



Factors Influencing the Electronic Textbooks Adoption in Tanzanian High Schools

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: Despite the availability of electronic textbooks via mobile device applications in Tanzania, students in high schools are still adopting them slowly for their day-to-day studies. From the literature reviewed, no study has examined the influencing factors for adopting e-textbooks at this level of education in Tanzania. Therefore, this study, in particular, fills that gap by extending the UTAUT model's key constructs of Effort Expectancy, Social Influence, and Facilitating Conditions to include the type of school (private or public) as a new moderating variable in predicting the adoption of electronic textbooks in Tanzania.

Methodology: The study employed survey research designs and strategies to collect data via questionnaires from 370 respondents using simple, stratified, proportional random sampling procedures. To test the validity, publishing and research professionals were consulted. For instrument reliability, a Cronbach value from 0.858 to 0.863 was achieved. A 0.05 threshold of significance was applied to evaluate the study hypotheses.

Findings: Effort Expectancy (.506 (95% CI:.404,.607)), Social Influence (.129 (95% CI:.046,.212)),

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and Facilitating Conditions (.273 (95% CI: .167, .379) significantly and positively influenced the adoption of e-textbooks. The type of school negatively moderated the relationship between Facilitating Conditions and BI to electronic textbook adoption (-.211 (95% CI: -.361 to -.061)). Through the multi-regression technique, the interactions revealed differences in private and public-school students' BI towards e-textbook adoption, where private scholars signify more effect than public schools. In particular, this study's findings are a stepping stone for students, teachers, app developers, e-textbook publishers, school administration, and policymakers to adopt electronic textbooks.

Recommendation: With these findings, the government, school administration, and e-textbook developers should improve the e-textbook adoption infrastructure and distribution by providing user-friendly platforms and services that effortlessly and quickly fulfil the expectations of high school students.

Keywords: Electronic textbook; social influence; type of school; effort expectancy; ETA; UTAUT; facilitating conditions.

1. INTRODUCTION

To date, schools in the developed world offer educational materials in a wide range of designs that can be delivered through the World Wide Web, the intranet, the extranet, or other electronic channels due to the rapid development of science and technology [1]. Mobile devices such as cell phones, tablets, e-readers, and laptops are used anywhere with the internet or without to deliver e-materials, including e-textbook content, in schools. Consequently, e-textbooks have become more common in the first world as teaching and learning tools for students and teachers to printed books. As of now, e-textbook platforms are readily available practically everywhere. Students and teachers now have an opportunity to learn more whenever and wherever they want to because of electronic textbook availability [2].

In developed nations, there has been a lot of interest in understanding what influences the user adoption of technology compared to developing ones [3]. Most of the prior studies done in developing countries, especially Tanzania, typically focused on e-learning devices without considering the applications and platforms that contain the authorised e-materials for use by students. Studies on the effects of Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) (UTAUT variables), while influenced by the Type of School (TS), on the usage of e-textbooks at the secondary level, have been conducted partially or not at all in Tanzania.

Additionally, studies on electronic textbook adoption while considering public or private schools (type of school) at this level of education in developing countries are limited. Type of School (TS) refers to the difference in school set-

up between public (government and community schools, both of which are subsidised by the government for recurrent costs) and private (not owned by the government) schools, which typically rely almost entirely on students' fees as well as owners' funding to cover school expenses.

This study has adopted three UTAUT variables and incorporated a type of school (TS) as a novel moderating factor based on the characteristics of this study's respondents and other literature reviewed. Using the extended UTAUT model [4] and adding a type of school (organisational setup) as one of the moderators creates an integrative adoption model that links the relationship between the independent variables (EE, SI, and FC) and the dependent variable of behavioural intention (BI) to E-Textbook Adoption (ETA). The inclusion of the type of school will add to the selected UTAUT constructs by testing its effect on electronic textbook adoption in Tanzania's educational sector [4]. This study addresses the lack of adoption models and novel interactions with contemporary technologies at the institutional level that allow for a wide spectrum of individual technology acceptance and use in Tanzania.

1.1 Research Objectives and Hypotheses

This study's main objective was to examine how social influence (SI), facilitating conditions (FC), and effort expectancy (EE) affected the adoption of electronic textbooks in Tanzanian private or public high schools. The following study objectives and hypotheses served as the study's guidelines:

1.1.1 Research objectives

The specific objectives of the study were to:

1. Examine the influence of effort expectancy on high school students' BI towards ETA
2. Examine the effect of social influence on high school students' BI towards ETA
3. Determine the influence of Facilitating conditions, moderated by type of school, on high school students' BI of towards ETA.

1.1. 2 Research hypotheses

Each of the first two research objectives has one hypothesis, except objective three, which has two hypotheses. The dependent variable (BI to ETA) is directly associated with Hypotheses 1, 2, and 3, and Hypothesis 4 has the interaction terms (FC with a type of school).

H1: Effort Expectancy has a significant positive influence on high school students' BI to ETA

H2: Social Influence has a significant positive effect on high school students' BI to ETA

H3: Facilitating Conditions have a significant positive influence on high school students' BI to ETA

H4: Facilitating Conditions, moderated by type of school, have a significant positive influence on high school students' BI to ETA

2. LITERATURE REVIEW

2.1 Empirical Review on the Study Objectives

Several works of literature that used the UTAUT perspective have revealed conflicting opinions on technology adoption [5,6,26], to name a few. Although numerous studies have attempted to demonstrate facilitating conditions, social influence, and effort expectancy to motivate behavioural intention to technology adoption that is appropriate for e-learning, very few studies exist on the effects of school type on the relationship between FC, SI, and EE on BI to ETA in Tanzanian high schools.

Several studies, though not done in Tanzania, have been conducted in African countries on what makes a student adopt e-textbooks for learning. [7] identified FC as a vital determinant that affects the adoption of e-books in South Africa. [6] (in Nigeria); [2] (in Developing Economy Countries); [8] (in Brazil); [9] (in Brazil)) have shown that effort expectancy significantly influences students' intention to adopt e-books and e-textbooks in their countries. The significance of social influence has been revealed by the studies of [10,9], and [11]. These results, however, are different from those of [12],

who claimed that e-books are not widely adopted because the functional differences between e-books and the traditional model prevent widespread adoption of e-books.

The adoption rate of e-textbooks in schools is moving slowly, despite Tanzania's growing use of the internet and other mobile technologies that enable their use. The low adoption rate of e-textbooks in Tanzanian high schools has brought about the need for this study. Hence, this study specifically investigates the effects of facilitating conditions, moderated by school type, effort expectancy, and social influence (the variable from the UTAUT model) on influencing the adoption of e-textbooks in Tanzanian high schools.

According to [13], the impact of technologies in schools can be possible if the necessary conditions for their use are sufficiently and readily available in those schools. It means that technology adoption in schools will depend on the ease of use of technology, Users believing in other people's opinions whom they respect, availability, accessibility and utility of equipment, adequacy of training to users and the school administration's readiness to adopt the technology. According to studies by [14] in Tanzania and [15] in Kenya, the type of school has an impact on how students use technology in the classroom. While taking into account the type of school, these studies have brought varied findings about the adoption of technology between private and public schools. therefore, to ascertain how the type of school affects technology adoption in the education sector in Tanzania, respondents from private and public high schools were chosen in this study.

Based on [4] model, this paper examined how ease of use of technology, facilitating conditions and how teachers, parents and peers motivate students from private or public high schools to adopt e-textbooks in Dar es Salaam Region. In particular, this study attempted to examine the influence of FC moderated by school type, SI and EE on electronic textbook adoption at the high school level in Tanzania.

2.2 Study Model and Conceptual Framework

Technology adoption has been explained using a variety of models and theories. These include the Theory of Reasoned Action (TRA) by [16]; the Technology Organisation Environment (TOE)

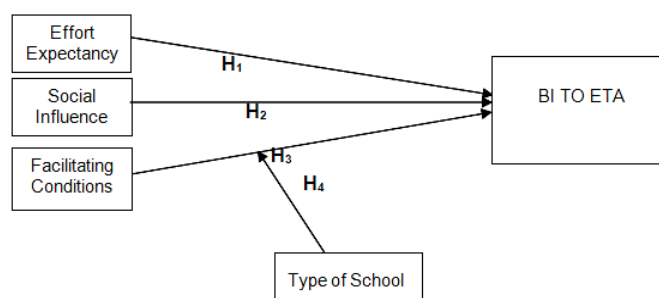


Fig. 1. The conceptual framework

framework by [17], the Technology Acceptance Model (TAM) by [18], Theory of Planned Behaviour (TPB) by [19]; Diffusion of Innovation Theory (DOI) by [20], and UTAUT by [21]. UTAUT model integrates eight (8) earlier models of technology adoption and makes it the best model indicating better individual adoption of technology out of these theories and models [1].

The UTAUT model employs experience, gender, age, and involuntariness of use as moderating variables, while Performance Expectancy (PE), EE, FC, and SI serve as predictors of behavioural intention (BI) and actual usage [21]. The UTAUT model's flaw is that it ignores various organisational structures that can affect technology adoption. UTAUT model anticipates that users can use the information system irrespective of institutional settings [22]. This paper has incorporated the school's type as a moderating variable to assess the use of electronic textbooks in the Tanzanian educational sector. The respondents' demographic features and the literature review from [14] are taken into account when choosing the type of school to be a moderating variable [23].

It is better to consider organisation-level setups to understand how technology is adopted at an organisation level. This connotes that e-textbooks users will have different influencing ways of e-textbooks adoption due to the settings of their school organisation, technology and environments surrounding them [24]. Therefore, this emphasises the necessity of understanding the type of school (private or public) as a crucial moderating construct to evaluate technology adoption, particularly the adoption of e-textbooks in Tanzanian schools.

As a result, a new variable called the type of school was added to the UTAUT theory to modify the predictor (FC). This study's theoretical framework was developed based on some of the variables from the UTAUT model. The framework assumption was that EE, SI, and FC all directly

influenced the adoption of electronic textbooks in Tanzania's high schools, whereas the type of school moderated the relationship between FC and BI to ETA.

3. METHODOLOGY

3.1 Population and Sample

The survey for this study had 370 high school respondents (98%) from the Dar es Salaam region. The study population consisted of pupils from 22 schools spread across the five municipalities. The questionnaire was used to collect data. The questionnaire was divided into five sections: respondents' demographic characteristics, BI to ETA, EE, SI and FC variables. The study area (Dar es Salaam area) was selected due to the presence of appropriate e-textbooks adoption infrastructures, the Tanzania Institute of Education (a government institution dealing with printed and electronic textbook development and distribution) in the area, having many e-textbooks platforms developers and having many high schools (78) for sample adequacy [25].

Proportionate stratified and simple random sampling was used to select respondents with access to e-textbooks and e-textbooks reading devices. Data were collected at once within two months. The questionnaire's measuring scale was a five-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree." Five items, modified from [4] and [26], were used to measure EE. Five items from [26] and [27] were used to measure SI, five items from [4] were used to measure FC, and five items from [22] and [28] were used to measure BI to ETA.

3.2 Reliability and Validity

The reliability test was run to ensure the measurements of the study's internal consistency [29]. The reliability of the research instruments was tested using the Cronbach alpha coefficient.

The Cronbach's alpha reliability scores varied from 0.80 to 0.863, indicating that the values were above the minimum cut-off point of 0.7, revealing that the questionnaire was reliable in measuring the intended studied constructs [29]. Experts in research, blended learning, and publishing were consulted for validity assessment.

Table 1. Shows the reliability results

Construct	Reliability Cronbach's alpha
BI to ETA	0.86
EE	0.863
SI	0.858
FC	0.80

Source: Fieldwork, (2022)

4. RESULTS

This paper was to examine the high school students' influencing factors for building BI on ETA in their studies. The respondents' demographic features, research hypotheses, and Pearson correlation coefficients were all addressed in tandem with the study's findings.

4.1 Demographic Characteristics of Respondents

The study's demographic characteristics included high school students from different schools. The 213 (57.6%) students were from public schools, while the rest 157 (42.4%) were from private schools found in the Dar es Salaam region.

4.2 Correlation Analysis

The postulated relationships between the UTAUT key variables in Hypotheses 1 to 3 were tested to see if they supported the sample using the Pearson product-moment correlation coefficient. As a general rule, a correlation coefficient below +0.30 is typically considered little; between +0.30 and +0.50 is considered low; between +0.50 and +0.70 demonstrates a moderate effect; between +0.70 to +0.90 is high and +0.90 or more is generally considered extremely high [30].

Table 2. Directions and strength of the correlations

Level	Strength
Little	+0.00 +0.30
Low	+0.30 +0.50
Moderate	+0.50 +0.70
High	+0.70 +0.90
Extremely	+0.90 1.00

In this study, the results of the Pearson product-moment correlation revealed a moderately significant positive relationship between effort expectancy and BI to use e-textbooks ($r.699, p.05$). Additionally, there was a moderate positive correlation between facilitating conditions and BI that were statistically significant ($r.534, p.05$), as well as between social influence and students' BI to ETA ($r.462, p.05$) as shown in Table 3. As a result, H1, H2, and to support the findings by showing moderate correlational effects on BI to ETA. Table 3 presents the results of the study H3 were determined.

Table 3. Pearson correlations results

IV	Pearson correlation	BI to ETA
EE	R	.669
	Sig.(2tailed)	.000
SI	R	.462
	Sig.(2tailed)	.000
FC	R	.534
	Sig.(2tailed)	.000

4.3 Multiple Linear Regression Analysis coefficients

To test the study's hypotheses, multiple linear regression analysis was applied.

4.4 The Model Summary

The results in Table 5 below indicated that the predictors in the model are capable of predicting over 50% of the variance in BI to ETA.

5. DISCUSSIONS OF THE FINDINGS

The main objectives of this study were to examine the influence of FC, SI and EE on the e-textbooks adoption and the use of the type of school (TS) as the moderator on the relationship

Table 4. The Multiple linear regression analysis

Model	Coefficients ^a				Sig.	95.0% Confidence Interval for B	
	Unstandardized Coefficients		Standardized Coefficients	T		Lower Bound	Upper Bound
	B	Std. Error	Beta				
(Constant)	.194	.181		1.073	.284	-.162	.551
FC_score	.273	.054	.284	5.065	.000	.167	.379
Schooltype – recod	.652	.269	.342	2.420	.016	.122	1.181
SchooltypeXFC	-.211	.076	-.413	-2.759	.006	-.361	-.061
SI_score	.129	.042	.136	3.052	.002	.046	.212
EE_score	.506	.052	.483	9.799	.000	.404	.607

a. Dependent Variable: BI to ETA_score

Table 5. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.710 ^a	.504	.497	.66925	1.104

a. Predictors: (Constant), EE_score, Schooltype - recoded, SI_score, FC_score, schooltypeXFC
 b. Dependent Variable: BI to ETA score

between FC and BI to ETA. Specifically, the study examined if the type of school moderates the relationship between FC and BI towards ETA by students in high school education in Tanzania.

This part is discussed in the rights of objectives and the hypotheses in each objective.

5.1 Effort Expectancy Influences High School Students' BI to ETA

The hypothesis for objective one was as follows:

H1: *EE has a significant positive influence on BI to ETA*

While controlling other variables, the multiple linear regression model, demonstrated that, for each unit increase in EE, BI to ETA increased by.506 (95% CI:.404,.607). The results of Table 3 showed the significant effect of EE on the adoption of e-textbooks ($p>0.05$). Additionally, it is pointed out in this study that the effort expectancy variable is the most significant predictor of BI.

According to [31] effort expectancy is widely accepted as one of the main factors of technology adoption behaviour because, without the ease of use, users will get challenged by the novel technology and ignore its adoption unless outside forces are applied. The study results provide strong empirical support for the findings of [21] and [4] on the UTAUT model and follow-up researchers that applied the UTAUT model to understand technology adoption, use and acceptance behaviour [21,4]; [32]. The technology adoption, particularly e-textbooks, is significantly influenced by effort expectancy in previous studies such as that of [9] on the adoption of technology for reading and that of [36] in Tanzania on the Instructors' Intention to Adopt and Use Open Educational Resources in Higher Education in Tanzania. Few or no any researcher has specifically examined the influence of EE on e-textbooks in high schools, instead, they did it on e-learning in its totality [33,10] Therefore, this paper has filled that gap.

5.2 Social Influence Affects High School Students' BI to ETA

The hypothesis for objective two was as follows:

H2: *SI has a significant positive influence on BI to ETA*

Holding other factors fixed, the multiple linear regression model demonstrated that the BI to ETA increased by 129 (95% CI:.046,.212) for each unit increase in SI. The results of Table 3 revealed that adoption of e-textbooks was significantly influenced by social influence ($p>0.05$). The simple linear regression model demonstrated SI to have a significant positive relationship with BI to ETA. In particular, the findings on social influence showed a significant effect on students' BI to ETA in Tanzanian high schools. This study's findings are consistent with the study by [34] in Fujian, China; [6] in Nigeria and [35] in Taiwan.

5.3 Facilitating Conditions Influence High School students' BI to ETA

There are two hypotheses for objective three. Hypothesis One stated as follows:

H3: *FC has a significant positive influence on students' BI to ETA*

After controlling for other model factors, the study found that the BI to ETA increased by.273 (95% CI:.167,.379) for every unit score rise in FC. The correlation between the criterion variable (BI to ETA) and the predictor variable (FC) is shown in Table 3. From the analysis, the FC showed a strong significant positive relationship with BI to ETA. The paper's findings demonstrated that FC had a direct significant influence on students' BI to adopt e-textbooks in the Tanzanian education sector.

The respondents revealed that they might use e-textbook platforms if they had abundant resources for promoting technology adoption on school campuses. As has been previously stated, the user solely uses the available resources, information, and assistance [36]. The study's findings correspond to those of [37] research. According to [38] and [18], FC should have had a positive effect on the adoption of e-books. For optimal results in Tanzania, the e-textbook designer and distributors need to take into consideration the school infrastructures, instructor expertise, and student needs. It signifies that researchers and those responsible

for developing and disseminating electronic textbooks must keep putting the wants and needs of students before anything else [39,40].

Hypothesis two of objective three is stated as follows:

H4: FC moderated by type of school, has a significant positive influence on students' BI to ETA

The interaction effects (or moderation effects) of TS on FC and BI to ETA were measured by adding another term to the regression model to be estimated by multiplying the independent variables and the moderator (type of school). The type of school was coded with public schools in the control category. The block method was employed to perform the regression analysis for the interaction effects. The first block of the model included effort expectancy, social influence, and facilitating conditions. The second block then had all of these variables (SI, EE, and FC), as well as the interaction terms (type of school dummy) and FC. The significance level for the interaction effects was set at 0.05.

As can be seen from the findings shown in Table 3, ST exhibits a statistically significant negative interaction effect on the relationship between FC and BI to ETA ($p>0.05$). While holding other variables in the model constant, the effect of FC on students' BI to ETA across types of school, revealed that for each unit score increase in FC, BI to ETA increased by -.211 (95% CI: -.361 to -.061).

This study considerably contributes to the body of literature by exploring a previously unexplored moderating effect of "Type of school" on the relationship between facilitating conditions and BI to ETA. The findings of this study revealed that students in a certain type of school (public and private) have different beliefs on the BI to ETA due to differences in facilitating conditions available in their particular school campuses. In particular, the results indicated that private schools have a stronger effect on facilitating conditions than public schools. It implied that students in private and public schools deserve different treatment since they hold distinct perspectives regarding the availability of infrastructure, resources, and knowledge concerning the e-textbooks adoption in the schools they attend.

Therefore, H1, H2, and H3 revealed positive statistical support for BI to ETA. However, H4 shows that the effect of FC on students' BI to

ETA across types of schools, has a negative beta value of -.211 ($p>0.05$). The relationship between FC and BI to ETA was adversely affected by TS's interaction effect, which was statistically significant (Table 3). Compared to public schools, the impact of FC through private schools had a more effect on BI to ETA.

6. CONCLUSION AND RECOMMENDATIONS

The results of the study analysis suggest that social influence (SI), effort expectancy (EE), and facilitating conditions (FC) have direct statistically significant relations to high school students' BI to ETA. The type of School (TS) statistically affects the relationship between Facilitating conditions and BI to ETA. These results provide information on the characteristics that influence how users adopt e-textbooks in the Tanzanian educational system, with a focus on the significance of FC moderated by TS as the determining factor for BI to ETA in Tanzanian secondary schools. The empirical results of this study significantly broaden our understanding that EE, SI and FC variables influence users' choices on the adoption of digital-related textbooks in high schools. The study results revealed that the ease of use of technology, believing in other people's opinions, and availability of appropriate infrastructure, experts and other resources in the school campuses influence the adoption of e-textbooks.

This paper's findings provide public and private schools insights about what features to add to make students adopt e-textbooks ease. The study recommends to school management and teachers use available devices with e-textbooks to motivate their students to adopt the same. Subsequently, this may result in increasing more e-textbooks users. The paper demonstrates the need to continue using some UTAUT variables by combining them with other moderating constructs including TS, as a way of improving the model's ability to predict the adoption and use of electronic textbooks in educational or other sectors in Tanzania and beyond. Future studies can be done by incorporating the performance expectancy variable with other UTAUT moderating variables.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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