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The effectiveness of using Google educational apps to develop self-efficacy among education technology students

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ABSTRACT

This study investigates the effectiveness of Google Educational Apps in enhancing self-efficacy among education technology students at Minia University. Utilizing a quasi-experimental design, the research involved 28 graduate students from the Special Diploma in Education Technology, who engaged with an educational website developed on Google Sites. Multiple assessment tools, including performance tests and self-efficacy measures, were employed before and after the intervention to evaluate skill acquisition and changes in self-efficacy levels. Statistical analyses indicated both significant improvement in both self-efficacy and performance scores, with the large effect size indicating substantial gains in learning. Performance test scores improved substantively from pre-test (M = 19.64) to post-test (M = 50.11), and self-efficacy levels also grew substantially ($t = 63.69$, $p < 0.001$; $\eta^2 = 0.993$). These results confirm the large-scale positive relationship between usage of Google Educational Apps and improved technological competence and learner confidence. The study highlights the importance of cloud-based applications in meeting the evolving needs of the digital learning environment. It recommends the use of such apps at universities to improve student participation, foster collaborative learning, and prepare future educators for technology-rich classrooms. The results provide real-world implications for enhancing educational quality by strategic technology adoption.

KEYWORDS: Google educational apps, self-efficacy, educational technology, higher education, technology integration

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1. Introduction

The ICT revolution has created an unprecedented wave of development and change in various fields, especially in the field of education, due to the Internet speeds available to users and educators constantly searching for the best ways, and the means to provide an interactive learning environment, to attract the interest of learners, and to encourage them to interact and share their views and experiences. Many institutions have tended to make their applications available for use through the Internet, including Google, which raises the slogan "Cooperation and partnership for successful education" because it provides tools that contribute to the service and development of educational institutions [1][2].

Google apps are an advanced cloud computing model that significantly enhances communication and knowledge sharing in educational environments. Through tools such as Google Sites and Google Docs Editor, learners can participate in collaborative digital writing, enhancing their interaction and creativity. Studies show that using these tools facilitates teamwork, helping students develop effective collaboration and communication skills [3][4]. The desire to use Google Docs reflects students' understanding of its importance in their school life, allowing them to improve the quality of their work and increase their participation[5]. Google apps also play an important role in developing learners' self-efficacy, as individuals who trust their abilities tend to confront challenges confidently. This positive belief enhances their willingness to participate and risk learning [6] [7] [8]. Using these educational tools enhances trust and encourages positive interaction between students, leading to a rich and effective learning experience. Google Apps is a powerful way to support learning and enhance academic effectiveness, making it an ideal choice for educational institutions seeking to improve educational quality and learner experience [9].

Self-efficacy, a leading concept in educational psychology, is the expectation that individuals possess in their ability to complete tasks, influencing motivation, persistence, and engagement, especially in challenges like learning computer tools[10][11]. As much as interest in technology adoption for learning continues to grow, very little is known about computer tools and self-efficacy in universities. Previous studies have considered technologies like Google Apps for collaboration and competence achievement but not the immediate impact on self-efficacy among education technology students[12][13]. This study bridges the knowledge gap by examining the relationship between Google Educational Apps and self-efficacy, attempting to link technological interventions with psychological outcomes. This study offers educators valuable insights into how to build confidence, digitally literate pre service teachers.

1.1 Problem Statement

The current research problem originated from multiple sources, including:

(a) **Field observation:** To ascertain the extent to which education technology students acquired the skills of using Google Educational Apps, researchers conducted a survey that saw (84) students from graduate studies, and students from the 4th Division of Education Technology about their use of Google Educational Apps in the educational process. The results of the survey showed a consensus (69.4%) of students that they did not use Google applications in educational respects. To ascertain the level of self-efficacy of education technology students in the academic aspects of education technology, the researcher applied a measure of self-efficiency to (84) graduate students, fourth division students, Department of Education Technology, the results of the survey showed that (77.1 %) of students have lower than average grades in the scale, as we collect (78.2%) Students will improve their performance in developing their competence. Thus, there are inadequacies in the performance of education technology students in the recruitment of Google educational applications on the other hand, as well as students' subjective inefficiency in academic aspects in the field of specialization.

(b) **Results of previous studies:** Relevant studies recommended, inter alia, the use of cloud computing applications to develop diverse practical skills [1][2][14]. It also noted that Google's educational applications can be used as a technical catalyst to enhance self-efficiency in innovative ways, by integrating technology education. Google Apps allows knowledge and information sharing for everyone, supports continuing education systems for learners, and provides them with new environments and connections that help them develop their competencies.

1.2 Research Questions

Building on the above, the research problem has been formulated to address the following primary question: What is the effectiveness of gaining the skills of using Google Educational Apps in developing the self-effectiveness of education technology students?
The following sub-questions emerged from the Chairman's question:

(a) What has been the impact of using an educational website in gaining education technology students the skills of using Google's educational apps?
(b) What is the impact of the use of an educational website on the development of education technology students' self-sufficiency?
(c) What is the relationship between acquiring the skills of using Google Educational Apps and students' self-efficacy towards specialization?

1.3 Research Objectives

Current search objective to:

- Education technology students gain the skills of using and employing Google's educational applications in the field of specialization.
- Developing the self-efficacy of students in the Department of Education Technology by acquiring the skills of using and employing Google Educational Apps.

The importance of current research is that it can contribute to responding to the demands of many technical and educational professionals that modern technologies, such as Google Educational Technologies, should be integrated into education to keep pace with modern technological developments. While the necessity for digital integration in the classroom is well-established, there remains a clear absence of empirical studies focused on the impact of Google Educational Applications on the self-efficacy of education technology students within institutions of higher education. This research tries to fill this gap by evaluating the effectiveness of a methodically designed intervention offered via Google Sites, intended to enhance technological proficiency as well as self-efficacy among students in the discipline. By situating this research within the broader discourse on digital literacy and learner empowerment, the research provides empirically grounded insights into the double role of cloud-based learning tools in facilitating skill development as well as the psychological preparedness necessary for effective engagement with technology-supported learning spaces. These are especially pertinent findings for guiding pedagogic practice that seeks to prepare prospective teachers with the skills needed to cope with and direct in digitally rich learning environments.

2. Related Work

The theoretical framework included two axes, which are dealt with in some detail below:

2.1 First axis - Google Educational Apps

Google's educational apps, especially Google Apps for Education (GAFE), play an important role in enhancing learning experiences across educational phases, by facilitating innovative teaching methods, increasing student interaction, and streamlining teacher management functions. Research suggests that GAFE can effectively support early childhood education by providing interactive tools that promote creativity and collaboration among children [15]. A comprehensive assessment of the educational applications available on Google Play highlights the importance of selecting appropriate applications that are in line with educational objectives, focusing on criteria such as age suitability and coverage of diverse areas of learning [16]. In the area of distance learning, Google Suite for Education has proven effective in enabling teachers to manage classes online, conduct assessments, and facilitate communication using platforms such as Google Classroom and Google Meet [17][18]. Although many teachers adopt these tools, some face challenges in making full use of all available applications, underscoring the need for ongoing training and support for teachers [19]. At the same time, some teachers consider that relying on digital tools may reduce the effectiveness of traditional teaching methods, necessitating a balanced approach that combines traditional technology and practices to achieve the best educational outcomes.

2.2 Second axis - Self-efficacy

Self-efficacy plays a crucial role in the educational process, influencing both teachers and students in diverse contexts. Research has shown that teachers with high levels of self-efficiency tend to adopt positive attitudes toward inclusive education and more effective classroom management [20]. For students, self-efficacy is linked to achieving outstanding academic performance through strategies such as goal setting and self-regulation that enhance their confidence in their abilities [21]. Moreover, the evidence has been found to support that educational technology has the capability to increase self-efficacy in students to a great extent, as it enables personalization and increased autonomy in learning [22]. While self-efficacy is typically regarded as a positive trait in education, an overabundance of confidence may lead to complacency, potentially impeding learning and growth. Therefore, it is essential for both teachers and students to strike a balance between self-efficacy and realistic self-assessment, as illustrated in **Table 1.**

Table 1: Recent Studies on Google Educational Apps, Self-Efficacy for Education Technology Students

Author	Methodology	Results	Comment
S. F. Oyeleye, I. O. Agboola, O. O. Folorunsho[23]	Descriptive survey research design with a sample of 173 undergraduates from the University of Ibadan, Nigeria. A multistage sampling technique was used, and data was collected via a structured questionnaire.	(1) High level of computer self-efficacy among undergraduates (Mean = 3.33). (2) 91.3% reported using Google Cloud Platform (e.g., Gmail, Google Docs, Google Drive). (3) 65.7% were daily users of Google Cloud. (4) Slow data entry and downloading were identified as major challenges.	The study emphasizes the significance of cloud computing for personal information management among undergraduates, suggesting the potential for enhanced academic and social benefits if students broaden their use of cloud platforms beyond just Google.
Noornadiah Md. Sari & Khoo Yin Yin[24]	Quasi-experimental study using pre- and post-questionnaires, involving 207 Form Six economics students selected through random cluster sampling.	The experimental group using Google Classroom showed significantly better self-efficacy in economic learning compared to control groups, as confirmed by ANOVA analysis.	The study highlights the positive impact of Google Classroom on self-efficacy, suggesting its effectiveness in enhancing collaborative learning environments.
Ahmad Awwad, Ashwaq Hoorani, Amnah Abo Mokh[25]	Review of previous studies focusing on the impact of Google Apps in education, assessing their effectiveness in achieving learning goals.	The significant positive impact of Google Apps on student achievement. Improved communication between faculty and students, increased collaboration, and development of technical and social skills.	Google Apps help overcome the challenges of 21st-century educational goals by enhancing collaboration, communication, and skill development in learning environments.
A.A. Bilyalova, E.N. Gilyazeva, G.M. Polkina[26]	An experimental study using the Google Classroom platform with university students. Four components of self-educational competence (motivational, active, cognitive, evaluative, and reflexive) were analyzed.	Significant improvement in self-educational competence was observed in the experimental group using Google Classroom compared to the control group. Components of self-educational competence were positively impacted.	The study emphasizes that modern digital educational tools like Google Classroom effectively enhance students' ability to self-educate, highlighting the importance of integrating these platforms into university settings.

Author	Methodology	Results	Comment
Xiaoyuan Chen [27]	Survey of 71 students from a Chinese vocational institute using the "College Students' Internet Learning Self-Efficacy Questionnaire" (Xie, 2011). Semi-structured interviews were also conducted.	Exposure to educational technology significantly improves learners' internet self-efficacy. Key factors like gender, grade, and discipline influence self-efficacy.	The study highlights the importance of carefully integrating educational technology into teaching to enhance students' internet confidence. Teachers should focus on quantity, quality, and method.
Munirah Ghazali, Vassilios Makrakis, Nelly Kostoulas-Makrakis, Nanung Agus Fitriyanto [28]	Principal component analysis (PCA) to develop a self-efficacy measurement for ICT-enabled education for sustainability (ICTeEfS). Multiple regression analysis to test predictors with 1815 teachers.	Teachers' knowledge of sustainability and ICT competence were significant predictors of ICTeEfS self-efficacy. Gender showed no significant effect. Urban teachers exhibited higher self-efficacy than rural teachers. Novice teachers showed higher predictive power in ICTeEfS self-efficacy.	The study highlights that while teachers possess ICT skills, gaps remain in effectively integrating them pedagogically for sustainability education. Resources and support influence teacher self-efficacy, especially in urban areas.
Maman Suryaman, Kriswanda Krishnapatria, Arip Solehudin[29]	A qualitative case study investigating the impact of Google Drive on self-regulated learning (SRL) management. In-depth investigation focused on G-Drive's role in learning management and student self-regulation.	Google Drive improved learning management by enhancing teaching materials, self-assessment, communication, and learning tools. It also fostered active learning, metacognition, motivation, and responsibility in students.	The study shows that Google Drive significantly contributes to effective learning management and self-regulated learning, promoting student responsibility and engagement in independent learning.
Rahmah Rahmah, Wardono Wardono, Sugiman Sugiman[30]	A quasi-experimental study with two groups (experimental and control) of seventh-grade students at MTsN 3 West Aceh. The experimental group used Creative Problem Solving with Google Classroom, while the control group used Discovery Learning.	(1) The experimental group showed significantly higher mathematical literacy than the control group, with a t-value of 5.75 > 1.99. (2) The experimental group also had a greater increase in literacy with a t-value of 2.89 > 1.99. (3) Self-efficacy contributed 49.4% to the mathematical literacy of students in the experimental group.	The study indicates that Creative Problem Solving assisted by Google Classroom effectively enhances students' mathematical literacy, with self-efficacy playing a critical role in the improvement.

Author	Methodology	Results	Comment
Justin Michael Locketz [31]	Qualitative phenomenological research design using activity system theory and a self-directed learning schema. Conducted face-to-face interviews with six school administrators in California.	1. Collaboration motivates learning and use of Google Apps for Education. 2. Familiar objects (Production) help administrators transform their usage. 3. Organizational environments impact the effectiveness of informal learning.	The study suggests the need for creating a culture of self-directed learning and aligning resources to support systemic technological change for successful adoption.

Researchers consistently emphasize the positive impact of Google education software on students' self-efficacy, collaboration, and studies. They discover through research that Google Cloud and Google Classroom software aid in strengthening the confidence of students, enhance communication, and involve them in co-learning. They discover that Google software has helped strengthen students' academic capabilities and foster their levels of confidence while utilizing computer-based technologies in learning environments. Overall, the research highlights the revolutionary potential of Google apps in current education, supporting improved pedagogical practices and encouraging greater student motivation.

2.3 Research Assumptions

1-There is statistically a difference between the average scores of the research group in tribal and post-measurement of the student assessment card in the skills of using Google's educational applications in favor of dimensional measurement.

2-There is a statistically differential D between the average scores of the research group in tribal and post-measurement of self-efficiency measures in favor of dimensional measurement.

3-There is a correlation between the acquisition of Google's educational application skills and the subjective competence of education technology students towards specialization.

3. Materials and Methods

3.1 Research Curriculum and Sample Size

The current research is based on the semi-experimental method of measuring the impact of the independent variable on the dependent variable and follows the tribal and post-group application method, where measurement tools (performance test, evaluation card, self-efficiency scale) are applied before the trial. The experimental processing, which is an educational website designed using Google Sites, is then applied to give students the skills to use and employ Google's educational apps. Then, measurement tools (performance test, evaluation card, self-efficiency measure) are reapplied after the experiment to measure results.

The study employed a quasi-experimental approach involving two distinct groups: survey group of 9 students for preliminary piloting and pilot group of 28 students for the main test in the 2022-2023 academic term. Purpose sampling was used to obtain the pilot group, representing 30% of the population of students, to make it generalizable to the research interest in the impact of Google Educational Technologies on the competence and self-efficacy of students. The method provided enlightening data regarding the integration of these technologies within higher education, but subsequent studies could be enhanced by randomization to increase generalizability and reduce possible biases.

Measurement Tools

Develop a questionnaire to identify Google's most important educational applications that contribute to the development of self-efficacy:

The identification was aimed at identifying Google's educational applications that contribute to the development of knowledge management skills and self-efficacy of postgraduate students in the Department of Education Technology of the Faculty of Quality Education of the University of Minia. Its preparation was based on

previous studies and research on Google's educational applications. The resolution in its initial image included 8 apps, including Google Search Engine, Google Documents, Google Sites, and Google Blogs. The questionnaire was presented to 15 arbitrators to assess the contribution of apps, with results showing 100% of arbitrators agreeing with the importance of the three apps (search engine, Google docs, and Google sites) in developing students' knowledge management skills.

(a) **Identify the list of basic and sub-skills for Google Educational Apps:** The identification was aimed at identifying the basic and sub-skills students should master to produce projects using Google's educational applications. The questionnaire is designed based on literary reviews and previous studies. The questionnaire included three main themes: Google Search Engine Skill, Google Document Creation Skill, Google Website Creation Skill, and included 3 Main Skills and 24 Sub-Skills.

The preliminary identification was presented to 25 arbitrators in the fields of education, technology and computer science. The results showed that 96% of arbitrators agreed with the subskill membership of the main skills, and 100% acknowledged the importance of skills. Based on the observations, adjustments were made that included the deletion of some unnecessary sub-skills and modification of certain procedures. In its final form, the identification included 3 main skills and 20 sub-skills.

(b) **Skilled Performance Test:** The Skill Performance Test is designed to measure learners' acquisition of Google Search, Google Site, Google Docs and knowledge management skills (acquiring, storing, sharing, and applying knowledge). The test included three projects: searching for the topic of "Mental Maps" using the Google search engine with documentation of results, creating a website using Google Site titled "Mental Maps" with various pages, and preparing a document using Google Docs titled "Concept of Mental Maps" with sharing it with others.

(c) **Performance test evaluation:** Drafted in a clear and straightforward manner, the projects were presented to 13 specialized arbitrators to assess their suitability and measure their educational objective. The evaluation process relied on a 3-score performance measure for correct performance without directing to 0 in case of no performance or complete error. The test was proven valid for application after the proposed modifications were made.

(d) **Skilled scorecard:** The scorecard was developed to measure learners' performance efficiency in Google educational applications through the implementation of three projects. The card included three main themes: Google Search Engine Handling, Google Docs Creation, Google Websites Creation, plus 16 sub-skills.

(e) **Card design and evaluation:** The card's design was based on a skill analysis and was presented to 25 arbitrators to assess its accuracy and validity. Instructions included clarification of the objective and method of use, with a quantitative rating of performance ranging from 3 scores for excellent performance to 0 for unfinished performance. The card received 100% full approval from the arbitrators, proving its applicability.

(f) **Final picture:** After making the necessary adjustments, the card in its final form has 17 sub axes and provides an accurate and comprehensive tool for evaluating learners' performance in Google educational applications.

(g) **Self-efficacy measure:** It aims to assess students' levels of self-efficacy. It consists of 10 items, each answered on a four-point scale (never, rarely, often, always), with scores ranging from 10 to 40. Higher scores indicate greater self-efficacy, while lower scores reflect lower levels. The scale can be administered individually or collectively within 5–10 minutes. Scoring involves assigning 4 points for "always," 3 points for "often," 2 points for "rarely," and 1 point for "never." The maximum score is 40, allowing for an accurate evaluation of self-efficacy levels.

(h) **Constant:** The scale constant factor was determined by reapplying the scale at 15-day intervals on the same sample of 28 students. **Table 2** illustrates the stabilization factor by reassessing the self-efficacy metric (A).

Table 2: Stabilization coefficient by reprocessing the self-efficacy metric (A)

Variables	Average	Standard deviation	Constant Factor	Indicative level
First Application	6.85	3.57	0.63	0.01
Second application	17.28	1.62		

The previous table shows the following: The constant factor value is statistically significant at an indicative level of 0.01, giving rise to confidence in the results that can be achieved when using this measure. The following table shows the stabilization factor by reapplying the self-impulse scale (B), as illustrated in **Table 3.**

Table 3: Stabilization coefficient by reprocessing the self-efficacy metric (B)

Variables	Average	Standard deviation	Constant Factor	Indicative level
First Application	12.85	2.15	0.76	0.01
Second application	18.28	1.23		

The previous table shows the following: The constant factor value is statistically significant at an indicative level of 0.01, giving rise to confidence in the results that can be achieved when using this measure.

1.1 **Search Procedures**

Figure 1 provided a visual representation of the general flowchart steps involved in search procedures. This flowchart outlined the key phases and decision points that were typically encountered during the search process, guiding users towards efficient and effective information retrieval. The flowchart served as a valuable tool for understanding the underlying logic and structure of search engines and databases. It helped users visualize the different stages involved, from initiating a search query to analyzing the results and refining the search criteria as needed. By understanding the flowchart, users could gain insights into how search systems worked and optimize their search strategies to achieve better outcomes. In the following sections, we would have delved deeper into each step of the search process, exploring the specific techniques and algorithms employed by search engines to retrieve relevant information and present it to users in a meaningful way.

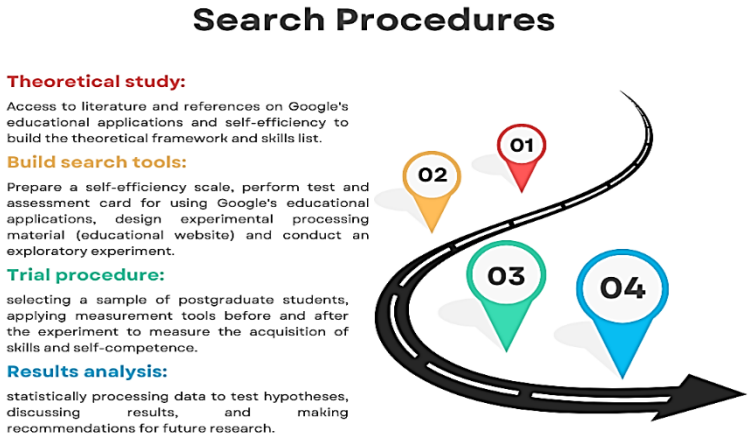

Figure 1: The Flowchart steps.

First - Theoretical study

- Explore studies, references, and literature on concepts related to Google's educational applications to strengthen the theoretical framework of research and build a list of skills.
- Examine studies, references, and literature on self-efficiency concepts to strengthen the theoretical framework and reach the measure of self-efficiency towards education technology.

Second - Building research tools

This phase has gone through the following steps:

(a) Analyze self-efficiency measures to assess the right measure for research.

(b) Prepare a list of skills to use and employ Google's educational apps and present them to the arbitrators to make the necessary adjustments and arrive at their final form.

(c) Development of measurement and evaluation tools:

- A performance test to assess the practical aspect of basic skills to use and employ Google's educational applications, and to present it to the arbitrators for authorization and calculation of its honesty and consistency.
- Evaluation card to measure the performance of students of the research group in the performance test, submit it to the arbitrators for their leave, and calculate their honesty and stability.

(d) Design, produce, and authorize experimental processing material to be presented to a group of arbitrators, make proposed amendments, and arrive at its final form.

(e) Conduct an exploratory experiment to document measurement applications and experimental processing material to ensure the clarity of content formulation, guidance, and the integrity of associations, calculate the veracity and consistency of tools, and make the proposed adjustments for application to the research group. The survey group students were subsequently excluded from the basic experience.

Third - Conduct the research experiment

This phase has gone through the following steps:

1. Selection of research sample: Students of higher studies - First Division of Private Diploma - Department of Education Technology, Faculty of Quality Education, University of Minia.
2. Application of pre-test measurement tools:
   - Performance test and assessment card to measure the level of students in the performance side of the skills of using and employing Google Educational Apps before starting the search experiment.
3. An application of experimental processing material which is an educational website based on Google Sites.
4. The application of measurement tools is dimensional:
   - Performance tests and evaluation cards to measure the impact of using the website to gain the skills of using and employing Google's educational apps.
   - Self-Efficiency Measure: To learn the relationship between acquiring the skills of using and employing Google educational applications and students' self-efficiency towards education technology.

Fourth - Deriving and analyzing findings statistically

Obtaining and statistically processing data to test the validity of research assumptions to arrive at, discuss, and interpret findings, and then submit conclusions, recommendations, and proposals for future research in the light of research findings.

4. Results and Discussion

First research question and first imposition

To answer the first question for research and verification of the first imposition: The researcher revealed the differences between the performance of the research group in the tribal and post-performance test applications that measure the performance component of the skills of using and employing Google educational applications by extracting the computational averages and the value (v) of the research group as shown in **Table 4.**

Table 4: Indication of the Difference between the Average Scores of Research Group Members in Dimensional Application of Skill Test and Evaluation Card (n = 28Cadets), (Grand End = 51 Degrees)

Variables	Computational Level	Standard deviation	Indication of Differences			effect size (η2)	
			Value (v)	Indicative level	Level of connotation	Value	Connectedness

Tribal Application	19.64	2.248	63.69	0.00	D. Statistically	0.993	high
Remote Application	50.11	.832					

Table 4 shows that a statistically different D between the average scores of members of the research group, in the tribal and post-measurement of the skill test and the evaluation card, where the "V" value was equal (63.69). And then the imposition is accepted because the difference is statistically D as shown in **Figure 2.**

Figure 2: shows Computational Level, Standard deviation, Value (v), Effect size (η2) of tribal and remote applications Performance Test.

This necessitated the calculation of the ETA box (η2) where its value was equal to (0.993), which indicates a high impact volume.

Second research question and second imposition:

To answer the second question for the research and verification of the second imposition: The researcher revealed the differences between the performance of the research group in the tribal and remote applications of the self-efficiency scale by extracting the computational averages and the value (v) of the research group as shown in **Table 5.**

Table 5: Indication of Difference between Average Scores of Search Group Members in Remote Application For the self-efficiency measure (n = 28pupils), (Grand end = 40 degrees)

Variables	Computational Level	Standard deviation	Indication of Differences			effect size (η2)	
			Value (v)	Indicative level	Level of connotation	Value	Connectedness
Tribal Application	11.61	1.499	67.588	0.00	D. Statistically	0.994	high
Remote Application	38.64	1.615					

Table 5 shows a statistical difference of D between the average scores of members of the research group, in the tribal and postgraduate measurement of the skill test and the evaluation card, where the "V" value was equal (67.588). And then the imposition is accepted because the difference is statistically D as shown in **Figure 3.**

Figure 3: shows Computational Level, Standard deviation, Value (v), Effect size (η2) of tribal and remote applications Self-efficacy scale.

This necessitated the calculation of the ETA box (η2) where its value was equal to (0.997), which indicates a high impact volume.

Third research question and third imposition:

To answer the third question for research and verification of the third imposition: The researcher calculated the correlation factor between the grades of the search group, between Google's educational applications and self-efficacy as provided in **Table 6.**

Table 6: Indication of correlation between the grades of members of the research group in Acquiring skills Employment of Google Educational Apps and Self-Efficiency (n = 28pupils)

Variables	Binding coefficient	Indicative level	Indicative Type
Google Educational Apps and Self Efficiency	0.746	0.00	D. Statistically

Extrapolating results in Table 6 show a correlation between the grades of members of the research group, in the acquisition of Google's educational application recruitment skills and self-efficacy, where the value of the correlation coefficient is equal (0.746) as shown in **Figure 4.**

Figure 4: shows the Correlation between Google's educational application skills and self-efficacy

The imposition is therefore accepted because it is statistically validated and there is a high correlation.

Through research hypotheses and from data obtained and processed statistically, and in the light of what was presented, the research results indicated that the use of Google Educational Apps has an effective impact and has even positively affected the performance of students of the performance-side search group. The research group's change is due to several reasons, including:

- The interconnectedness of Google Educational Services and the availability of all services according to the Gmail email contributed to the availability of various channels of communication and the integration of the educational website from the availability of services and powers within the site as well as the dialogue and discussion service through Google +, the availability of all Google services from adding and uploading videos on YouTube, uploading photos on the Picasa account are all Google educational apps.
- Students' participation in activities within the educational site has helped to increase opportunities for developing complex skills, such as: thinking at a higher level, collaborating, communicating, and providing a problem-solving plan that has led to a higher level of student performance.
- Using multimedia technology in delivering content and addressing learner senses is consistent with watching the finest details in skill performance through digital videos.
- Provide instant feedback by the teacher for the learner's responses while applying skills and follow up learners' step by step as they apply skills and evaluate them directly and send comments and annexes via the powers offered by Google Website Services as well as through Google Documents.
- The ability of the learner to control the number of views of digital videos and the ability to control instant suspension, submission, or return to see the most important exact details of skill.
- Using activities and tests where the educational site included many activities requiring the learner to answer them, which contributed to the learner's study of the rapporteur as well as the learner's search for more information through the Internet and the online library located on the educational site to perform educational activities.
- The site provides students with participation in content and educational activities where the learner's attitude from a passive recipient of information turns into a participant in the learning process. This has a positive impact on students' performance efficiency.
- Multiple interactions (simultaneous/asynchronous) within the site, including the dialog and chat room as well as the powers of Google Services to add comments and attachments to the site pages and display educational content on the site in the form of multiple texts, photos, written graphics, videos, various means of communication between teacher and learner, and continuous follow-up has increased learners' skills.
- Building positive communication and collaborative relationships among members of the research group has led to an exchange of experiences, support for learners in learning, and the exercise of skills in problem-solving, and self-reliance, as well as increased student competitiveness.
- Communication and collaboration during learning through the educational site and the tools provided by Google's networking and collaboration apps created an integrated learning environment for sharing experiences and acquiring information and knowledge, all of which helped to achieve high scores on the performance test.
- Fulfilling the tasks and mandates required by the educational site associated with the subjects of study and achieving the goals, resulted in a higher level of performance for learners. The availability of lecture

content throughout the educational site enabled students to follow their lessons, review them subjectively and support their self-learning concept.

The research results revealed that self-sufficiency significantly enhanced the performance of experimental group students. This is due to a series of key factors: the systematic identification of student-developed activities after every lecture, with strengths and weaknesses made obvious; diverse collections of individual and group work which ensured active participation and application of learned skills; and immediate feedback from teachers through Google educational software, improving student capability. In addition, the constructivist character of the learning environment and its interactivity supported higher-level cognition and student satisfaction. Integrating media, collaborative tools, and student autonomy into the Google-centric environment created an effective and flexible learning experience. Ultimately, proficiency in basic skills of utilizing Google Educational Apps assisted in building student self-efficacy, academic achievement, and organizational competence.

This study demonstrated marked improvements in both technical proficiency and self-efficacy among education technology students following structured engagement with Google Educational Apps. While the profoundly large effect sizes, particularly for self-efficacy, are questionable, a variety of reasonable and positive factors might account for these results. First, low baseline scores for self-efficacy indicate large scope for increase, and mastery learning, hands-on character of the intervention would have certainly hastened the process, consistent as it was with Bandura's theoretical expectation to learn self-efficacy via direct experience. That ceiling effect and sensitivity need consideration is without denial, it nonetheless being those post-tests below scale midpoint effectively evidenced room for growth further, and in directions of real change as opposed to overstatement thereof. In addition, the program's targeted motivation and readiness of participants can be regarded as having boosted the intervention effect, an asset rather than a limitation when considering targeted instructional design. While absence of a control group and small sample size limit generalizability and causal interpretations, compatibility of such results with the body of literature on educational technology makes such findings even more believable. Rather than interpreting the high scores as artifacts, they might be viewed as evidence of the potential of targeted practice-focused digital learning environments if brought into line with learners' interests and needs. Subsequent studies would do well to build on these encouraging results by employing more rigorous designs and examining moderating variables to advance knowledge regarding for whom and under what conditions such tools are most likely to be effective.

5. Limitations

While the study effectively demonstrates the positive impact of Google's educational apps on self-efficiency, it is important to acknowledge some limitations. First, the sample size of 28 students, although sufficient for study, may not be representative of all students of education technology. The quasi-experimental design with nonrandom assignment leaves the door open for confounding variables, thereby limiting the causal inferences. Additionally, self-report measures have the potential for response bias, and the absence of a control group further undermines the internal validity of the study. To increase the generalizability of the study, future research would include larger, more diverse samples. Moreover, the semi-experimental research design of the study—drawn from pre-existing instructional kits and not randomized—prevents variables from being separated, and it is unlikely that changes in self-efficacy can be attributed to the utilization of Google's educational apps exclusively. Finally, the study's focus on a single cohort of students, namely those of the Department of Education Technology, restricts the generalizability of results to other educational contexts. Besides, the research also concentrated on developing self-efficacy through a specific curriculum. Subsequent studies ought to examine the effectiveness of Google's learning materials across subjects, student populations, and other learning outcomes other than self-efficacy.

6. Conclusions and Future Work

The study highlights that integrating Google's educational applications is associated with the self-efficacy of education technology students, with a clear positive correlation between Google app proficiency and students' confidence in their academic abilities. Structured use of Google Sites and Docs was linked to technical skill development and academic self-efficacy, with pre- to post-test gain being evidenced. Google Sites facilitated

interactive, student-centered learning that encouraged self-direction and problem-solving. Quasi-experimental design limitations, small, specialized sample, and narrow measurement tools, nevertheless, reduce the generalizability of the findings. Studies with more varied populations of students and longitudinal investigations into long-term effects should be undertaken. Expanding studies across disciplines would test broader generalizability, while qualitative studies would offer greater insight into the student experience. Following up on the role of instructional strategies and integrating newer technologies like AI and augmented or virtual reality could also enhance Google apps' educational potential.

Future Research Directions

The findings of this study provide a valuable foundation for understanding the impact of Google's educational apps on student learning and development. Future research should employ rigorous designs, diverse samples, and mixed methods approaches to deepen insights. Focusing on equity, infrastructure, and validated measures will strengthen the evidence base and support more effective, inclusive integration of digital tools in education.

Expanding the Scope of Investigation

- **Investigating Relationships:** Conduct research to explore the correlation between the employment of Google's educational apps and other educational and psychological variables. This would provide a more comprehensive understanding of the app's impact on students' learning and development.
- **Enhancing Self-Efficacy:** Focus on research aimed at improving students' self-efficacy towards specialization. This could involve developing interventions or strategies specifically designed to boost students' confidence and belief in their abilities.
- **Applying Research to Diverse Samples:** Replicate the research with different research samples to assess the generalizability of the findings and identify any potential variations across different populations.

Authors' contributions

This research was conducted collaboratively by the authors. The study design, statistical analysis, and protocol writing were undertaken collectively by the authors. Authors AEK, EE, TAEH, and MAAT oversaw the study analyses, managed literature searches, and contributed to the initial draft of the manuscript. All authors reviewed and approved the final manuscript.

Declaration

Ethics approval and consent to participate: Ethics approval was obtained from The Scientific Research Ethics Committee of the Daraya University, Minia, Egypt.

Consent for publication: This article is approved by the authors for sharing, adaptation, distribution, and reproduction in any medium or format, if you give appropriate credit to the original authors and the source.

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Data Availability

The data of experimental treatment can be accessed at: https://docs.google.com/spreadsheets/d/13MrZxNB-43p4QmLOauiyYraUKAlSAw9J/edit?usp=sharing&ouid=114027066753449049348&rtpof=true&sd=true.

References

1. H. Al-Samarraie and N. Saeed, "A systematic review of cloud computing tools for collaborative learning: Opportunities and challenges to the blended-learning environment," *Comput. Educ.*, vol. 124, pp. 77–91, Sep. 2018, doi: 10.1016/j.compedu.2018.05.016.
2. J. Wang, "Cloud Computing Technologies in Writing Class: Factors Influencing Students' Learning Experience," *Turk. Online J. Distance Educ.*, vol. 18, no. 3, Art. No. 3, Jul. 2017, doi: 10.17718/tojde.328954.
3. J. Cahill, "University Professors' Perceptions about the Impact of Integrating Google Applications on Students' Communication and Collaboration Skills," *J. Res. Initiat.*, vol. 1, no. 2, Nov. 2014, [Online]. Available: https://digitalcommons.uncfsu.edu/jri/vol1/iss2/7
4. "The Collaborative Benefits of Google Apps Education Edition in Higher Education - ProQuest." Accessed: Sep. 20, 2024. [Online]. Available: https://www.proquest.com/openview/aeb4a8cae3d7e22359a23b6cd1aa8539/1?pq-origsite=gscholar&cbl=18750
5. "Google Apps and Their Applications in eLearning: A Study." Accessed: Sep. 20, 2024. [Online]. Available: https://www.researchgate.net/publication/368788650_Google_Apps_and_Their_Applications_in_eLearning_A_Study
6. A. E. Koshiry, E. Eliwa, T. Abd El-Hafeez, and M. A. A. Tony, "The Effectiveness of a Mobile Learning Environment in Improving Psychological Security in Blind Students," *Scientifica*, vol. 2024, no. 1, p. 7629607, 2024, doi: 10.1155/2024/7629607.
7. A. M. E. Koshiry, E. Eliwa, T. A. El-Hafeez, and A. Omar, "Classification of University Excellence: A Multi-dimensional Exploration of Ranking Criteria Using Data Science and Visualization Technology," in *Proceedings of the 10th International Conference on Advanced Intelligent Systems and Informatics 2024*, A. E. Hassanien, A. Darwish, M. F. Tolba, and V. Snasel, Eds., Cham: Springer Nature Switzerland, 2024, pp. 209–220. doi: 10.1007/978-3-031-71619-5_18.
8. A. El Koshiry, E. Eliwa, T. Abd El-Hafeez, and M. A. A. Tony, "Effectiveness of a Cloud Learning Management System in Developing the Digital Transformation Skills of Blind Graduate Students," *Societies*, vol. 14, no. 12, Art. no. 12, Dec. 2024, doi: 10.3390/soc14120255.
9. A. Owayid and L. Uden, *The Usage of Google Apps Services in Higher Education*, vol. 446. 2014. doi: 10.1007/978-3-319-10671-7_9.
10. "Factors affecting students' self-efficacy in higher education - ScienceDirect." Accessed: May 06, 2025. [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/S1747938X1000045X
11. "Frontiers | the role of self-efficacy, motivation, and perceived support of students' basic psychological needs in academic achievement." [Online]. Available: https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2024.1385442/full
12. "Frontiers | Technology Acceptance, Technological Self-Efficacy, and Attitude Toward Technology-Based Self-Directed Learning: Learning Motivation as a Mediator." Accessed: May 06, 2025. [Online]. Available: https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2020.564294/full
13. "Students' Self-Efficacy and Confidence in Technological Abilities Resulting from Participation in 'The Curriculum and Community Environmental Restoration Science (STEM + Computer Science).'" Accessed: May 06, 2025. [Online]. Available: https://www.researchgate.net/publication/377678761_Students'_Self-Efficacy_and_Confidence_in_Technological_Abilities_Resulting_from_Participation_in_The_Curriculum_and_Community_Environmental_Restoration_Science_STEM_Computer_Science
14. "The Effects of Smart Classroom-Based Instruction on College Students' Learning Engagement and Internet Self-efficacy | SpringerLink." Accessed: Sep. 20, 2024. [Online]. Available: https://link.springer.com/chapter/10.1007/978-3-319-94505-7_21
15. "Utilization of Google Apps for Education (GAFE) as a learning medium for early." Accessed: Sep. 20, 2024. [Online]. Available: https://www.researchgate.net/publication/382399632_Utilization_of_Google_Apps_for_Education_GAFE_as_a_learning_medium_for_early
16. A. Chatzopoulos *et al.*, "Evaluation of Google Play educational apps for early childhood education," *Adv. Mob. Learn. Educ. Res.*, vol. 3, pp. 770–778, Jul. 2023, doi: 10.25082/AMLER.2023.02.004.
17. "Google Suite for Education Application Analysis In Distance Learning At MI Miftahul Akhlaqiyah."

Accessed: Sep. 20, 2024. [Online]. Available: https://www.researchgate.net/publication/366560412_Google_Suite_For_Education_Application_Analysis_In_Distance_Learning_At_MI_Miftahul_Akhlaqiyah
18. V. Makarenko, O. Aleksieieva, A. Fysiuk, T. Filimonova, and N. Tsypliak, "Google's Digital Tools for Education: A Selection of Tools," *J. Curric. Teach.*, vol. 13, p. 91, Jul. 2024, doi: 10.5430/jct.v13n3p91.
19. "Pemanfaatan Google Apps for Education (GAFE) sebagai Media Pembelajaran Sekolah Dasar." Accessed: Sep. 20, 2024. [Online]. Available: https://www.researchgate.net/publication/362472283_Pemanfaatan_Google_Apps_for_Education_GAFE_sebagai_Media_Pembelajaran_Sekolah_Dasar
20. "Self-efficacy among Classroom, Subject and Special Education Teachers." Accessed: Sep. 20, 2024. [Online]. Available: https://www.researchgate.net/publication/383164468_Self-efficacy_among_Classroom_Subject_and_Special_Education_Teachers
21. Q. Wu, "The Impact of Self-efficacy on Academic Achievement among College Students," *SHS Web Conf.*, vol. 193, Jun. 2024, doi: 10.1051/shsconf/202419302004.
22. "Students' Technology Acceptance, Motivation and Self-Efficacy towards the eSchoolbag: An Exploratory Study." Accessed: May 06, 2025. [Online]. Available: https://www.researchgate.net/publication/322211165_Students'_Technology_Acceptance_Motivation_and_Self-Efficacy_towards_the_eSchoolbag_An_Exploratory_Study
23. S. F. Oyeleye, I. O. Agboola, and O. O. Folorunsho, "Computer Self-Efficacy and Use of Cloud Computing for Personal Information Management among Undergraduate Students in a Nigerian University," *Commun. J. Libr. Inf. Sci.*, vol. 26, no. 1, Art. no. 1, Jun. 2024.
24. N. Md Sari and Y. Y. Khoo, "The Effect of Google Classroom-Assisted Learning on Self-Efficacy among Form Six Economics Students," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 11, Nov. 2021, doi: 10.6007/IJARBSS/v11-i11/11527.
25. A. Awwad, A. Hoorani, and A. Abo Mokh, "The Impact of Employing Google Apps in Education on Students' Achievement," in *Radical Solutions in Palestinian Higher Education: Research from An-Najah National University*, D. Burgos and S. Affouneh, Eds., Singapore: Springer, 2022, pp. 75–86. Doi: 10.1007/978-981-19-0101-0_7.
26. A. A. Bilyalova, E. N. Gilyazeva, and G. M. Polkina, *Development of Self-Educational Competence of Students by Means of Digital Educational Technologies*. 2020. doi: 10.2991/aebmr.k.200502.033.
27. X. Chen, "The role of the exposure of education technology on learners' internet self-efficacy," *Trans. Soc. Sci. Educ. Humanit. Res.*, vol. 5, pp. 606–617, Apr. 2024, doi: 10.62051/ccwnzw48.
28. M. Ghazali *et al.*, "Predicting Teacher's Information and Communication Technology-Enabled Education for Sustainability Self-Efficacy," *Sustainability*, vol. 16, p. 5323, Jun. 2024, doi: 10.3390/su16135323.
29. M. Suryaman, K. Krishnapatria, and A. Solehudin, *Utilization of Google Drive in Improving the Effectiveness of Self-Regulated Learning (SRL) Management*. 2018. doi: 10.2991/aecon-18.2018.14.
30. R. Rahmah, W. Wardono, and S. Sugiman, "Mathematical Literacy Viewed from Self-Efficacy through Creative Problem-Solving Learning Assisted by Google Classroom," *Edunesia J. Ilm. Pendidik.*, vol. 5, pp. 1160–1174, Jun. 2024, doi: 10.51276/edu. v5i2.889.
31. J. Locketz, "Exploring motivations and informal learning of school administrators adopting Google Apps for Education," *Theses Diss.*, Jan. 2019, [Online]. Available: https://digitalcommons.pepperdine.edu/etd/1047