

Exploring Cognitive Dissonance among Undergraduate Students at the University of Cape Coast: Investigating Resistance and Acceptance in the Adoption of Technology

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Abstract

This study investigates the role of cognitive dissonance in influencing technology adoption behaviours among undergraduate students at the University of Cape Coast. As educational institutions increasingly rely on technology to enhance learning, understanding the psychological and social factors that affect students' willingness to adopt technology is critical. Cognitive dissonance—an internal conflict that arises when individuals hold contradictory beliefs or experience discomfort from conflicting information—is examined concerning technology acceptance, perceived ease of use, perceived usefulness, and resistance among students. Using a quantitative approach, data were collected through surveys and focus group discussions with undergraduate students across various academic disciplines. Quantitative analysis revealed that cognitive dissonance significantly affects students' perceptions of technology's usefulness and ease of use, which are key determinants in the Technology Acceptance Model (TAM). Conversely, peer support and positive social influences were found to mitigate dissonance, enhancing acceptance. The study identifies critical barriers to effective technology adoption, including high perceived complexity and lack of confidence in using digital tools. To address these challenges, it recommends that institutions focus on reducing cognitive dissonance by providing tailored support and training, designing user-friendly interfaces, and fostering a positive technology culture. The implications for the literature are significant, as this study highlights the need to integrate cognitive dissonance into existing technology acceptance models to better predict user behavior and adoption rates. In conclusion, cognitive dissonance plays a vital

role in shaping students' attitudes toward technology, suggesting that targeted interventions addressing both psychological and social dimensions are essential to enhance technology acceptance and integration in academic settings. By exploring cognitive dissonance within the TAM framework, this study contributes to a deeper understanding of technology adoption in higher education and provides actionable insights for improving student engagement with digital tools.

Keywords

Dissonance, Cognitive, Technology, Behaviours, Influence, Digital Literacy, Integration, Resistance, Acceptance

1. Introduction

The integration of information technology (IT) in higher education is crucial for enhancing learning experiences, improving academic outcomes, and preparing students for the digital economy. However, at the University of Cape Coast, several factors hinder the effective adoption and use of technology among undergraduate students. Many students enter the university without a solid IT background, and the high cost of personal computers makes technology inaccessible for a significant portion of the student body. The university's limited number of computer labs further restricts students' opportunities to practice and develop their IT skills. Additionally, the incorporation of IT into academic programs often lacks practical tuition, consideration of students' prior IT experience, and adequate time for practice. The absence of structured programs to encourage widespread adoption and use of technology exacerbates the issue.

This situation results in significant variations in students' IT skills, influenced by their diverse backgrounds and levels of exposure to technology. Consequently, students experience cognitive dissonance—a psychological discomfort arising from conflicting attitudes, beliefs, or behaviors—when required to use IT in their studies. This study aims to explore the nature of cognitive dissonance among undergraduate students at the University of Cape Coast in the context of technology adoption. By investigating the factors that contribute to resistance and acceptance of IT, this research seeks to provide a comprehensive understanding of the barriers to effective technology use in academic settings. The findings will inform the development of targeted interventions to support students, enhance their IT competencies, and promote a more inclusive and effective integration of technology in higher education.

1.1. Background to the Study

The rapid advancement of information technology (IT) has revolutionized educational systems worldwide, providing tools that enhance teaching and learning

processes. Globally, institutions of higher learning are increasingly integrating IT to improve accessibility, collaboration, and efficiency in education. For instance, E-learning platforms, virtual classrooms, and digital resources have become fundamental components of modern education (Ali, 2020: pp. 23-30). However, the adoption and effective use of these technologies vary significantly across different regions and institutions, influenced by factors like infrastructure, economic resources, and educational policies (Rana & Rana, 2020: pp. 153-167). In Africa, the adoption of IT in higher education faces unique challenges. For example, while there is a growing recognition of the potential benefits of IT in education, many African countries struggle with inadequate infrastructure, limited access to high-speed internet, and insufficient funding for educational technologies (Zabolotniaia et al., 2020: pp. 421-440).

Recent studies have highlighted issues like the digital divide, where significant disparities exist between students from urban and rural areas and among different socio-economic groups (Alam, 2021: pp. 57-73). Despite these challenges, there are promising initiatives aimed at improving IT integration. For example, the African Virtual University (AVU) has been working to provide affordable access to quality higher education through e-learning across the continent (Haleem et al., 2022: pp. 304-321). Nonetheless, the overall progress remains uneven, and many institutions still grapple with fundamental barriers. Ghana has made commendable strides in incorporating IT into its education system, with the government and private sector investing in infrastructure and digital literacy programs.

Initiatives like the e-Ghana project seek to enhance IT infrastructure and promote the use of technology in various sectors, including education (Abusamhadana et al., 2021). However, challenges persist, particularly in higher education. Universities often face issues related to funding, infrastructure, and disparities in IT skills among students. Research indicates that while students in urban universities may have better access to resources, institutions in less affluent areas struggle to provide adequate IT facilities and training to their students. At the University of Cape Coast (UCC), the integration of IT into academic programs is essential for aligning with global educational standards and improving student outcomes. However, several significant barriers make it difficult to achieve effective IT adoption among students. One of the primary issues is the insufficient number of computer labs available on campus.

This scarcity of facilities limits students' access to the necessary equipment for hands-on practice. As a result, students have fewer opportunities to develop and refine their IT skills through practical, experiential learning, which is essential for mastering new technologies. Additionally, the integration of IT into the university's curriculum is often inadequate. Many academic programs incorporate IT in a way that does not provide enough practical instruction. For instance, instead of offering extensive hands-on training and real-world applications, the curriculum focuses more on theoretical aspects of IT (Abdulai, 2011: pp. 34-41). This approach fails to address the diverse levels of IT proficiency among students who

come from various backgrounds and have differing degrees of exposure to technology.

These issues contribute to cognitive dissonance among students, which is the psychological discomfort experienced when individuals hold conflicting beliefs, attitudes, or behaviours (Nikula et al., 2023: pp. 55-72). In this context, the literature shows that students recognize the importance of IT for their academic success and future careers but feel frustrated and anxious because they lack the skills and resources to use these technologies effectively. This conflict between understanding the value of IT and feeling unprepared or unable to engage with it leads to resistance and disengagement, as shown. For example, in Lilian (2022: pp. 1-15), students understand that proficiency in IT is crucial for completing assignments and succeeding in the job market. However, they feel stressed and demotivated if they do not have enough opportunities to practice using computers and software. This psychological discomfort manifests as avoidance of technology-based tasks, reluctance to participate in IT-related activities, and a general sense of inadequacy.

By not adequately addressing these varying levels of IT skills and failing to provide sufficient practical training, the university exacerbates this cognitive dissonance. Students are left feeling unsupported and ill-equipped to meet the technological demands of their education, leading to a cycle of resistance and underutilization of available IT resources. Understanding and addressing these psychological barriers is crucial for developing effective strategies to support students and enhance the integration of IT in the academic environment.

1.2. Problem Statement

Despite the global trend towards integrating information technology (IT) in higher education, the University of Cape Coast (UCC) faces significant challenges in effectively adopting and utilizing these technologies. This problem is multifaceted, stemming from a combination of infrastructure deficits, economic barriers, and disparities in students' IT skills and experiences (Ali, 2020: pp. 23-30; Zabolotniaia et al., 2020: pp. 421-440). The push for digital education worldwide has highlighted the transformative potential of IT in enhancing learning outcomes and accessibility. However, many educational institutions, particularly in developing regions, struggle with the basic prerequisites for successful IT integration (Rana & Rana, 2020: pp. 153-167).

In Africa, and specifically in Ghana, these challenges are exacerbated by limited infrastructure, insufficient funding, and a significant digital divide that affects students' access to technology (Alam, 2021: pp. 57-73). At UCC, these broader challenges are mirrored and intensified by specific institutional issues. Many students enter the university without a solid background in IT, which impedes their ability to engage fully with digital tools and resources (Lilian, 2022: pp. 1-15). Additionally, the high cost of personal computers makes it difficult for a substantial portion of the student body to access the necessary technology (Haleem et al., 2022: pp. 304-321). The university's limited number of computer labs further restricts opportunities for

practical engagement and skill development (Abdulai, 2011: pp. 34-41).

Moreover, the current integration of IT into academic programs at UCC is often inadequate. It fails to account for the diverse IT skill levels among students, lacks practical tuition, and does not provide ample time for students to practice and develop their skills (Abusamhadana et al., 2021). This situation is compounded by the absence of structured programs designed to promote technology adoption and use on a large scale (Zabolotniaia et al., 2020: pp. 421-440). These challenges contribute to significant cognitive dissonance among students. Cognitive dissonance occurs when students experience psychological discomfort due to conflicting attitudes, beliefs, or behaviors related to IT use (Nikula et al., 2023: pp. 55-72). For instance, students may recognize the importance of IT for their academic and professional development but feel frustrated and demotivated by their lack of skills and resources. This dissonance can lead to resistance against using technology, further hindering its effective integration and utilization (Rana & Rana, 2020: pp. 153-167).

While previous studies have addressed various aspects of IT adoption, such as infrastructure improvements and training programs, there remains a gap in understanding the psychological barriers, particularly cognitive dissonance, that students face (Ali, 2020: pp. 23-30; Alam, 2021: pp. 57-73). Addressing these psychological factors is crucial for developing comprehensive solutions that not only improve access and skills but also enhance students' acceptance and effective use of technology. Therefore, this study aims to explore the cognitive dissonance experienced by undergraduate students at UCC in the context of IT adoption. By investigating the factors that contribute to both resistance and acceptance of technology, this research seeks to provide a nuanced understanding of the barriers to effective IT integration. The findings will inform the development of targeted interventions to support students, reduce cognitive dissonance, and promote a more inclusive and effective use of technology in higher education at UCC.

1.3. Purpose of the Study

The primary purpose of this study is to explore the cognitive dissonance experienced by undergraduate students at the University of Cape Coast (UCC) in the context of adopting information technology (IT) for academic purposes. This study aims to identify the factors contributing to both resistance and acceptance of IT among students, with a focus on understanding how psychological discomfort stemming from conflicting beliefs and experiences affects their engagement with technology. By investigating these dynamics, the research seeks to inform strategies and interventions that can enhance the effective integration of IT into the educational experience at UCC.

1.4. Research Questions

1) What factors contribute to cognitive dissonance among undergraduate students at UCC regarding the use of information technology in their academic pursuits?

2) How do students perceive the importance of IT for their academic success and future careers concerning their actual skills and access to technology?

3) What are the barriers to effective IT integration as perceived by students, and how do these barriers influence their attitudes and behaviors toward technology?

4) In what ways can understanding cognitive dissonance among students inform the development of targeted interventions to improve IT adoption at UCC?

1.5. Significance of the Study

This study is of significant importance as it aims to uncover the cognitive dissonance experienced by undergraduate students at the University of Cape Coast (UCC) regarding the adoption of information technology (IT). By delving into the psychological barriers that students face, the research will provide a nuanced understanding of their experiences with technology in an academic context. Such insights can inform educators and policymakers about the specific challenges that hinder effective IT integration, leading to targeted interventions that address these issues directly.

In addition to enhancing our understanding of student experiences, the findings of this study are crucial for improving IT integration within the university. By identifying the factors contributing to resistance and acceptance of technology, the research will help develop strategies that foster a more supportive and engaging learning environment. This is particularly important in an era where digital competencies are increasingly vital for academic success and career readiness. As such, this study aims to facilitate a smoother transition towards a more technologically integrated educational framework at UCC.

Lastly, the significance of this study extends to contributing to the broader academic literature on IT adoption in higher education, especially within the context of developing regions like Ghana. By focusing on the psychological aspects of technology use, the research will enrich existing discourse and highlight the importance of addressing cognitive dissonance in educational settings. Ultimately, the study aims to promote equity in education by ensuring that all students, regardless of their prior exposure to technology, have the opportunity to engage meaningfully with IT and succeed in a digital learning environment.

2. The Literature Review

2.1. Issues Raise in the Literature

The literature reveals several common challenges associated with IT adoption in higher education. These include a lack of infrastructure, inadequate funding, and insufficient training for both students and faculty (Treve, 2021: pp. 67-84). Studies have also pointed out that the digital divide and the disparity in IT skills hinder effective technology use. For instance, research conducted at Nigerian universities identified similar issues, where students faced difficulties due to limited access to computers and internet facilities, as well as inadequate support for IT learning (Shahid et al., 2022: pp. 34-52). Similarly, a study conducted across several South African

universities highlighted significant challenges in IT adoption due to the digital divide (Damoah et al., 2021: pp. 92-109). The research found that students from rural and low-income backgrounds had limited access to personal computers and reliable internet connections. Additionally, the universities lacked sufficient infrastructure to support widespread IT use. The study emphasized the need for targeted initiatives to bridge the gap in IT skills and provide equitable access to technological resources.

Also, a study in Kenya explored the barriers to effective IT integration in higher education (Mugimu, 2021: pp. 88-104). It revealed that many students had minimal prior exposure to computers and the internet, primarily due to the socio-economic conditions in their home regions. The research pointed out that the existing IT curriculum was too theoretical and did not offer enough practical training. Consequently, students struggled to apply their IT knowledge in real-world scenarios, leading to low levels of technology adoption and proficiency. In the same way, research conducted at universities in Tanzania found similar issues with IT adoption. Students frequently encountered obstacles such as inadequate access to computer labs, insufficient numbers of computers, and unstable internet connectivity (Mushimiyimana et al., 2022: pp. 45-61). Furthermore, the study identified a lack of comprehensive IT training programs tailored to different skill levels. This lack of practical support and resources created significant barriers to effective technology use, contributing to the persistence of the digital divide within the student population.

2.2. Solutions from Other Studies

Various solutions have been proposed to address these challenges. Enhancing infrastructure, increasing funding, and providing comprehensive training programs are commonly recommended. For example, a study at South African universities suggested the implementation of blended learning models that combine online and face-to-face instruction to bridge the gap in IT skills (McKinney & Swartz, 2022: pp. 25-40). According to Sophonhiranrak (2021: pp. 101-116), another approach is the development of targeted programs to support students from disadvantaged backgrounds, ensuring they have the necessary resources and training to engage with technology effectively.

2.3. Gaps Identified

Despite these efforts, significant gaps remain. There is a need for more context-specific research that addresses the unique challenges faced by individual institutions like UCC. Additionally, while many studies focus on infrastructure and access, fewer explore the psychological aspects of technology adoption, such as cognitive dissonance. Understanding how students perceive and react to IT integration can provide deeper insights into the barriers and help develop more effective interventions.

3. Research Method

This study adopts a mixed-methods approach, combining both qualitative and

quantitative research designs to provide a comprehensive understanding of how cognitive dissonance influences technology adoption among students at the University of Cape Coast. The quantitative component follows an explanatory research design, utilizing a simple random sampling method to collect data from a minimum of 377 students drawn from approximately 20,000 students on campus, as determined by [Krejcie and Morgan \(1970: pp. 607-610\)](#). The sample includes students from various academic levels and programs, with the inclusion criteria focusing on students currently enrolled at the university, regardless of their specific program of study. The exclusion criterion includes non-students.

The qualitative component involves conducting in-depth interviews and focus group discussions to gather rich, detailed insights into students' experiences and perceptions of technology use, as well as how cognitive dissonance impacts their attitudes and behavior. These qualitative data will complement the quantitative findings, offering deeper context to the numerical results. The quantitative data is collected using structured questionnaires designed to assess the key elements of the study, including students' perceptions of technology's usefulness, ease of use, and their experiences of cognitive dissonance.

For the quantitative analysis, structural equation modeling (SEM) is used to create a model integrating cognitive dissonance into the Technology Adoption Model (TAM). SmartPLS 4 is employed to perform partial least squares (PLS) regression analysis on the model. The TAM framework focuses on two primary factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), which influence users' attitudes, intentions, and actual use of technology. By incorporating cognitive dissonance into this framework, the study aims to provide a more nuanced understanding of the psychological barriers that affect students' technology adoption.

The qualitative findings will be analyzed thematically to identify common themes related to students' experiences with technology and cognitive dissonance, which will inform the interpretation of the quantitative results. This mixed-methods approach allows for a more holistic examination of the factors influencing technology adoption and offers insights into how cognitive dissonance can be addressed to enhance students' use of technology for academic and personal development.

1) Perceived Usefulness (PU): Students may recognize the importance of IT but feel unprepared or lack confidence, causing cognitive dissonance and potentially reducing their perception of IT's usefulness.

2) Perceived Ease of Use (PEOU): A lack of prior experience and inadequate practical training can make IT seem difficult to use, creating cognitive dissonance and anxiety, which impacts their ease of use perception.

3) Attitude Towards Use (ATU): Cognitive dissonance can lead to negative attitudes toward IT if students feel they lack the necessary skills despite valuing IT's role in education.

4) Behavioral Intention to Use (BI): The conflict between recognizing IT's importance and feeling incapable of using it effectively can diminish students' intentions to use technology.

5) Actual Use (AU): Cognitive dissonance can lead to avoidance behaviors, where students minimally use or avoid using technology to reduce discomfort.

The extended TAM model incorporates cognitive dissonance by adding constructs shown in **Figure 1**. This helps identify specific points for intervention to reduce cognitive dissonance and promote effective IT adoption and usage among students

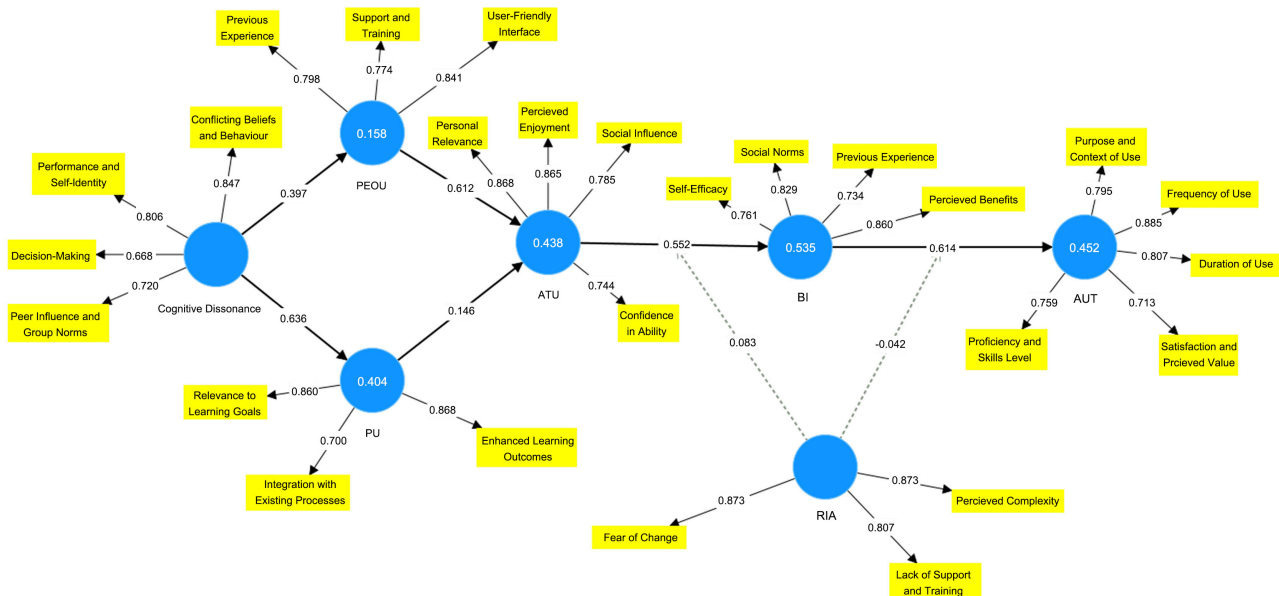


Figure 1. Structural model of the study constructs. Note: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Towards Use (ATU), Behavioral Intention to Use (BI), Actual Use (AU). ----- : Moderating Effects, ————— : Direct Effect.

Quality Criteria

This concise interpretation supports the study’s overall findings by affirming the reliability and validity of the measurement model. The results in **Table 1** present key psychometric properties of the constructs used in the study. Cronbach’s alpha and composite reliability measures indicate the internal consistency and reliability of each construct. All constructs demonstrate acceptable reliability, with Cronbach’s alpha values ranging from 0.738 to 0.853, and composite reliability scores mostly exceeding 0.8. This suggests that the measurement scales used for each construct are consistently reliable. Average Variance Extracted (AVE), which reflects the amount of variance captured by the constructs relative to the amount of variance due to measurement error, ranges from 0.583 to 0.725. While all constructs meet the threshold of 0.5 for AVE, indicating sufficient convergent validity, the Cognitive Dissonance construct has the lowest AVE, pointing to potential areas where the construct’s measurement could be improved.

The implications of these findings for the study are significant. High reliability scores for constructs like Attitude Towards Technology (ATU) and Resistance to IT Adoption (RIA) suggest robust measurements and confidence in the data collected for these variables. However, the lower AVE for Cognitive Dissonance indicates that

while the construct is reliable, its measurement might not capture all relevant aspects effectively. This could affect the study's ability to fully understand and interpret the role of cognitive dissonance in technology adoption. Addressing these measurement issues may enhance the study's validity and provide clearer insights into the factors influencing students' resistance and acceptance of technology.

Table 1. Reliability and validity.

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Attitude Towards Technology (ATU)	0.833	0.837	0.889	0.668
Actual Use of Technology (AUT)	0.853	0.867	0.894	0.630
Behavioural Intentions (BI)	0.810	0.824	0.875	0.636
Cognitive Dissonance	0.758	0.765	0.847	0.583
Perceived Ease of Use (PEOU)	0.755	0.838	0.846	0.648
Perceived Usefulness (PU)	0.738	0.747	0.853	0.661
Resistance to IT Adoption (RIA)	0.819	0.881	0.887	0.725

The results in **Table 2** are the Heterotrait-Monotrait Ratio (HTMT), which assesses discriminant validity among the constructs in the study. Discriminant validity measures whether distinct constructs are indeed different from each other. HTMT values below 0.85 typically indicate adequate discriminant validity, suggesting that constructs are sufficiently different. The table shows that most HTMT values between different constructs are below this threshold, signifying that the constructs have good discriminant validity. However, the HTMT value for Perceived Usefulness (PU) <-> Cognitive Dissonance is notably high at 0.849, which, while still below the 0.85 cutoff, is relatively close and could warrant further scrutiny to ensure clear differentiation between these constructs.

The implications of these findings are twofold. Firstly, the generally low HTMT values reinforce the validity of the constructs used in the study, supporting the robustness of the measurement model. This is crucial for ensuring that the study's conclusions about cognitive dissonance and technology adoption are based on clearly defined and distinct constructs. Secondly, the higher HTMT value between PU and Cognitive Dissonance suggests a potential overlap or relationship between these constructs, which could indicate a need for a more nuanced analysis or revision of the measurement items to refine the construct definitions and enhance the clarity of the study's findings.

Table 3 presents the Fornell-Larcker criterion, which is used to assess the discriminant validity of the constructs by comparing the square root of the Average Variance Extracted (AVE) (diagonal values) with the correlations between constructs (off-diagonal values). The square root of each construct's AVE should be greater than the correlation with any other construct, indicating that each construct shares more variance with its own indicators than with those of other constructs. In this table, the diagonal values (e.g., 0.818 for ATU) are higher than the

Table 2. Discriminant validity.

Heterotrait-monotrait ratio (HTMT)—List								
Constructs	Heterotrait-monotrait ratio (HTMT)							
AUT <-> ATU	0.763							
BI <-> ATU	0.740							
BI <-> AUT	0.779							
Cognitive Dissonance <-> ATU	0.549							
Cognitive Dissonance <-> AUT	0.458							
Cognitive Dissonance <-> BI	0.667							
PEOU <-> ATU	0.757							
PEOU <-> AUT	0.712							
PEOU <-> BI	0.564							
PEOU <-> Cognitive Dissonance	0.464							
PU <-> ATU	0.375							
PU <-> AUT	0.378							
PU <-> BI	0.336							
PU <-> Cognitive Dissonance	0.849							
PU <-> PEOU	0.253							
RIA <-> ATU	0.263							
RIA <-> AUT	0.441							
RIA <-> BI	0.579							
RIA <-> Cognitive Dissonance	0.657							
RIA <-> PEOU	0.191							
RIA <-> PU	0.682							
Heterotrait-monotrait ratio (HTMT)—Matrix								
Constructs	ATU	AUT	BI	Cognitive Dissonance	PEOU	PU	RIA	RIA × ATU
ATU								
AUT	0.763							
BI	0.740	0.779						
Cognitive Dissonance	0.549	0.458	0.667					
PEOU	0.757	0.712	0.564	0.464				
PU	0.375	0.378	0.336	0.849	0.253			
RIA	0.263	0.441	0.579	0.657	0.191	0.682		
RIA × ATU	0.204	0.103	0.127	0.284	0.065	0.377	0.341	
RIA × BI	0.139	0.174	0.155	0.306	0.045	0.347	0.438	0.638

Table 3. Fornell-larcker criterion.

Construct	ATU	AUT	BI	Cognitive Dissonance	PEOU	PU	RIA
ATU	0.818						
AUT	0.641	0.794					
BI	0.627	0.664	0.798				
Cognitive Dissonance	0.444	0.379	0.524	0.764			
PEOU	0.647	0.594	0.490	0.397	0.805		
PU	0.292	0.300	0.248	0.636	0.238	0.813	
RIA	0.238	0.414	0.501	0.529	0.163	0.522	0.851

corresponding off-diagonal correlations (e.g., 0.641 for ATU <-> AUT), confirming that each construct exhibits adequate discriminant validity. The implications of these results for the study are positive. The fact that the square roots of the AVE for each construct are higher than the correlations with other constructs suggests that the model's constructs are well-differentiated. This means the study can confidently interpret the constructs such as Attitude Towards Technology (ATU), Cognitive Dissonance, and Resistance to IT Adoption (RIA) as distinct factors influencing technology adoption. However, the correlation between Cognitive Dissonance and Perceived Usefulness (PU) is moderately high (0.636), indicating that while discriminant validity is maintained, there may be some conceptual overlap between these constructs, potentially affecting the interpretation of their individual roles in explaining resistance and acceptance of technology.

The fit summary in **Table 4** presents key indicators used to evaluate how well the model fits the data, comparing both the Saturated and Estimated models. The SRMR (Standardized Root Mean Square Residual) measures the difference between observed and predicted correlations. Values below 0.08 indicate a good fit, but here, both the saturated model (0.113) and the estimated model (0.129) exceed this threshold, suggesting the model could be improved for a better fit. The d_{ULS} and d_G are distance measures that evaluate discrepancies between the empirical and model-implied covariance matrices. Higher values in the estimated model ($d_{ULS} = 5.884$, $d_G = 1.390$) compared to the saturated model ($d_{ULS} = 4.447$, $d_G = 1.265$) indicate a less optimal fit in the estimated model. The Chi-square tests the model fit, where lower values indicate better fit. Here, both models have high chi-square values (792.139 for the saturated model and 838.755 for the estimated model), pointing to a less ideal model fit, as the discrepancy between the observed and expected covariance matrices is high. The NFI (Normed Fit Index) measures model fit improvement relative to a null model. The NFI values (0.603 for the saturated model and 0.580 for the estimated model) are below the recommended threshold of 0.9, signaling that the model does not provide a strong fit to the data. These results indicate that the current model has room for improvement. The high SRMR and chi-square values, along with low NFI scores, suggest the model does not fit the data well. Refining the model by revisiting the constructs or including

additional paths could enhance fit and lead to more accurate interpretations of how cognitive dissonance and related constructs influence technology adoption.

Table 4. Model fit.

Fit summary	Saturated model	Estimated model
SRMR	0.113	0.129
d_ULS	4.447	5.884
d_G	1.265	1.390
Chi-square	792.139	838.755
NFI	0.603	0.580

4. Results and Discussion

Table 5 provides an overview of the path coefficients, total effects, and R-squared (R^2) values for the relationships between various constructs in the study. Path coefficients represent the strength of the relationships between constructs, while R-squared values indicate the percentage of variance in the dependent variable explained by the independent variables.

Table 5. The path effects.

Path	Total effects	Construct	R-square	R-square adjusted
Cognitive Dissonance -> ATU	0.336			
Cognitive Dissonance -> AUT	0.114			
Cognitive Dissonance -> BI	0.185			
Cognitive Dissonance -> PEOU	0.397	PEOU	0.158	0.150
Cognitive Dissonance -> PU	0.636	PU	0.404	0.399
PEOU -> ATU	0.612	ATU	0.438	0.428
PEOU -> AUT	0.207			
PEOU -> BI	0.338			
PU -> ATU	0.146	ATU	0.438	0.428
PU -> AUT	0.049			
PU -> BI	0.081			
ATU -> AUT	0.339			
ATU -> BI	0.552	BI	0.535	0.523
BI -> AUT	0.614	AUT	0.452	0.437
RIA -> AUT	0.334			
RIA -> BI	0.403			
RIA × ATU -> AUT	0.051			
RIA × ATU -> BI	0.083			
RIA × BI -> AUT	-0.042			

1) Cognitive Dissonance has notable effects on several constructs, with a moderate impact on Perceived Usefulness (PU) (0.636) and Perceived Ease of Use (PEOU) (0.397). These path coefficients suggest that cognitive dissonance plays a crucial role in shaping students' perceptions of technology, particularly regarding its usefulness and ease of use. However, its effects on other constructs, such as Attitude Towards Technology (ATU) (0.336) and Behavioral Intentions (BI) (0.185), are smaller but still significant, indicating that cognitive dissonance indirectly influences students' technology adoption decisions.

2) R-squared values show the extent to which the independent variables explain the variance in the dependent constructs. For instance, BI (Behavioral Intentions) has an R^2 of 0.535, meaning 53.5% of the variance in behavioral intentions can be explained by factors such as cognitive dissonance, perceived usefulness, and perceived ease of use. Similarly, 43.8% of the variance in Attitude Towards Technology (ATU) is explained by PU and PEOU, highlighting the strong influence of these constructs on students' attitudes. Actual Use of Technology (AUT) has an R^2 of 0.452, meaning 45.2% of the variance is explained, largely driven by BI (0.614), indicating that behavioral intentions are a significant predictor of technology use.

The path analysis underscores the importance of Cognitive Dissonance in shaping both perceived ease of use and usefulness, which, in turn, affect attitudes, behavioral intentions, and actual technology use. The high R-squared values for BI, ATU, and AUT suggest that the model effectively explains a significant portion of the variance in students' adoption of technology. However, the relatively weaker effects of constructs like RIA (Resistance to IT Adoption) and its interactions suggest that resistance may not play as large a role as expected. The findings provide valuable insights for developing strategies to reduce dissonance and enhance positive attitudes toward technology adoption among students.

4.1. Hypotheses Test

The results in **Table 6** are the path coefficients between various constructs, as well as their sample mean, standard deviation, t-statistics, and p -values. The path coefficients show the strength and direction of the relationships, while the t-statistics and p -values indicate the statistical significance of those relationships. The results highlight several strong and statistically significant relationships. For instance, Attitude Towards Technology (ATU) \rightarrow Behavioral Intentions (BI) has a high path coefficient (0.552) with a t-statistic of 8.965 and a p -value of 0.000, indicating that attitude significantly predicts behavioral intentions. Similarly, BI \rightarrow Actual Use of Technology (AUT) shows a strong relationship (0.614) with a t-statistic of 8.863, emphasizing that students' behavioral intentions are highly predictive of their actual technology use. Other significant paths include Cognitive Dissonance \rightarrow Perceived Ease of Use (PEOU) (0.397) and Cognitive Dissonance \rightarrow Perceived Usefulness (PU) (0.636), both with low p -values (0.000), demonstrating that cognitive dissonance plays a crucial role in shaping students' perceptions of technology. However, paths like RIA (Resistance to IT Adoption) \rightarrow AUT (0.086) and RIA \times

BI → AUT (−0.042) are not statistically significant (p -values of 0.420 and 0.516), indicating that resistance may not directly impact actual technology use or intentions as strongly as other constructs do. The findings indicate that attitude, behavioral intentions, and perceptions of ease of use and usefulness are critical determinants of technology adoption among students. Resistance to IT adoption, on the other hand, shows limited influence on actual technology use. These insights suggest that interventions aimed at improving attitudes and reducing cognitive dissonance could be more effective in promoting technology adoption.

Table 6. Hypotheses test.

Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	p -values
ATU → BI	0.552	0.559	0.062	8.965	0.000
BI → AUT	0.614	0.620	0.069	8.863	0.000
Cognitive Dissonance → PEOU	0.397	0.403	0.082	4.867	0.000
Cognitive Dissonance → PU	0.636	0.636	0.070	9.065	0.000
PEOU → ATU	0.612	0.615	0.056	10.877	0.000
PU → ATU	0.146	0.146	0.064	2.265	0.024
RIA → AUT	0.086	0.085	0.107	0.807	0.420
RIA → BI	0.403	0.395	0.083	4.861	0.000
RIA × ATU → BI	0.083	0.080	0.056	1.485	0.137
RIA × BI → AUT	−0.042	−0.041	0.065	0.649	0.516

4.2. Importance-Performance Map Analysis

4.2.1. The Constructs

The Importance-Performance Map Analysis (IMPA) results show the relative importance and performance of each construct in relation to the outcome variable (likely the Actual Use of Technology (AUT)). Importance refers to the strength of the relationship between each construct and the outcome, while performance indicates how well the construct is performing in the context of the study, typically on a scale of 0 to 100.

1) Behavioral Intentions (BI) shows the highest importance (0.614) and a relatively high-performance score (54.150), indicating that BI is the most crucial predictor of students' actual technology use. This reinforces the idea that when students intend to use technology, they are more likely to follow through with actual use. Cognitive dissonance has a much lower importance (0.114), but its performance score (66.710) is relatively high, suggesting that while it is not as strong a predictor, it still functions effectively in influencing technology adoption.

2) Perceived Usefulness (PU) has the highest performance score (74.028) but a low importance score (0.049). This indicates that although students perceive technology as useful, this perception doesn't strongly predict actual usage in this context. Conversely, Perceived Ease of Use (PEOU) has a moderate importance score (0.207) but a lower performance score (40.376), suggesting that ease of use is somewhat influential but not performing well among students. Resistance to IT

Adoption (RIA), with an importance score of 0.334 and a performance of 69.389, shows that resistance is moderately important and relatively high-performing in affecting technology adoption.

The IMPA results suggest that Behavioral Intentions (BI) should be a primary focus for promoting technology adoption, as it is both highly important and performing relatively well. While Perceived Usefulness (PU) performs well, its low importance indicates that increasing its performance might not significantly impact actual use. On the other hand, improving the performance of Perceived Ease of Use (PEOU) could have a more substantial effect, given its moderate importance. These insights can guide strategies to enhance students' engagement with technology by focusing on improving ease of use and reinforcing positive behavioral intentions. (Figure 2)

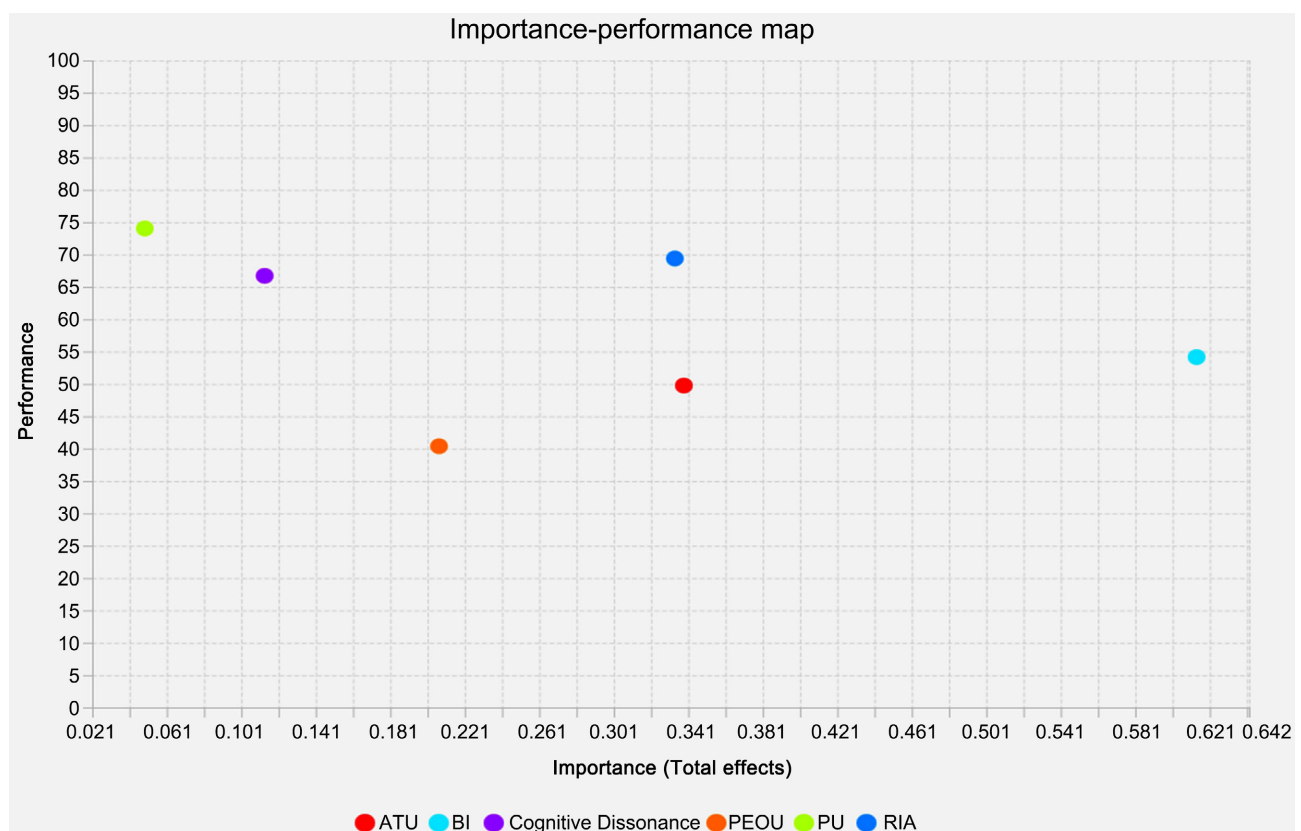


Figure 2. IMPA of Constructs.

4.2.2. Factors

The Importance-Performance Map Analysis (IMPA) for Actual Use of Technology (AUT) reveals that key factors like Perceived Benefits, Perceived Complexity, and Social Norms play a significant role in influencing technology adoption among students. Perceived Benefits holds the highest importance but is underperforming, suggesting that while students recognize the advantages of using technology, they are not fully aware of these benefits. Similarly, the complexity of the technology and alignment with social norms have moderate importance but require

improvements to encourage greater usage. Self-Efficacy and Previous Experience are also crucial factors, with moderate-to-high importance, showing that students' belief in their ability to use technology and their prior experience with it directly impact their likelihood of using it again. While these areas perform moderately well, there is room for enhancement, particularly in boosting students' confidence and expanding on their past positive experiences.

A more User-Friendly Interface is another key area for improvement, as usability issues seem to be hindering broader adoption. On the positive side, Fear of Change and Support and Training are relatively well-managed, with high-performance scores, indicating that efforts to reduce students' resistance to new technology and provide adequate support have been successful. However, improving the enjoyment of using technology and building Confidence in Ability are areas where further interventions could significantly enhance students' engagement and actual use of technology. (Figure 3)

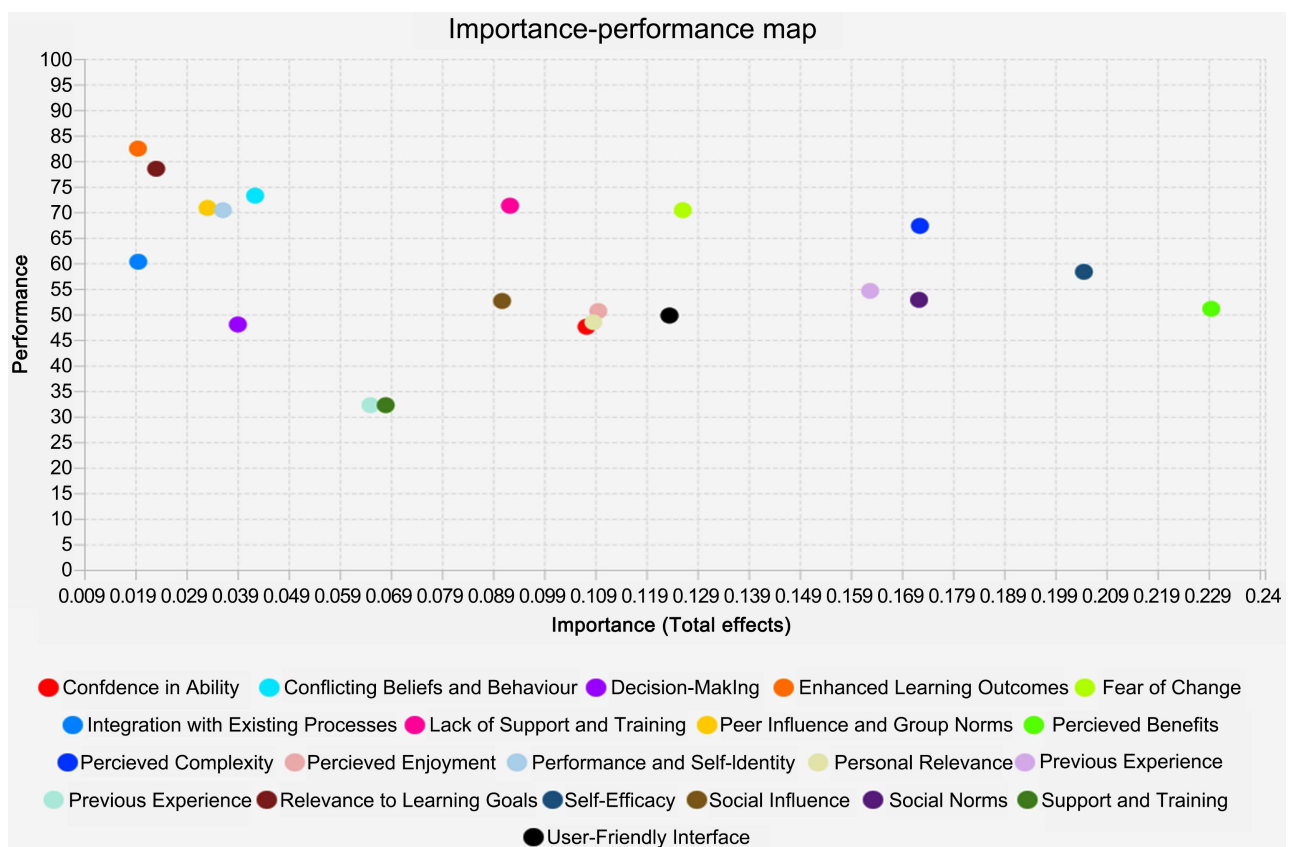


Figure 3. IMPA for Indicators.

4.3. Focus Group Discussion

4.3.1. The Factors Contributing to Cognitive Dissonance

During the focus group discussion, participants highlighted cultural beliefs and societal expectations as significant factors influencing cognitive dissonance in technology adoption among graduates. Many described feeling conflicted when

using technologies that clashed with traditional practices or community norms. In several cases, graduates encountered resistance from family members, who viewed reliance on technology as a departure from established ways of life. This cultural tension, they agreed, often led to feelings of unease and a struggle to balance modern demands with respect for traditional values.

Another major theme that emerged was the gap between perceived and actual usefulness of technology. Many graduates initially adopted digital tools, expecting to boost their productivity or job prospects. However, they expressed frustration when these technologies failed to deliver the anticipated benefits, often due to poor infrastructure or limited access to reliable internet. For some, this mismatch between expectations and reality heightened their sense of dissonance, making them question the true value of investing time and resources in these tools.

Participants also discussed financial constraints and the pressures they faced to adopt costly technologies. With many graduates in entry-level positions or still job hunting, high device and data costs made technology adoption a financial burden. Some noted that this stress compounded their doubts about technology as they weighed its benefits against the financial sacrifices required. Privacy and data security concerns further added to their hesitation, especially in contexts where protections were limited, and data misuse was a real risk.

Finally, the discussion touched on the challenges of acquiring the necessary digital skills, which added to their cognitive dissonance. Graduates mentioned feeling inadequate or overwhelmed due to limited training and support in mastering new technologies. Many also noted a sense of lost social interaction, as digital communication often felt impersonal. This discomfort with reduced face-to-face connections, along with peer pressure to keep up with technology trends, made many feel torn between the need to adapt and a desire for more traditional interaction. The insights from this discussion highlighted the complex, multifaceted nature of cognitive dissonance in technology use among graduates in developing regions, underlining the importance of addressing these contextual challenges to improve technology integration.

4.3.2. Students Perception of the Importance of IT for Their Academic Success

In the focus group, students expressed mixed feelings about the role of IT in their academic success and future careers. Many viewed technology as essential for their studies, citing its value for research, assignment completion, and collaborative projects. They believed that mastering IT skills could improve their academic performance and give them a competitive edge in the job market. However, while most acknowledged the importance of technology, some admitted to feeling uncertain about their ability to fully leverage it due to varying levels of confidence and skill.

Students also highlighted a gap between their aspirations to use technology effectively and the actual skills they possessed. Although they were motivated to learn, many participants felt they lacked adequate training, especially in advanced

IT applications relevant to their fields. Some had received basic training, but they pointed out that it often fell short of preparing them for the specific demands of their courses. This skills gap left students feeling apprehensive about their readiness for future careers that increasingly rely on digital proficiency.

Access to technology emerged as another significant concern among students. While some students had access to personal laptops and reliable internet, others relied on shared resources or had limited access to devices outside of campus. This disparity affected their ability to practice and develop essential IT skills, leading to feelings of frustration and disadvantage. Several participants noted that limited access restricted their chances of improving their technology skills, which could affect their career preparedness.

Finally, students discussed the pressures they faced from both academic expectations and future career demands to stay current with technology trends. Despite these pressures, many felt that without improved access and targeted IT training, it would be challenging to meet these expectations. The discussion concluded that while students clearly recognized IT's importance, their actual skills and access were often insufficient to meet their goals, highlighting a need for better resources and support to close the gap between their perceptions and practical abilities.

4.3.3. The Barriers to Effective IT Integration as Perceived by Students

In the focus group, students identified several barriers that hindered effective IT integration into their academic lives. A primary concern was the lack of consistent access to reliable technology and internet connections. Many students depended on shared computers or limited campus resources, which restricted their ability to complete assignments or explore new tools. This limited access made them feel frustrated and disengaged, as they felt unable to keep up with their peers who had better access.

Another barrier highlighted was the insufficient training and support available for developing IT skills. Students shared that, although some courses included basic digital tools, the training rarely covered the advanced applications needed for their specific fields. They felt that without practical, hands-on experience, their learning was incomplete. This skills gap left many feeling unprepared and discouraged about their ability to use technology effectively in both their academic and future professional lives.

Financial constraints were also a recurring theme in the discussion. Some students mentioned that they could not afford the latest devices or software, which limited their ability to stay up-to-date with technological advancements. These economic barriers influenced students' attitudes, causing some to feel that technology was a luxury rather than a necessity. This sense of exclusion contributed to their hesitation and reluctance to embrace new technologies that seemed out of reach.

Finally, students discussed how these barriers influenced their behavior and attitudes toward technology. They noted that the lack of access, training, and resources often led to lower motivation and confidence in their IT abilities. Many

found themselves avoiding tasks that required advanced digital skills or relying on outdated methods to complete assignments. Overall, these barriers shaped a cautious and sometimes negative attitude toward technology, highlighting the need for more inclusive and accessible IT support to foster positive engagement with technology.

4.3.4. Students Understanding of Cognitive Dissonance Informed the Development of Targeted Interventions to Improve IT Adoption

During the focus group, students discussed how understanding cognitive dissonance could help design interventions to improve IT adoption. They recognized that cognitive dissonance often arises when their beliefs about the importance of technology clash with their actual experiences or skills. If institutions could identify these moments of dissonance, they could offer tailored support to help students overcome their reluctance and frustration. For example, providing targeted IT training programs that align with students' specific needs could reduce feelings of inadequacy and improve their confidence in using technology.

The group also suggested that addressing the underlying causes of dissonance, such as limited access to technology or inadequate skills, could make a significant difference in IT adoption. Interventions could focus on improving access to devices and reliable internet, especially for students in underserved areas. When students have the resources they need, their sense of dissonance diminishes, leading to more positive attitudes toward technology. This would create a more inclusive environment where all students can engage with IT without the added stress of logistical barriers.

Furthermore, students emphasized the importance of fostering a growth mindset through interventions. By encouraging students to view technology adoption as a gradual learning process, institutions could help reduce the cognitive dissonance that arises from initial struggles. Peer mentoring, hands-on workshops, and real-life applications of technology could support this shift in mindset, making students feel more comfortable with technology in both academic and future career contexts.

Finally, the students pointed out that understanding cognitive dissonance could lead to more personalized interventions. Instead of a one-size-fits-all approach, institutions could identify individual students' challenges and offer customized support. Whether it's providing extra help with specific software or creating online resources tailored to different fields of study, such targeted interventions would make technology adoption more accessible and less stressful. This, in turn, would help students overcome cognitive dissonance and embrace technology with greater confidence.

5. Summary of the Findings

The study on cognitive dissonance, technology acceptance, and resistance among undergraduate students at the University of Cape Coast sheds light on key challenges they face with technology adoption. Many students experienced cognitive

dissonance when their beliefs about technology's value for academic and career success clashed with their actual experiences, such as difficulties in usage, inadequate training, and limited access. This mismatch between their understanding of technology's importance and its practical challenges led to frustration and resistance. When students lacked the necessary skills or resources to navigate technology, this dissonance intensified, making them less likely to fully embrace new tools or applications.

Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) were major contributors to cognitive dissonance. Many students felt discomfort when technology seemed overly complex or less helpful than expected, which increased their hesitation toward adoption. Additionally, cultural factors played a role, as students' sense of self-efficacy and attitudes were shaped by community beliefs and norms regarding technology. The perceived complexity of certain digital tools, coupled with self-doubt, further heightened cognitive dissonance and discouraged adoption. Social influences also affected students' responses to technology, as peer and family perspectives shaped their attitudes. Students surrounded by peers who embraced technology often felt more confident, while those facing skepticism from their social circles were more likely to resist technology use.

To address these challenges, the study recommended enhancing training and support to build students' confidence and skills in using digital tools. Cultural specificities need to be considered, as some students may have distinct beliefs or reservations about technology based on their backgrounds. Institutions should also make technology more accessible and enjoyable to use by designing user-friendly interfaces and promoting a positive technology culture. Peer influence and social norms could be leveraged to normalize technology use, encouraging students to view technology as both manageable and beneficial. Addressing these psychological, cultural, and social factors together could significantly reduce cognitive dissonance and resistance, enabling students to benefit from technology in their academic and professional development.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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