ACADEMIA International Journal for Social Sciences
Volume 5, Issue 3(a), 2026 ISSN-L (Online): 3006-6638

Exploring IT Self-Efficacy among Generation Z Research Students: Perceptions, Influences, Engagement, and Academic Consequences

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Received: 25-01-2026 **Revised:** 11-02-2026 **Accepted:** 25-02-2026 **Published:** 12-03-2026

ABSTRACT

The study explores how Generation Z research students perceive and experience their information technology (IT) self-efficacy in academic contexts. Drawing on qualitative inquiry, it investigates four dimensions: students' self-perceptions of IT competence, the factors that influence their confidence in using technology, the impact of self-efficacy on engagement with digital learning tools, and the consequences of differing self-efficacy levels on academic performance, problem-solving, and interaction with research students. Data were collected from semi-structured interviews with research students representing multiple disciplines. Thematic analysis revealed that IT self-efficacy was shaped by early technological exposure, peer collaboration, institutional support, and individual motivation. Students with high IT self-efficacy demonstrated stronger digital engagement, higher problem-solving confidence, and better academic outcomes, whereas low self-efficacy led to dependency, avoidance, and frustration. The findings highlight the critical role of targeted digital literacy programs and support systems in enhancing IT self-efficacy and academic success among Generation Z research students.

Keywords: *Generation Z, IT Self-Efficacy, Digital Learning, Technology Confidence, Academic Engagement, Qualitative Research*

INTRODUCTION

The use of information technology self-efficacy has significantly influenced personal and professional lives in the current era of overloaded information. Information technology considered to be good for accomplishing the tasks at institutions that improves the approach-ability of employees to the organizational goals.

As information technology became more pervasive in organizational and personal lives, there was growing requirement for stimulating individuals with a vast range of multiple preferences, experiences, objectives and goals toward developing the technology as an integral part of their existence.

Information Technology Self-efficacy (ITSE) is the conviction that one can utilize or operate a computer to accomplish objectives. ITSE can boost a person's self-assurance in recognizing academic assignments, establishing standards for crucial activities to finish and accepting accountability for their own achievement in meeting their academic objectives. The computer skills and knowledge working with self-efficacy (SE) is an evaluation of someone's capacity to find out a specific task successfully.

A Self-efficacy model for remote working has been developed. In 2020, in the time of pandemic, COVID-19 enforced large community of people worldwide to work remotely for companies and organizations that were probably not ready for this change. Many of these people had little to no prior experience with remote work. Businesses that understand the art of conducting remote work activities and raising employee SE assessments, do better when implementing remote work policies.

The emergence of Generation Z those born between 1997 and 2012 has transformed the educational landscape. Often referred to as digital natives, these students have been immersed in technology from an early age [1], [2]. While their familiarity with digital tools is assumed to be high, research increasingly suggests that comfort with technology for personal use does not necessarily translate to confidence in academic or research-related technology use [3], [4]. This gap highlights the importance of exploring information technology (IT) self-efficacy, defined as one's belief in their ability to successfully perform tasks using technology [5].

IT self-efficacy influences how students approach digital tasks, solve problems, and engage in academic environments [6]. For research students, particularly those in Generation Z, strong IT self-efficacy may enhance their ability to navigate data analysis tools, research management systems, and collaborative digital platforms. Conversely, low self-efficacy can lead to technological avoidance, decreased engagement, and academic stress [7].

Problem Statement

Despite widespread technology integration in higher education, disparities persist in how effectively students use digital tools for academic purposes. Many Generation Z students exhibit confidence in everyday technology use but struggle with specialized academic applications (e.g., reference management, statistical software, or online collaboration systems). Understanding how these students perceive their IT self-efficacy and how it affects engagement and academic performance is essential for developing effective instructional and support strategies.

Research Questions

1. How do Generation Z research students perceive their own IT self-efficacy?
2. How do factors influencing Generation Z students affect their confidence in using technology for academic tasks?
3. How does IT self-efficacy impact their engagement with digital tools in learning environments (e.g., coursework and research)
4. How do the consequences of low or high IT self-efficacy affect academic performance, problem-solving, and interaction with peers and instructors?

LITERATURE REVIEW

The concept of self-efficacy originates from [7] social cognitive theory, which posits that belief in one's ability to perform a task influences behavior, motivation, and performance. In the context of technology, [5] extended this notion to "computer self-efficacy," now commonly referred to as IT self-efficacy. Research consistently indicates that students with high IT self-efficacy are more likely to explore new tools, persist in challenging digital tasks, and exhibit higher academic achievement.

Generation Z students are often assumed to possess innate digital competence. However, several studies [4], [11] suggest that digital nativity does not automatically ensure technological mastery. While Gen Z students are proficient in social media and mobile applications, their academic technology usage often lacks depth and strategic understanding. Hence, educators must differentiate between "digital familiarity" and "academic digital competence."

Generation Z is uncovered to the net as early as three years old. Generation Z is normally characterized as owning a heightened feel of self- awareness, independence, and motivation in evaluation to previous generations [8]. [9] revealed that the advancement of technology has changed how one learn and gain knowledge. However, the Internet offers quick access to information technology across a variety of domains, which boosts productivity and saves time.

The moderating influence of creative self-efficacy and the mediation effect of information sharing in the aforementioned direct relationship assessed [10]. The results demonstrated the important effects of creative work practices and self-leadership. Furthermore the outcomes validated creative self-efficacy's mediation function in the relationship between these two attributes. Furthermore there was a stronger correlation between innovative work behavior and self-leadership when there was a greater exchange of knowledge.

IT self-efficacy is shaped by multiple variables, including prior technological exposure, perceived ease of use, social encouragement, and institutional infrastructure (Venkatesh & Bala, 2008). Peer collaboration and positive feedback reinforce confidence, while negative experiences or inadequate support diminish it. These influences are especially relevant for research students, whose academic success often depends on complex digital tools for data collection, analysis, and dissemination. IT self-efficacy influences both behavioral and affective dimensions of learning. High self-efficacy enhances digital engagement, promotes problem-solving persistence, and fosters autonomy [4].

The research investigated the effects of technological self-efficacy beliefs (TSE) on occupational commitment and desires for occupational mobility accounting for the possibility of automation and developmental assistance as contextual modifiers [12]. Both directly and through the mediation effect of professional dedication, the study found a negative connection between TSE and plans for occupational mobility. The relationship between TSE and mobility intention was higher in jobs with low to medium automation potential which was contrary to the expectations. The significance of the research findings for enhancing comprehension of the possible impacts of technological progress on career mobility and offering useful recommendations for equipping workers to adapt to evolving work settings.

METHODOLOGY

A qualitative, phenomenological research design was adopted to explore the lived experiences of Generation Z research students regarding their IT self-efficacy. This approach allows a deep understanding of participants' subjective perceptions and the meanings they attach to their technological engagement [13]. Rather than quantifying attitudes, the study sought to interpret participants' reflections, narratives, and emotions surrounding their digital competence within academic contexts.

Participants

Sixteen M.phil and Ph.D research students participated in the study whom expressions were on the extreme ends regarding research questions, represented disciplines such as education, information technology, business, and the social sciences. All participants identified as members of Generation Z and were enrolled in research-oriented degree programs. Purposive sampling ensured that each participant had experience using academic technologies such as learning-management systems, referencing software such as NVivo for qualitative data-analysis

Participants' pseudonyms were used to maintain confidentiality. Ethical approval was obtained from the institutional review board, and informed consent was secured prior to each interview.

Data Collection Procedures

Data were collected through semi-structured interviews conducted face to face to accommodate participants' schedules. Each interview recorded lasted between 45 and 60 minutes. Initially the interviewer read and transcribe each interview discussion. Then assigned codes to the texts, a code was a word or short phrase that assigns attribute to certain data. Further the interviewer highlighted words and phrases that were present in both interviews in the initial coding. After the initial coding, the interviewer scrutinized the data

line-by-line in order to ensure that no codes were missed. The interviewer then sorted the data from coded words into categories. This type of categorizing allowed the codes to have a sense of order. Once categories of similar words had been obtained by reviewing the coded words, the interviewer then looked into common reoccurring themes as clusters of meaning that form from central ideas from interviews. The final step of the coding process involved a deep and comprehensive review of the resulting themes that methodically led to the development of several common themes. Coding was considered a judgment call because researchers bring different aspects to the process, such as biases, temperaments, penchants and coincidences.

Data Analysis

Thematic analysis [14] was employed following six-phase framework: familiarization, coding, theme generation, reviewing, defining, and writing. NVivo software assisted in organizing codes and ensuring consistency. Initial open coding produced 65 codes, which were subsequently collapsed into three major themes aligned with the study's research questions. Reflexive journaling was maintained to minimize researcher bias and ensure transparency in interpretation.

Trustworthiness and Credibility

To ensure rigor, the study applied [15]. [16]. [17] criteria of credibility, dependability, confirmability, and transferability. Member checking was used: participants reviewed summaries of their transcripts to verify accuracy. Peer debriefing with two fellow researchers helped refine thematic categories. Detailed descriptions of context and participants were provided to enhance transferability.

FINDINGS AND THEMATIC ANALYSIS

Analysis of the interviews yielded three central themes reflecting the multidimensional nature of IT self-efficacy among Generation Z research students:

1. Confidence in using digital tools of generation Z research students
2. Frustrations with technology of generation Z research students
3. Impact on academic outcomes of generation Z research students

These themes were elicited by common categories among the interviews. They represent perspectives of a small sample size of the generation Z research students' population. Each theme was presented as a descriptive trait with its own set of sub-themes and commonalities figure. 1 Thematic analysis by [14]. The interview participants shared their beliefs and current experiences. Figure 2 provides a visual of the main themes and sub-themes that emerged from the qualitative data.

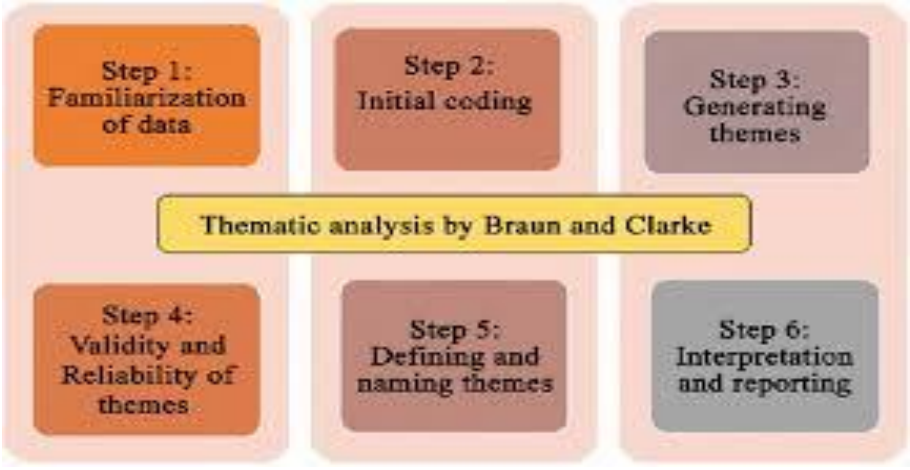

Figure. 1 Thematic analysis by Brun and Clarke (2006)

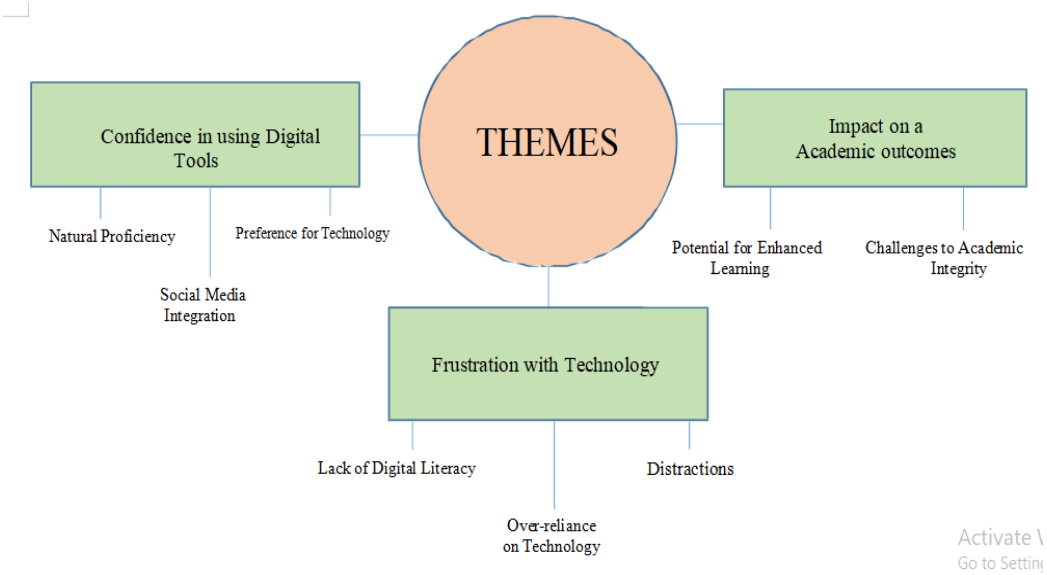

Figure. 2 Interview' themes and sub-themes.

All sixteen participants from the interviews discussed how they were confident in using digital tools. There were three categories related to this theme: Confidence in using Digital Tools; Impact on a Academic Outcome; Frustration with technology. Further the theme "Confidence in using Digital Tools have sub themes; Natural proficiency; Preference for technology; social media interaction. Impact on an Academic Outcome have sub themes Potential for enhanced learning; Challenges to Academic Integrity. Frustration with technology have sub themes; lack of digital literacy over reliance on technology and Distraction. Figure 2 offers a visual of the first theme that emerged from the interviews.

Theme 1: Confidence in using Digital Tools

M.Phil and Ph.D research students of generation "Z" were aware of the importance to use digital tools. Research students acknowledged that interviewees were naturally proficient in using digital tools and they prefer to use latest technology and social media integration.

Natural proficiency

Natural proficiency was discussed at length. When the researcher posed the question that asked the participants to explain the kinds of resources available to them in their personal life that would help assist them in difficult situations, interviewees emphasized on learning and skill development. One responded # 4 states that:

I believe that my digital literacy and computer self-efficacy are directly related. I mean that I could increase my knowledge and proficiency in the digital world since I feel comfortable utilizing computers to support my learning in online courses. I could increase my self-efficacy in concurrent computer use in this way.

Another respondent # 5 while in the interview quoted that "I referred to as digital natives, have grown up with technology and are generally comfortable and proficient with various digital tools and platforms."

Another sub theme was discussed with few of the participants regarding their Problem Solving and Critical Thinking One participant #16, explained that:

I used digital tools like smartphone, computer and software's for my problems solving and critical thinking. I usually use different software for seeking the basic ideas from the different sources of such as google, You tube, Chat GPT, google scholar, linkedin, science direct, J store and different depositories some-for help out in research such as Matlab, Meta Horlistic, Python R-language are these purchased tools which enhance my learning.

Theme 2: Influential Factors Shaping IT Self-Efficacy

Frustration with Technology

The next theme got split from the discussion responses from research student's during the interviews was 'Frustration with Technology". Few of the respondents elaborated that everyone has not enough skills to navigate current era's gadgets and today's technological instruments, such as smartphone usage and its complex integration for the end users. Few of the researchers get frustrated while using the research tools and with its much complexes results with overloaded information to filter out the valuable contents. On the other end IT self-efficacy plays a vital role to achieve in their academic goals and tasks if literate good enough in IT self-efficacy and they get more excitement while learning and achieving their goals. In support of this version. The theme is shown below:-

Lack of digital literacy

The next sub theme extracted from the discussions with the research students was "Lack of digital literacy". Respondents # 5 have view point that "People having less digital native and proficient in using smart phones feel much frustrated as some times they are unable to use their banking app for online transactions and transfer of funds"

In support of the former version of the research Respondents # 4 second his stance and quoted as "Some people got much frustrated due to not able to upload their resume or fill online applications for jobs hunting and even don't know how to upload their credentials as per format required due to less IT self-efficacy".

Over reliance on Technology

The next sub theme extracted from the outcome of the interviews was "Over reliance on Technology" as digital native most of the generation "Z" research students become dependent on technology to illustrate their viewpoint, as when the system fails and all the things get paralyzed. Respondents # 7 quoted as "I feel down when the Wi-Fi's signals get disconnected. Of if GPS glitches, I could not navigate or interact with peers and friends. In such situations technical glitches create chaos".

Few of the interviewees have view point regarding the over reliance on technology's setbacks and stated as under

Sometime technology failed or crashed and over reliance on technology resultantly give frustration and enhanced anxiety such as if a supermarket unable to process cash bills due to billing system crashed. Or sometime they got so much confused and in the state of doubt while using the calculator as they don't do mental math.

Distractions

The next sub theme taken from the results of the discussion with research students was "Distractions". Most of the generation "Z" research students get distracted become sometime they struggle to stay active and

vigilant or attentive but social media notifications distract their attention and focus to achieve their goals. Respondents # 11 quoted that "When I am completing my academic tasks and assignments during the process constant pings of WhatsApp notifications distract my attention and steal my focus and productivity".

Majority of the respondents expressed that they were mostly concentrated regarding their assignments to be completed on time but indulgence of social media winks time and again distract their attention and they got involved every few minutes in socializing with friends and groups resultantly due to non-compliance of instructions by the teachers to submit their assignments on time resulted into embarrassment.

Theme 3: IT Self-Efficacy and Digital Engagement, Impact on academic outcomes

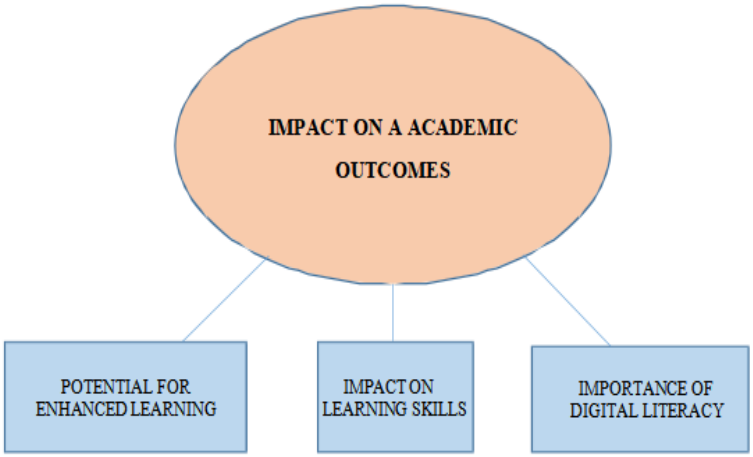

Figure 3. Main themes and sub-themes

Respondent # 15 stated that

The advancement of technology, digital tools, and innovative teaching methods has significantly influenced academic outcomes, offering new ways to enhance learning, engagement, and overall student success". Integrating technology and digital strategies in education improves learning experiences, making them more interactive, accessible, and effective.

Respondent # 8 expressed that "the integration of AI, digital tools, and interactive learning strategies in education has transformed academic outcomes, making learning more personalized, engaging and accessible. Institutions that adopt these technologies see improvements in student success, knowledge retention and overall academic performance."

Respondent # 4 stated that

The integration of technology and innovative learning methods in education has a profound impact on learning skills, shaping how students acquire, process and apply knowledge. Technology enhances cognitive abilities, critical thinking, collaboration and problem-solving, leading to improved academic outcomes.

Furthermore, social learning tools foster collaboration and communication among students, helping them develop essential skills for academic and professional success. Tools like Tinkercad or Minecraft Education Edition allow students to apply design thinking to real-world problems, encouraging innovative solutions.

Platforms such as Adobe Creative Cloud and Canva enable students to create digital art, video content, and graphics, fostering creativity.

Finally the Respondent # 16 expressed their viewpoint that

Technology significantly enhances learning skills by promoting cognitive development, improving collaboration and communication, fostering digital literacy, and encouraging creativity". With personalized learning, engaging tools, and flexible, accessible resources, students are better equipped to master key skills that lead to improved academic outcomes.

Respondent # 15 students expressed that "Digital literacy has become a foundational skill in the modern educational landscape, influencing academic outcomes significantly". As technology continues to shape the way someone learn, work, and communicate, students' ability to navigate digital platforms, critically evaluate information, and use digital tools effectively was crucial for their success in both academic and professional settings.

Respondent # 1 expressed that

Digital literacy was crucial for academic success as it enables students to access a broader range of resources, critically assess information, collaborate efficiently, and develop essential skills for the future". The importance of digital literacy extends beyond academic outcomes it prepares students for lifelong learning and success in an increasingly digital world. By fostering digital literacy, educational institutions can help students thrive academically and professionally.

High levels of IT self-efficacy translated into active and creative engagement with digital tools. Confident students were more likely to integrate technology strategically into their coursework and research.

Summary of Themes

Generally, the analysis revealed that IT self-efficacy is multi-layered phenomena that influenced Generation Z research students by initial experiences with social learning in the academia. Moreover, as much someone owns self-efficacy can fosters more digital engagement with high independence impact and strong academic achievements, conversely how low self-efficacy owns that correlates with avoidance, much stress with and less collaboration.

DISCUSSION AND INTERPRETATION OF FINDINGS

The research investigated the perceptions of Generation Z research students' concerning their IT self-efficacy and explored how this firm belief fosters their engagement with digital gadgets and academic performances. The study's outcomes based on thematic analysis revealed that IT self-efficacy is complex and not completely strong among Generation Z learners, though they are considered to be as "digital natives". The interviewee in general perceived themselves as commendable digital natives and good users of latest technology but less confident while using specialized academic applications. These finding correlates [4] argument that digital nativity does not equal to digital literacy. The research students were self-assured in familiar digital environments but hesitant while applying latest technology in the research-focused contexts, likewise data analysis tools, managing references or digital collaboration.

The theory of self-efficacy explained by [6] describes the much perceptions developed through multi-layered experiences, social persuasion and emotional stability. Resultantly, less mastery experiences in academic tools and technologies leads to low IT self-efficacy among Generation Z research students. The

current study findings correlates with the previous studies conducted that IT self-efficacy is influenced by initial experiences, institutional support, peer's collaboration and personal enthusiasm (Venkatesh & Bala, 2008). The students who initially used to with computers and digital tools and received proper guidance from competent mentors feels capable; conversely, who did not received proper guidance and use less digital tools felt frustrated. The collaboration of peer was most influencing while learning through informal networks and shared problem-solving helped students to build confidence.

The findings are aligned with social cognitive theory, which suggests that through mastery experiences develops confidence along with social persuasion and sociological regulations (Bandura, 1997). Enhancing students' capability and willingness to experiment with technology and overcome fear of failure with the help of Peer and instructor's support acted as positive reinforcements. Moreover, high self-efficacy students demonstrated proactive, strategic use of technology, integrating it into their academic workflow. IT self-efficacy significantly influenced students' engagement with digital tools. This supports findings by [4], who revealed that research students having strong IT self-efficacy are more liable to use technology innovatively and persistently.

Conversely, the research students having low self-efficacy try to avoid accomplish tasks and most often relied on others. Moreover, students with low self-efficacy often restrict themselves to basic functionalities and avoid challenges. This sociological behavior perceived them "self-handicapping" phenomenon, where individuals restrict themselves from perceived failure by avoiding tasks that judge their competence [19].

The consequences of IT self-efficacy extended well beyond technical performance into realms emotional states, cognitive and interpersonal dimensions. The students having high self-efficacy testified a sense of sovereignty and accomplishment of digital tasks positively that influenced their academic performances. Conversely, low-efficacy students most of the time experienced hesitation, anxiety and a reluctance to engage themselves in digital environments.

These findings are aligned and consistent with Paraskeva, Bouta, and Papagianni (2008), who revealed that low IT self-efficacy correlates with less motivation and engagement. Likewise, students having low confidence were less confident to communicate with peers and instructors online or to participate in distance learning academic groups, which leads to reduce academic integration.

Theoretical Implications

The research reinforces the assertion that self-efficacy is context-dependent and build through experiential learning Bandura's (1997). It encompasses this theory by insertion of IT self-efficacy within the specific framework of 'Generation Z' research students and significantly, revealed that "digital natives" also required intensive academic support in order to obtain general digital fluency to be translated into academic technology competence.

Practical Implications

The practical implications of outcomes of the study are that institutions should emphasize the need to go beyond assuming technological competence among Generation Z research students. Moreover, universities should offer and formulate programs to provide digital literacy, emphasizing academic software and technologies, research databases and digital platforms. Peer's mentoring and scaffolding should be engaged in academic curriculum to boost their confidence and sustain engagement.

RECOMMENDATIONS

Based on the comprehensive findings of this study, some practical recommendations are suggested that Academic-specific software like NVivo, SPSS, EndNote and concerted research tools should be implanted in technology training in the universities to incorporate into research curriculum. The study also recommend that universities should promotes knowledge-sharing groups where students can share digital skills and techniques, which could help them to boost their self-esteem and teamwork and further to promptly resolve technical issues, should conduct research students' online tutorials, workshops, seminars and easily available IT helpdesks.

Furthermore, the educators can facilitate steady development of students' self-efficacy by boosting their technological learning, encouraging them to evaluate strengths and weak areas where they need to improve further. It is also proven fact that not every single student begins with the same level of digital confidence, which include several dimensions of learning pathways that may suit in a befitting manner through a range of IT skills. These tactics can thus be implemented in educational institutions which may foster an environment that will encourage Generation 'Z' students to be confident with technology and achieve academic accomplishments and goals

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