Technology Acceptance in Higher Education: Google Apps through the Lens of the Theory of Planned Behavior

Sarah Noori Dagman [a], Mustafa Radif[b]

[a]University of Al-Qadisiyah – College of education .Email: edu.sych.it13@qu.edu.iq

[b]University of Al-Qadisiyah – College of Computer Science and Information Technology. Email: mustafa.radif@qu.edu.iq

A R T I C L E I N F O

A B S T R A C T

This paper examines the acceptance of Google Apps in higher education through the lens of the Theory of Planned Behavior (TPB). It explores the relationship between attitudes, subjective norms, perceived behavioral control, and the intention to use Google Apps among university professors. The study reviews previous research on the factors influencing the adoption of Google Apps and TPB's application in educational settings. The findings provide insights into enhancing the integration of digital tools in educational environments.

MSC.

1.Introduction

The paper consists of several sections: context and research questions, research context, LMS and GAFE tool, literature review, theoretical framework and research model, research methods, results, discussion, conclusion. This study examines the impact of GAFE on students' intention to use it. Using the TPB, self-efficacy, perceived behavioral control, satisfaction, and service quality, the study collected data from 230 students and analyzed it using PLS and multiple regressions. The analysis shows that subjective norms, attitudes, and self-efficacy predict students' intentions to use GAFE in a business marketing context. The paper argues that university students should be proficient in using technology provided by their institution.

∗Corresponding author Mustafa Radif

Email addresses: mustafa.radif@qu.edu.iq

Communicated by 'sub etitor'

1.1 Background and Rationale

Technology acceptance models have been used to study and predict human behavior in relation to information systems. Despite the focus on monographic software solutions, there is progress in solutions like ERP technologies. These technologies are popular in certain commercial sectors and are applied to university technologies such as student information systems and financial systems. Technology acceptance theories are particularly interesting in situations with high rates of technology development. The rapid growth of Google Apps for Education in higher education shows how these tools contribute to the university environment. This study examines the use of Google Apps with the theory of planned behavior for system evaluation and compares it to other acceptance models. [1,2].

1.2 Background and Rationale

To achieve our objective, we established more specific objectives: 1) Explore the impact of the academic environment. 2) Identify barriers and benefits of using Google Apps for education and their relation to attitudes and beliefs of future teachers and students. We conducted a comparative analysis of students' and teachers' beliefs on the use of social networks for professional development. We implemented an exploratory case study on teaching through Google Apps for education to understand these beliefs. Our approach ensures analysis from different perspectives in teaching and learning contexts. The NEU was established in 2010 to provide higher education that meets community needs. We need reliable, free, and accessible applications for educational purposes. We found one similar study on the acceptance of a Learning Management System in Higher Education Institutions. Our objective is to explore the use of Google Apps for Education by students and teachers at university of Al-qadisyah. We will use the Theory of Planned Behavior to address this research topic and examine future teachers and students. perceive Google Apps for education, specifically referring to the expected use and perceived usefulness of a learner in the academic field. [3,4].

2. Theoretical Framework

The theory of planned behavior model has been reliable in studies on intentions to perform behaviors, including technology acceptance. However, its limitations in the context of general technology acceptance have been noted. It may be interesting to explore students' intention and behavior in using Google Apps for academic purposes. The theory of planned behavior posits that behavioral intention is determined by attitude, subjective norms, and perceived behavioral control. The influence of perceived behavioral control on behavior is mediated by the actual degree of control the person has over the action. [5,6].

2.1. Theory of Planned Behavior Overview

The relationship between the components of the attitude model is intricate. The association of the subjective norm with the attitude is complex. Factors like belief, motivation, and similarity influence the subjective norm. The theory of planned behavior, developed by I. Ajzen, has existed for three decades. The model includes attitude, subjective norm, and perceived behavioral control as determinants. Moderating variables specific to the studied population are also considered. The model predicts a target behavior based on the conscious decision of an agent influenced by attitude, subjective norm, and behavioral control [7].
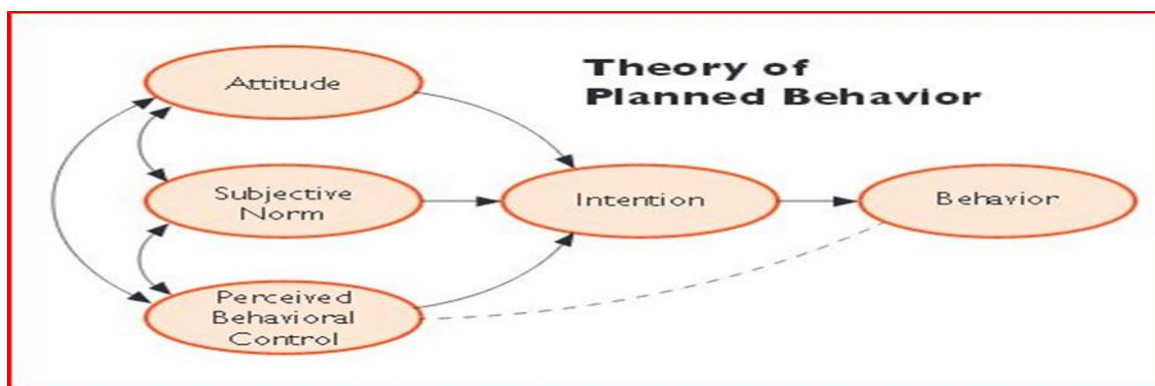
Fig. 1- Theory of Planned Behavior (TPB) by Ajzen (1991).

2.2. Relevance to Technology Acceptance

Factors can enable limitations technology acceptance and thus are vital to the study of e-learning. Once technology acceptance is understood, this can inform appropriate action to improve the strength of the relationship between technology and teaching. Gugerty and Gugerty believed that some of the many variables affecting e-learning include the following: academic rigor, admission requirements for the academic program delivery, appropriate feedback, course support, completion and progress, course assessment, class size, and transferability [8].

The summaries quoted clearly indicate to all that student technology acceptance in higher education is important. There are other stakeholders with vested interests in this matter. The availability of student technology acceptance knowledge results in better informed academic staff. This, in turn, will benefit the school in the use of technology and the innovative practices that are facilitated by the technology. This will also likely better enhance communication between students, academics, and support staff, and could attract more communication to the academic school [9,10,11,12].

3. Literature Review

Since the seminal work of Rogers who proposed the innovation diffusion theory (IDT), a host of studies have been undertaken to trace the factors that affect the adoption pattern, stage, and association with the innovation attributes (hooked to social systems). Changes and emerging applications are at a changing but recognizable rate [13]. Results of higher education research on technology adoption overcome barriers to teaching, learning, and training, and they come in various shapes and flavors. Both administrative areas (e.g., ERP, cloud computing) and pedagogically driven changes have been the focus of what educationally is acceptable [14].

From the moment an instructional technology comes into play, it changes content, materials, and human interactions—both instructionally and otherwise. Anderson identified five generations of distance learning organized around the range and use of technologies in support of learning goals. Each generation embodied technological innovations, applications, research, and delivery. Focused on the role of technologies in instructional systems, Kurzweil explored virtual schools and their settings [15]. It is widely acknowledged that a new era in instruction has emerged in the wake of emerging technologies, driven by Web 2.0 tools. Despite their potential benefits, much remains to be learned about how technology integration can be optimally managed. Consequently, a pragmatically grounded response to instructional technology is fundamentally required [16].

3.1. Technology Acceptance in Higher Education

Many educators focus on initial demands for successful adoption of technology in education. Research on student perceptions of cutting-edge information systems in higher education is crucial due to their influence on the adoption of advanced technologies. University students play a key role in accepting new technologies as they are the future workforce. However, studies show that there is a reluctance towards adopting and using advanced technologies. Investigating educational technology adoption is necessary as technology is prevalent in society. Most studies, though, are only limited to basic software and hardware use.
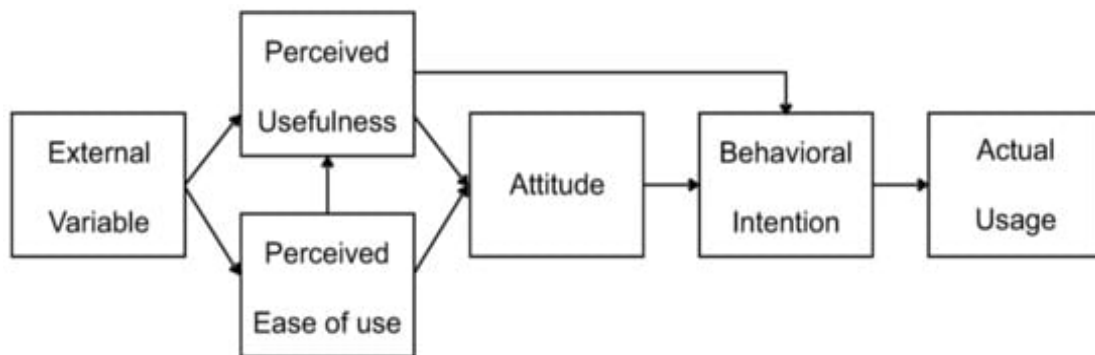

Fig. 2- Technology Acceptance Model (TAM) by Davis (1989).

3.2. Google Apps in Education

Google Docs is a cloud-based word processing application that allows real-time saving and sharing. It is free and flexible, making it easy for students to handle and store data. We researched and compared Google Docs with GAFE, finding that traditional communication methods had limitations. We reviewed literature from 2006 to 2011 on Google Apps for Education and compared it to the standard version. GAFE is a suite of productivity tools provided by Google, delivered on the Internet. It offers web-based email, calendar, and collaborative document editing.

4. Methodology

Data processing in this study involved typicality analysis to compare perceived usefulness and perceived security. The software application, "Omnibus3.0 vacOMNIAN," was used to find sub-groups with similar computer skill, employment, and GPA status. IBM Statistical Analysis for Social Science was used to test reliability and predict behavior. Students showed high variance in their responses with no strong correlation among all factors. Findings showed no difference in perception of theory of planned behavior with respect to Google Apps based on GPA. Small and large business students did not differ in study measures. Transgress study had higher percentages than not transgress study. The study investigated student acceptance of Google Apps at a regional college. The sample consisted of 210 students with a response rate of 43%. The questionnaire assessed attitude, subjective norm, and perceived behavioral control using a 7-point Likert Scale. Google Apps were evaluated across several categories related to e-mail, calendar, documents, spreadsheet, and portfolio [17].

4.1. Research Design

As technology advances, e-learning practitioners and instructional designers should consider both the perceived usability of technology and its impact on users' behavioral intention. This study explored the use of Google Apps by university students using the theory of planned behavior (TPB) in higher education. A survey of 297 students was conducted, and structural equation modeling was used to test the hypothesis. Results showed that perceived behavioral control indirectly influenced behavior through attitude or subjective norm. Perceived behavioral control is a crucial factor in shaping users' positive attitudes and subjective norms [18,19].

4.2. Data Collection Methods

Incentives motivated participants. Academic staff who participated in workshops, filled in the survey, and had at least one student been entered into a raffle for sponsored prizes. A prize drawing event concluded the study. A pilot test was conducted to address any questionnaire administration difficulties. The survey instrument gathered data on variables such as usefulness, ease of use, subjective norm, and attitude. A Likert scale was used. All variables were measured according to established dimensions. Questionnaire items can be obtained from the contact author for further analysis. Data on behavioral intention and actual use of GApps were collected using specific items from TAM literature [20,21].

5. Findings and Discussion

Cloud computing is important in academia, with schools and universities using services like Google Apps for Education. Security and privacy concerns exist, but the acceptance of both teachers and students in higher education institutions is necessary for implementing cloud computing. This study focuses on business undergraduates' attitudes and intentions toward using Google Apps, showing that attitudes, perceived behavioral control, and subjective norm are all positively related to intentions. Subjective norms, affective quality, perceived usefulness, and ease of use also predict attitudes. Perceived behavioral control is influenced by technology facilitating conditions. Significantly predict perceived ease of use.

5.1. Perceived Usefulness of Google Apps

The development of items to measure the perceived usefulness of Google Apps involved data from multiple sources. Initially, items were created based on common productivity domains associated with Google Apps. These items were then refined using well-evidenced frameworks and research. A small set of items was developed for pilot testing and reviewed by a panel of Google Cloud users. This resulted in a refined set of perceived usefulness items, based on Davis et al.'s influential Technology Acceptance Model. Despite noted flaws, this model has been widely adopted and utilized. The objective of the study is to investigate practices for trouble-free Google Apps usage, including web

interactivity with accommodation websites. To achieve this, the perceived usefulness of Google Apps for website development and maintenance is conceptualized, which influences motivations and usage behavior.

5.2. Attitude towards Google Apps

Students' long-term attitude towards using Google Apps in their coursework is recognized when they observe and perceive its fulfilled promises. An extension of the concept of TPB is necessary because the theory does not include previous experiences. Previous experiences with technologies used steadily in the past play a significant role in forecasting future organizational use and intention. A data paradigm to evaluate students' experience with Google Apps in a formal educational institution is suggested. Compatibility, ease of use, and usefulness are reflected in the individual's level of attitude. Instructors will have a positive attitude towards using technology in teaching when they value the technological benefits it provides and understand its efficiency in achieving teaching objectives.

6. Key Findings

1. Attitude Towards Google Apps: A positive attitude towards the use of Google Apps was found to be a crucial factor. Professors who perceived the tools as beneficial and useful for their teaching and administrative tasks were more likely to adopt them.

2. Subjective Norms: The influence of colleagues, students, and institutional culture played a significant role. Professors were more inclined to use Google Apps when they felt that their peers and students supported its use.

3. Perceived Behavioral Control: Confidence in the ability to use Google Apps effectively was a strong predictor of adoption. Providing adequate training and support can enhance this confidence, thereby promoting greater use of these tools.

7. Implications for Practice

To enhance the acceptance and utilization of Google Apps in higher education, the following strategies are recommended:

- Training and Support: Institutions should invest in comprehensive training programs to build professors' confidence in using Google Apps. Technical support should be readily available to address any issues that may arise.

- Encouraging Positive Attitudes: Highlighting the benefits and successful use cases of Google Apps can foster positive attitudes among faculty members.

- Leveraging Social Influence: Institutions can promote the use of Google Apps by creating a supportive culture where peer and student endorsements are visible and valued.

8. Future Research Directions

Future studies should explore the following areas to build on the findings of this research:

- Longitudinal Studies: Conducting longitudinal studies can provide insights into how attitudes, subjective norms, and perceived behavioral control evolve over time and influence the sustained use of Google Apps.

- Diverse Contexts: Expanding the research to include a diverse range of institutions and cultural contexts can help generalize the findings and identify context-specific factors.

- Comparative Studies: Comparing the adoption of Google Apps with other educational technologies can reveal unique challenges and advantages, informing broader strategies for technology integration in higher education.

9. Limitations

This study relied on secondary data from previous research, which may limit the scope and applicability of the findings. Additionally, the focus on university professors may not fully capture the experiences and challenges faced by other stakeholders, such as students and administrative staff.

10. Conclusion

The application of the Theory of Planned Behavior to understand the acceptance of Google Apps in higher education has provided a robust framework for identifying key factors that influence technology adoption. By addressing these factors through targeted interventions, institutions can enhance the integration and effective use of digital tools, ultimately improving teaching and learning outcomes.

Acknowledgements

References

[1] W. M. Al-Rahmi, N. Yahaya, M. M. Alamri, I. Y. Alyoussef, A. M. Al-Rahmi, and Y. B. Kamin, "Integrating innovation diffusion theory with technology acceptance model: Supporting students' attitude towards using a massive open online courses (MOOCs) systems," Interactive Learning Environments, vol. 29, no. 8, pp. 1380–1392, 2021.

[2] S. Min, K. K. F. So, and M. Jeong, "Consumer adoption of the Uber mobile application: Insights from diffusion of innovation theory and technology acceptance model," in Future of tourism marketing, Routledge, 2021, pp. 2–15.

[3] H. E. Fitzgerald, B. Karen, S. T. Sonka, A. Furco, and L. Swanson, "The centrality of engagement in higher education," in Building the field of higher education engagement, Routledge, 2020, pp. 201–219.

[4] C. Kappo-Abidemi and K. K. Ogujiuba, "Higher education institutions and corporate social responsibility: triple bottomline as a conceptual framework for community development.," Entrepreneurship and Sustainability Issues, 2020.

[5] M. P. Kan and L. R. Fabrigar, "Theory of planned behavior," in Encyclopedia of personality and individual differences, Springer, 2020, pp. 5476–5483.

[6] M. Soliman, "Extending the theory of planned behavior to predict tourism destination revisit intention," International Journal of Hospitality & Tourism Administration, vol. 22, no. 5, pp. 524–549, 2021.

[7] M. S. Hagger, M. W.-L. Cheung, I. Ajzen, and K. Hamilton, "Perceived behavioral control moderating effects in the theory of planned behavior: A meta-analysis.," Health Psychology, vol. 41, no. 2, p. 155, 2022.

[8] K. V. Elumalai et al., "Factors affecting the quality of e-learning during the COVID-19 pandemic from the perspective of higher education students," COVID-19 and Education: Learning and Teaching in a Pandemic-Constrained Environment, vol. 189, no. 3, p. 169, 2021.

[9] Q. Al-Maatouk, M. S. Othman, A. Aldraiweesh, U. Alturki, W. M. Al-Rahmi, and A. A. Aljeraiwi, "Task-technology fit and technology acceptance model application to structure and evaluate the adoption of social media in academia," Ieee Access, vol. 8, pp. 78427–78440, 2020.

[10] M. S. Taat and A. Francis, "Factors Influencing the Students' Acceptance of E-Learning at Teacher Education Institute: An Exploratory Study in Malaysia.," International Journal of Higher Education, vol. 9, no. 1, pp. 133–141, 2020.

[11] J.-H. Han and H. J. Sa, "Acceptance of and satisfaction with online educational classes through the technology acceptance model (TAM): The COVID-19 situation in Korea," Asia Pacific Education Review, vol. 23, no. 3, pp. 403–415, 2022.

[12] J. E. Raffaghelli, M. E. Rodríguez, A.-E. Guerrero-Roldán, and D. Bañeres, "Applying the UTAUT model to explain the students' acceptance of an early warning system in Higher Education," Computers & Education, vol. 182, p. 104468, 2022.

[13] C. Pinho, M. Franco, and L. Mendes, "Application of innovation diffusion theory to the E-learning process: higher education context," Education and Information Technologies, vol. 26, no. 1, pp. 421–440, 2021.

[14] T. D. Oyedotun, "Sudden change of pedagogy in education driven by COVID-19: Perspectives and evaluation from a developing country," Research in Globalization, vol. 2, p. 100029, 2020.

[15] E. Arthur-Nyarko, D. D. Agyei, and J. K. Armah, "Digitizing distance learning materials: Measuring students' readiness and intended challenges," Education and Information Technologies, vol. 25, no. 4, pp. 2987–3002, 2020.

[16] J. Lim and T. J. Newby, "Preservice teachers' attitudes toward Web 2.0 personal learning environments (PLEs): Considering the impact of self-regulation and digital literacy," Education and Information Technologies, vol. 26, no. 4, pp. 3699–3720, 2021.

[17] G. Eisele et al., "The effects of sampling frequency and questionnaire length on perceived burden, compliance, and careless responding in experience sampling data in a student population," Assessment, vol. 29, no. 2, pp. 136–151, 2022.

[18] X. Li et al., "Mechanism of attitude, subjective norms, and perceived behavioral control influence the green development behavior of construction enterprises," Humanities and Social Sciences Communications, vol. 10, no. 1, pp. 1–13, 2023.

[19] G. Shan, C. L. Yee, and G. Ji, "Effects of attitude, subjective norm, perceived behavioral control, customer value and accessibility on intention to visit Haizhou Gulf in China," Journal of Marketing Advances and Practices, vol. 2, no. 1, pp. 26–37, 2020.

[20] N. S. A. Alanzi and W. S. Alhalafawy, "A proposed model for employing digital platforms in developing the motivation for achievement among students of higher education during emergencies," Journal of Positive School Psychology, vol. 6, no. 9, pp. 4921–4933, 2022.

[21] Z. Cheng, J. C. Richardson, and T. J. Newby, "Using digital badges as goal-setting facilitators: A multiple case study," Journal of Computing in Higher Education, vol. 32, no. 2, pp. 406–428, 2020.