure relevancy and accuracy of online writing course content. Utilizing a variety of learning styles and activities is important to maintain students' interest in writing, especially in online classes. The success of online learning is often a function of personal learning styles and individual learning preferences. Poorly designed writing classes ignore students' self-selecting content needs. Classes that are not stimulating or worth students' time or effort leads to a higher drop-out rate. Integration of multimedia can enhance writing course content and design, and increase the effectiveness of online learning with a variety of learning styles.

3.2. Digital Writing Tools

The word processors can be considered as the most viable part of the digitization of writing, followed by subsequent innovative technologies that provide functionality and additional assistance to the writers, such as formatting devices, pagination, spelling and grammar checkers, synonym finders, search and replace, tracking and commentary functions, outline tools, index generators, etc. (Strobla et. al., 2019). Over time there are many more tools and apps developed that can be adopted in

academic writing. All this innovative technology can enhance students' academic writing skills.

There are numerous useful Web 2.0 tools and apps available that can be integrated in writing-intensive classes to improve students' academic and technical writing skills. As shown in table 1, 2, and 3, there are many applications, software and tools available that can help writing improvement. The writing apps mentioned in the Table 1, are either free or may need minimum fees. The writing apps listed in Table 2 are only compatible with Android operating systems-based devices. The writing apps listed in Table 3 are mainly used for editing and designing purposes.

Table 1. Available tools and apps to enhance students' writing skills

Writing Apps	
Minimum Fee or Free Basic Plan	**Free**
• Scrivener • Ulysses • Reedsy Book Editor • iA Writer • Storyist • Final Draft • ProWritingAid • Hemingway • Readable • Freedom • Evernote	• Grammarly • Reedsy Book Editor • NaturalReader • FocusWriter • Reedsy Prompts • yWriter • Novelist • Markor • Character Story Planner 2

Table 2. Android specific writing apps

Writing Apps for Android Operating Systems	
• Character Story Planner 2 • Google Docs, Drive, Keep Notes • Grammarly Keyboard • JotterPad • Markor	• Microsoft Word, OneDrive, OneNote • Novelist • Pure Writer • Writer Plus • Writer Tools

Table 3. Writing apps for editing and designing

Writing Apps for Designers and Writers
Quip: Cross-platform writing and collaboration app
Hemingway Editor: Ultimate editing tool
Grammarly: Writing and editing tool that teaches
Draft: Minimal Markdown editor
Airstory: Research, outline, and write in one place

3.3. Searching Tools and Apps for Writing

There are two search methods to find suitable tools among the many useful tools available to integrate in writing classes: 1) General tools search: Explore the tool landscape to get ideas about what could be done with this tool in a writing class. 2) Specific tool search: Already have identified learning objectives of the class and look for tools to achieve those objectives. Both search methods yield productive and useful results; however, for academic and technical writing-intensive classes, especially in Cyber Security and Information Technology programs, the specific tool search is more efficient and appropriate.

3.4. Criteria to Choose Digital Technology

Any given instructional strategy can be supported by a number of contrasting technologies, similarly any given technology might support different instructional strategies. But, for any given instructional strategy for a specific class, some technologies are better than others. Before deciding which learning tool to use in a writing-intensive class, the instructor should follow five criteria (Sloan-C Institute Consortium, 2012).

3.4.1. Accessibility: Is the tool accessible by users with different operating systems such as Windows and Mac based devices? Is the tool viewable in a variety of web browsers such as Firefox, Safari, Chrome, etc.? Does the tool work well with all different types of internet connections such as cable, broadband, satellite, etc.? Does the tool provide options following American Disability Act compliance that support students with disability? Is the tool free or require a fee and/or license? Will the tool be around for a while or will be obsolete soon?

3.4.2. Usability: How user friendly is the tool? Is the tool easy to use? How complicated is it to learn to operate? Does the tool have a robust and easy to use Help feature? Does anything have to be downloaded and installed on the computer to use the tool? Do users have to create an account to use the tool?

3.4.3. Privacy, Security, and Intellectual Property: Does the tool protect students' personal data? Does the tool allow students to restrict unauthorized access to their work or information? Does the tool allow students and instructors to retain their copyright status to the content they have created? Can students and instructors save a copy of their created product for archival purposes?

3.4.4. Workload and Time Management*:* How much extra effort is needed for the instructors to develop their class using the tool? How much extra effort do students need to put into work on their assignments using the tool? Is it possible to embed the tool into the e-learning systems that are already being used as a platform for the class?

Does the tool make it easy to track students' works and assignments as well as interaction in class? Does the tool support individual and group feedback for students?

3.4.5. Creativity, Collaboration, Interaction: Does the tool allow instructors and students to be creative during the learning process? Does the tool provide opportunities for different types of interaction such as visual, verbal, and written, as students' individual learning process is different? Does the tool increase the perception of connectedness and communications, especially in online classes? Does the tool encourage collaboration?

4. Theoretical Models to Analyze Technology Acceptance

Understanding the factors that affect people's acceptance of an innovative technology is very important. In the past few decades, different theoretical models have been developed with varying levels of conceptual and empirical support to explain the factors that contribute to people's acceptance of digital technologies. These cognitive behavioral models, primarily developed from theories in psychology and sociology, have been used to explain psychological factors that contribute to people's acceptance of an innovative technology (Venkatesh et al., 2012). These theoretical models include: Theory of Reasoned Action, Theory of Planned Behavior, Social Cognitive Theory, Diffusion of Innovation Theory, and Technology Acceptance Model (TAM). All these theoretical models are applied in literature to explain the antecedent factors that affect people's acceptance of innovative technology.

4.1. Theory of Reasoned Action

The first cognitive theoretical model used in the research on the people's acceptance of innovative technology was Theory of Reasoned Action. Fishbein and Azen (1975) developed this well validated theoretical model that explains psychological factors of people's behavior. The Theory of Reasoned Action, an expectancy-value model,

systematically explains how people's rational behavior relates their beliefs to attitudes, attitudes to intentions, and intentions to actual behaviors. That is, attitude plays a major role in people's intention to perform a specific behavior, which led to people's actual performance of that behavior (Fishbein & Ajzen, 1975). Attitude is defined as "a disposition to respond favorably or unfavorably to an object, person, institution, or event" (Ajzen, 2005, p. 3). Attitude is an important factor that contributes to how people act or behave. People's attitude influences their intention to accept a new technology or take a new action. Brown and Venkatesh (2005) explained that people's attitude forms from their cognitive beliefs.

4.2. Social Cognitive Theory

To explain people's acceptance of new technology better by adding more factors, Bandura's Social Cognitive Theory has been used in research in this discipline. Social Cognitive Theory is an empirically validated theoretical model of behavior in which Bandura (1986) proposed *self-efficacy*, which is an important construct widely accepted in social psychology (Compeau & Higgins, 1995). According to Bandura, there is a mutual relationship among environmental factors, cognitive factors, and human behavior. He argued that people's belief influences their choice of activities, degree of effort expended, and persistence of effort to achieve those activities. People's self-efficacy develops from their: 1) previous experience of success and failure; 2) vicarious experience from observing others' successes and failures; 3) social persuasion by peers, colleagues, relatives; and 4) physiological state (emotional arousal, e.g., anxiety). Bandura explained that self-efficacy is people's judgment of their own capabilities to execute a course of actions required to accomplish a performance. Consequently, self-efficacy influences people's choices about which action to undertake, how much effort and persistence to be exerted in the face of obstacles to perform those actions, and thus, the expertise of those. Based on the self-efficacy construct, Compeau & Higgins (1995) proposed the *Computer Self-Efficacy* construct to explain people's acceptance of new computer technology.

4.3. Theory of Planned Behavior

The Theory of Planned Behavior, an extension of Theory of Reasoned Action, is also an attitude-intention-behavior model. To better predict some actual behaviors from intention of those behaviors, the Theory of Planned Behavior includes Perceived Behavioral Control which is similar to Bandura's self-efficacy construct. Perceived Behavioral Control and self-efficacy both explain people's perception of their own ability to perform a behavior or sequence of behaviors. However, people's concern with the ease or difficulty of performing a behavior, or confidence in their ability to perform it, is their self-efficacy beliefs; whereas people's control over the behavior, represents their control beliefs (Ajzen & Fishbein, 2005).

Perceived Behavioral Control is people's subjective belief of their control over a goal-directed behavior. This belief specifically influences their decision to perform a behavior. The behavioral control can be affected by both internal and external factors that may facilitate or impede performance of an action or behavior. The internal factors include people's skills, abilities, knowledge, and emotions required to perform a specific behavior; while external factors include the situational and environmental characteristics such as, the resources and opportunities available for engaging in a specific behavior (Ajzen, 2001)**.** Theory of Planned Behavior is a general theory that has been applied to many disciplines, including IT, to predict actual behavior based on people's behavioral intention.

4.4. Technology Acceptance Model

While Theory of Reasoned Action, Social Cognitive Theory, and Theory of Planned Behavior are general theories of people's behavior, Technology Acceptance Model (TAM) is specific to acceptance of new technology. Based on Theory of Reasoned Action, Davis (1989) developed TAM to explain the factors that contribute to people's acceptance of different new technologies. TAM mentions Perceived Usefulness and Perceived Ease of Use of a new technology as the determinants of people's intention to use and their actual use of it (Brown et al., 2012). That is,

people's acceptance of a new technology is the result of a rational analysis of its desirable perceived outcome. Perceived Usefulness (PU) is "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, p. 320). Perceived Ease of Use (PEOU) is "the degree to which a person believes that using a particular system would be free of effort" (Davis, p. 320).

Theory of Reasoned Action explains that people's beliefs influence their attitude, which leads to their intention and, finally, generates actual behavior. Correspondingly, TAM states that PU and PEOU of an innovative technology form people's belief on a new technology and therefore, predict their attitude toward that technology, which in turn predicts intention to use it that finally led to actual use of technology. Thus, both Theory of Reasoned Action and TAM assume that people's reasoned action motivates their behavioral intention and actual behavior.

The original TAM was developed to explain the determinants of people's acceptance of a broad range of end-user computing technologies (Davis, Bagozzi, & Warshaw, 1989). However, compared to PEOU, PU has a stronger persistent effect on people's intention to use or actually use a new technology (Bhattacherjee & Premkumar, 2004; Davis, 1989). Perceived Usefulness has a direct positive relation with the use of a new technology (Davis, 1989), which suggests that people tend to focus more on the functionality, quality or value of a new technology than on its ease of use (Chan & Teo, 2007). Later, the extended versions of TAM included more variables to explain people's acceptance of new technology better.

Perceived Value and Perceived Usefulness of New Technology: Davis (1989) stated that people use a technology only to the extent that they believe that such technology will enhance their job performance or they will be benefited from using that technology. That is, people would use computer technology only if they believe that there would be positive benefits associated with it (Compeau & Higgins, 1995). Davis further explained the Perceived Usefulness of a technology through three categorical levels: job effectiveness, productivity and time savings, and the importance of the

technology to the people's job. Davis stated that perceived value parallels perceived usefulness. Thus, PU is defined as the perceived value to use a new technology. People evaluate the use of a new technology in terms of its Perceived Usefulness and set their intention to accept it based on the desirability of its usefulness.

According to Social Cognitive Theory, people's behavior more likely will be influenced by their belief that the behavior will result in valued outcomes. They will not perform a behavior if they do not believe that it will have favorable consequences (Compeau & Higgins, 1995). This PU is similar to Bandura's outcome judgment, which is "concerned with the extent to which a behavior, once successfully executed, is believed to be linked to valued outcomes" (Davis, 1989, p. 321). That is, people are more likely to perform specific behaviors when they expect to receive valued outcomes from that behavior.

There are two concepts of perceived value: perceived risk and perceived quality. In other words, benefits and sacrifices. Thus, the perceived value of a product is hypothesized as people's perceived net trade-off between what they will gain or benefit and what costs or sacrifices they have to make for using it. People define the perceived value of an innovative technology by comparing benefits with sacrifices for using that technology (Kim et al., 2007). Thus, people's acceptance of an innovative technology depends on the perceived consequences of using that technology (Beaudry & Pinsonneault, 2005).

4.5. Diffusion of Innovation Theory

Rogers (1995) in his Diffusion of Innovation Theory mentioned five basic characteristics of a new technology that contribute to the degree and rate of its acceptance. Those characteristics are: *relative advantage, complexity, compatibility, observability, trialability*. *Relative advantage* is the degree to which an innovative technology is perceived as being better than the one it supersedes. Like PU, the relative advantage of a new technology represents the perceived value of that technology and affects the people's acceptance decision (Agarwal & Prashad, 1999).

Complexity is the degree to which an innovative technology is perceived as being difficult to understand and use. Similar to PEOU and PU of TAM, complexity and relative advantage significantly affect people's acceptance of new technology (Lewis et al., 2003; Venkatesh & Brown, 2001). In Diffusion of Innovation Theory, the *diffusion* "is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p. 5). The *innovation* "is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1995, p. 11).

The traditional theories of writing and cognitive models explain the individual strategies writers can follow. The aforementioned socio-cognitive theoretical models have emphasis on such qualities of writing as its social connectivity, cognitive ability that connects writers to readers (Strobla et. al., 2019).

5. Factors Affect Acceptance of Digital Technology in Writing

Although proficiency in academic and technical writing is required in classes, especially in writing intensive classes, there are many students in computer technology programs, such as Cyber Security and Information Technology, who are reluctant to improve their writing skills because they believe that writing is not necessary in their future career in the technology industry. There are several factors that contribute to students' intention to improve their writing skills using innovative digital technology.

5.1. Interface Usability of Technology

One of the important technical factors in adopting a technology is its interface usability. Usability refers to "the extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11, 1998, p. 6). Usability is vital for Human-Computer Interaction, which is a field of inquiry that studies the interaction between

humans and computers in all forms, and is particularly engaged with understanding the relationship between humans and emerging technology. The field is interdisciplinary, originating from work on human factors in computer systems in the 1970's, and today uses diverse methods and practices from computer science, psychology, sociology, design and the arts. Human-Computer Interaction is a problem-solving field that strongly emphasizes constructive solutions for problems addressing challenges created by different kinds of computer systems, user interactions and contexts (Pargman et al., 2019). Contemporary technology and information systems not only influence individual end users but also have holistic effects on society at large (Clemmensen et al., 2019). The interface usability can influence people's PEOU of a technology. Consequently, it can be assumed that the user interface design of the writing tools and apps can play an important role in students' intention to adopt those technologies to improve their writing skills.

5.2. Accessibility to Technology Infrastructure

Another important factor in accepting a technology is students' inability to access technology infrastructure. This includes their inability to purchase technology required in the class, having interrupted internet connection, and incapability in handling online technology (Iqbal et al., 2021). The recent widespread growth of Information Technologies broadens the participation of people in socio-economic dimensions of life, including having access to key information and the opportunities of social interaction. However, despite the digital society's apparent pervasiveness, not everyone is digitally connected (Philip et al., 2017). The access to technology and infrastructure, and also acquisition of skills to deal with innovations of digital technology depends on many fundamental factors. Several studies show the role of socioeconomic, cultural and geographical characteristics determine the people's access level of technological advances worldwide (Nishijimaa et al., 2019).

Nelson et al. explained that the excessive costs of Internet connection, lack of technical skills, poor network coverage, and the shortage in the number of devices such as laptops or smartphones to engage students in an online learning environment

were the main barriers to continue to adopt e-learning systems in educational institutions (Larbi-Apau & Moseley, 2012). Another study in Nigeria showed that students and instructors complained about the problem of having an irregular power supply. Without adequate technical resources, it is challenging for both students and instructors to successfully run the learning process remotely using the e-learning platform (Adeoye et al., 2020). Students also encounter the challenges of ensuring authenticity verification, security, and fraud prevention online (Iqbal et al., 2021). The Theory of Planned Behavior explains how people's behavior is affected by the behavioral control, which ranged from complete control (no constraints or barriers) to a total lack of control (implementation of an action or behavior may require resources or skills which may be lacking). From this theoretical perspective, it can be assumed that students will not accept improving their writing by using technology, if they perceive that they are not in control of having access to that technology.

5.3. Perceived Value of Writing and Technology

Perceived value is a psychological factor that plays a vital role in people's decision in adopting a behavior. Bandura in his Social Cognitive Theory suggested that people are more likely to undertake behaviors they believe will result in valued outcomes than those they do not see as having favorable consequences (Bandura, 1986). Consequently, it can be assumed that students in computer technology programs, such as Cyber Security or Information Technology, will be willing to learn academic and technical writing, only if they perceive that it will be useful in their profession and there are values attached to it. Davis (1989) in his Technology Acceptance Model explained that people's acceptance of technology depends on the perceived consequences of use of that technology. The perceived value of a technology depends on a comparison between benefits and sacrifices people made when they use it. People will use a technology only to the extent that they believe that such technology will enhance their job performance or they will be benefited from using that technology.

Consequently, it can be assumed that students in writing-intensive classes in computer technology programs will be reluctant to improve their writing skills using technology if they believe that writing is not necessary in their future career in the technology industry. Similarly, students in programs that are not computer related, will likely not be interested in adopting a new technology that may improve their academic writing skill. Students would accept learning academic writing using technology only if they could see that there would be positive value associated with such an acceptance in their professional fields (Compeau & Higgins, 1995).

5.4. Attitude toward Writing and Technology

Davis, Bagozzi, and Warshaw (1989) stated that attitude is the degree to which people are interested in specific technology, which has a direct effect on the intention to use as well as actual use of those technologies. The extent to which a technology is actually accepted over a certain period of time is influenced by the intention to accept it. Since intention can be predicted by attitude towards a behavior, it is reasonable to predict that students' positive attitudes toward improving their academic and technical writing skill using tools and apps (Larbi-Apau & Moseley, 2012) will lead them to their acceptance of it.

Since attitude appears to be a major factor affecting people's acceptance of a technology, understanding their attitude toward a technology is very important. In the new technology accepting process, sometimes people's attitudes play a more important role than their skillset. That is, in taking action to improve writing proficiency using technology, students' attitude can play a more vital role than their technology skillset. Usually, students in computer technology, who have extensive IT skills, have held a less than positive attitude toward academic writing. Consequently, students' attitude toward improving their writing skills using technology should be considered as a major predictor of their action in this regard. Any research on the computer technology students' writing improvement using technology should include their attitude toward writing itself and using technology for that purpose.

5.5. Computer Self-Efficacy

According to the Theory of Planned Behavior, the internal factors such as people's skills, abilities, knowledge, and emotions are required to perform a specific behavior. Consequently, students with a lack of skills, abilities, and knowledge may not feel that they are capable of improving their writing using technology. While using a computer may not be a challenge for students in computer technology programs, the academic writing itself can be challenging to them. On the other hand, the use of innovative technology can be an important factor for the students in the academic programs that are not computer related. As Compeau & Higgins (1995) stated, *Computer Self-Efficacy* is people's belief in their own capability to use new computer technology in diverse situations. Consequently, students who are not from computer backgrounds may feel threatened by using the technology in their academic writing.

5.6. Motivation for Extra Effort

Motivation is a psychological factor that students must have to achieve successful learning. The motivation represents student's feelings regarding importance and meaningfulness toward performing a learning activity to improve their academic and technical writing using technology. Berestova et al. (2022) have described motivation from two basic dimensions: intrinsic and extrinsic. Intrinsic motivation concentrates on the pleasure, joy, and interest toward the learning process; it can be dedicated toward obtaining knowledge or reaching a specific achievement. Intrinsic motivation can also be determined by the level of satisfaction, autonomy, and enjoyment (Fırat et al., 2018). People's extrinsic motivation explains the learning process as a goal that should be achieved to satisfy any duties or obligations taken, as well as meet the responsibility role for accomplishing that purpose (Faridah et al., 2020). If students in computer technology programs perceive that writing is not valuable in their technical professional field, they will not be motivated to improve their academic and technical writing skills by putting in extra effort. They will not be obligated to adopt aforementioned writing apps and tools for that purpose either.

6. Proposed Theoretical Framework

Synthesizing the aforementioned theoretical models, the following theoretical framework can be proposed to explain students' acceptance of learning academic and technical writing using technology. The proposed framework specifically followed the original Technology Acceptance Model (Davis et al., 1989).

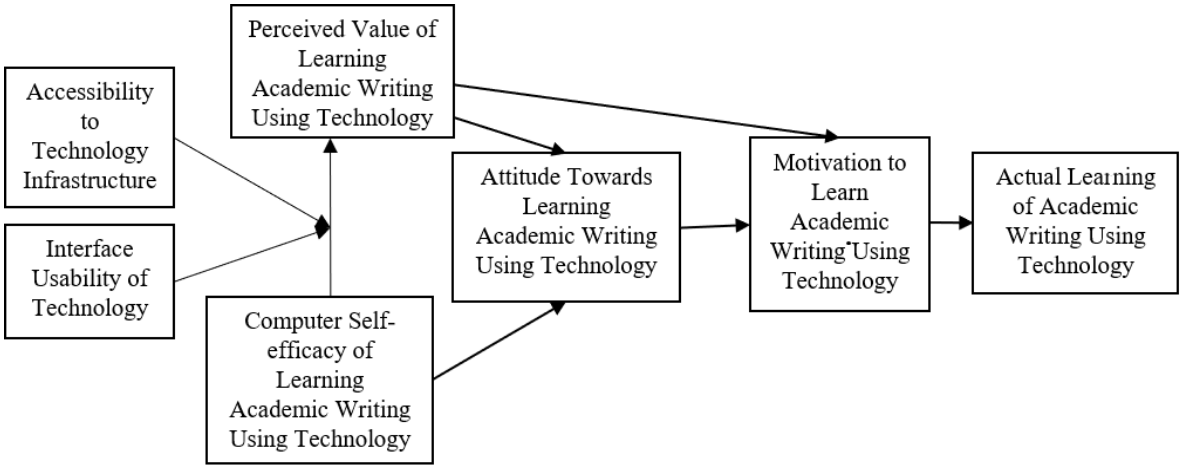

Figure 1. Theoretical model of students' learning academic writing using technology

The proposed framework in Figure 1 shows that accessibility to the required technology infrastructure and interface usability of the tools used in the learning of academic writing will have impact on students' computer self-efficacy and perceived value of learning writing using technology. Then students' computer self-efficacy and the perceived value will affect their attitude toward learning academic writing, but the perceived value will also directly influence their motivation to learn academic writing. The perceived value will have relatively more significant impact than the computer self-efficacy, as Davis (1989) stated that people will not use a technology only because it is easy to use, but also if it is useful in their personal and professional life. Students' attitude toward academic writing will influence their motivation to learn, which will finally lead them to actual learning of academic and technical writing using technology

7. Conclusions

This paper has reviewed several well-established theoretical models to find the contributing factors of students' acceptance of learning academic writing using technology. The theoretical models reviewed are: Theory of Reasoned Action, Social Cognitive Theory, Theory of Planned Behavior, Technology Acceptance Model, and Diffusion of Innovation Theory. These theoretical models have been widely used to explain the effect of psychological factors on people's acceptance of innovative technology. The aforementioned theoretical models explain that factors such as user interface, accessibility to required technology, attitude toward academic writing, perceived value of academic writing, and computer self-efficacy influence students' motivation to acceptance of learning academic writing using technology. A theoretical model on students' acceptance of learning academic writing using technology is proposed based on the review of well-validated existing theoretical models that originally stemmed from the disciplines of sociology and psychology.

In this study, the available tools and apps that can improve students' writing skills were identified while focusing on the factors, especially technical and psychological factors, that impact students' adoption of technology and whether or not they will put in extra effort to learn those which will improve their academic and technical writing. It has been found that there are plenty of tools and apps that can help students in improving their academic learning. However, there are a number of factors that may impact students' intention to adopt those technologies in their writing. Research findings revealed that students' perceived value, computer self-efficacy, and attitudes toward digital technology as well as their access to those technologies and interface usability affect their motivation to learn academic writing using technology. Especially to the students in computer technology programs, the perceived value and attitude toward the writing itself plays an important role in their motivation to put extra effort in improving academic writing using technologies. That is, high perceived value and favorable attitudes toward writing will lead to students' motivation to learn academic writing. Similarly, students' perceived value and attitude toward writing using digital technologies contribute to their motivation to adopt the aforementioned

technologies for improving their academic writing. In addition, the technical factors such as interface usability of those tools and apps as well as accessibility to technology infrastructure also play vital roles in this regard. Therefore, it is important to consider these factors in improving students' intention to learn academic and technical writing using digital technology, especially in their writing-intensive classes. Consequently, to ensure acceptance of technology by students in their writing-intensive classes the aforementioned factors need to be taken into serious consideration by the instructors, IT practitioners, and software developers.

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