

# USING THE THEORY OF PLANNED BEHAVIOUR TO EXPLAIN THE INTEGRATION OF ICT IN TEACHING AND LEARNING BY EDUCATORS IN PUBLIC TEACHER TRAINING COLLEGES IN TANZANIA

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## ABSTRACT

This study sought to explain the integration of ICT in teaching and learning (ITTL) using the Theory of Planned Behaviour (TPB). Basing on TPB, eight hypotheses (H1-H8) were postulated. H1 and H2 were to the effect that IITL was positively predicted by the intention to integrate ICT (II) and the perceived behavioural control on the integration of ICT (PBCI) respectively. H3 to H5 postulated that II was positively predicted by the attitude toward the integration of ICT (ATI), the subjective norm on the integration of ICT (SNI) and PBCI. H6 stipulated that ATI was positively predicted by the behavioural beliefs and outcome evaluations on the integration of ICT (bboei). H7 stipulated that SNI was positively predicted by the normative beliefs and motivation to comply on the integration of ICT (nbmci). H8 stipulated that PBCI was positively predicted by the control beliefs and perceived facilitation on the integration of ICT (cbpfi). The study involved 184 educators from seven TTCs from all geographical regions in Tanzania who responded to a self-administered questionnaire. Data were analysed using exploratory and confirmatory factor analyses, Cronbach alpha, means and multiple regression. Regression revealed that apart from H1 and H5, the rest of the hypotheses were supported. It was thus concluded that TPB was generally a good explanation of IITL in the study context. Hence TPB was a valid theory.

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**General terms:** Educator, ICT, Tanzania, Teacher Training, Teaching and Learning, Theory of Planned Behaviour.

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## **1. BACKGROUND**

### **1.1 Theoretical Perspective**

The Theory of Planned Behaviour (TPB) proposed by Ajzen (1991) shown in Figure 1, has actual behaviour (AB) as the main variable. Ajzen defined AB as an individual’s observable response in a given situation with respect to a given target. According to Figure 1, TPB theorises that AB is predicted by both behavioural intention (BI) and perceived behavioural control (PBC). Ajzen defined BI as an indication of person’s readiness to perform a given behaviour and PBC as the perceived ease or difficulty of performing the behaviour and is assumed to reflect past experience as well as anticipated impediments and obstacles. As per Figure 1, BI is in turn, predicted by attitude toward behaviour (ATB), subjective norm (SN) and PBC. Ajzen (1991) defined ATB as the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in questions (e.g., using technology), and SN as the perceived social pressure to perform or not to perform the behaviour. Ajzen observes that, “the more favourable the attitude and subjective norm with respect to a behaviour, and the greater the perceived behavioural control, the stronger should be an individual’s intention to perform the behaviour under consideration” (p. 181).

The TPB (Figure 1) theorises that ATB is predicted by behavioural beliefs and outcome evaluations (bboe). Ajzen (1991) defined behavioural beliefs (bb) as an individual’s subjective probability that performing the target behaviour will result in consequences, and outcome

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evaluation (oe) as rating of the desirability of the outcome. As per Figure 1, SN is predicted by normative beliefs and motivation to comply (nbmc). Ajzen defined normative beliefs (nb) as the likelihood that important individuals or group approve or disapprove of performing a given behaviour, and motivation to comply (mc) as the extent to which the person wants to comply with the wishes of the referent others. According to Figure 1, the TPB model posits that PBC is predicted by control beliefs and perceived facilitation (cbpf). Ajzen defined control beliefs (cb) as perception of the availability of skills, resources, and opportunities, and perceived facilitation (pf) as the individual's assessment of the importance of those resources to the achievement of outcomes. As will be revealed (in the literature section), past studies have generally ignored many of the constructs of TPB, notably the most important variable (AB), and the indirect explanatory variables (bboe, nbmci & cbpfi). Thus, the study intended to test whether the TPB in its fullness could explain the integration of ICT in teaching and learning (IITL) among educators in public TTCs in Tanzania.

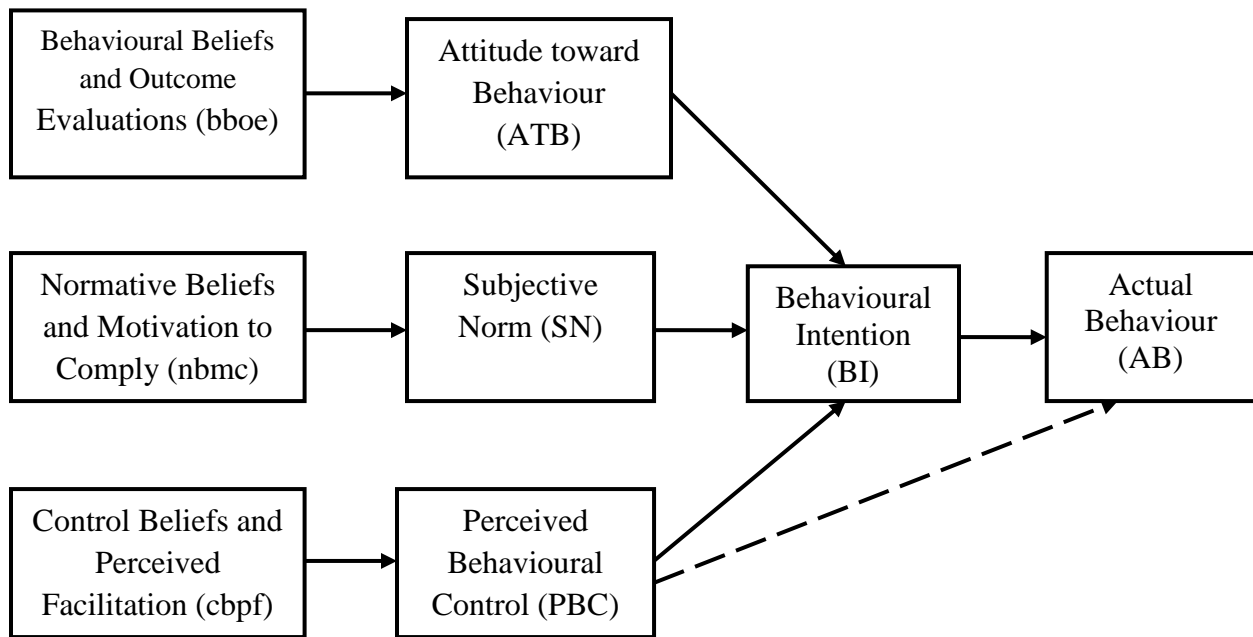


Figure 1: The Theory of Planned Behaviour (TPB)

Source: Ajzen, I. (1991). The Theory of Planned Behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179-211, page 182, Figure 1.

## 1.2 Conceptual Perspective

Basing on the Theory of Planned Behaviour, TPB (Figure 1), we derived Figure 2, where the main variable, actual behaviour (AB) referred to the integration of ICT in teaching and learning (IITL). Behavioural intention (BI) in this study was operationalised as the intention to integrate ICT (II). Attitude toward the behaviour (ATB) in this study referred to the attitude toward integration of ICT (ATI). Subjective norm (SN) in this study referred to the subjective norm on the integration of ICT (SNI). Perceived behaviour control (PBC) referred to the perceived behaviour control on integration of ICT (PBCI). Another explanatory construct of TPB in Figure 1, was behavioural beliefs and outcome evaluation (bboe) and was operationalised as the behavioural beliefs and outcome evaluation on the integration of ICT (bboei). Normative beliefs and motivation to comply (nbmc) - see Figure 1 - were operationalised as the normative beliefs and motivation to comply on the integration of ICT (nbmci). And finally, control beliefs and perceived facilitation (cbpf) in this study referred to the control beliefs and perceived facilitation on the integration of ICT (cbpfi).

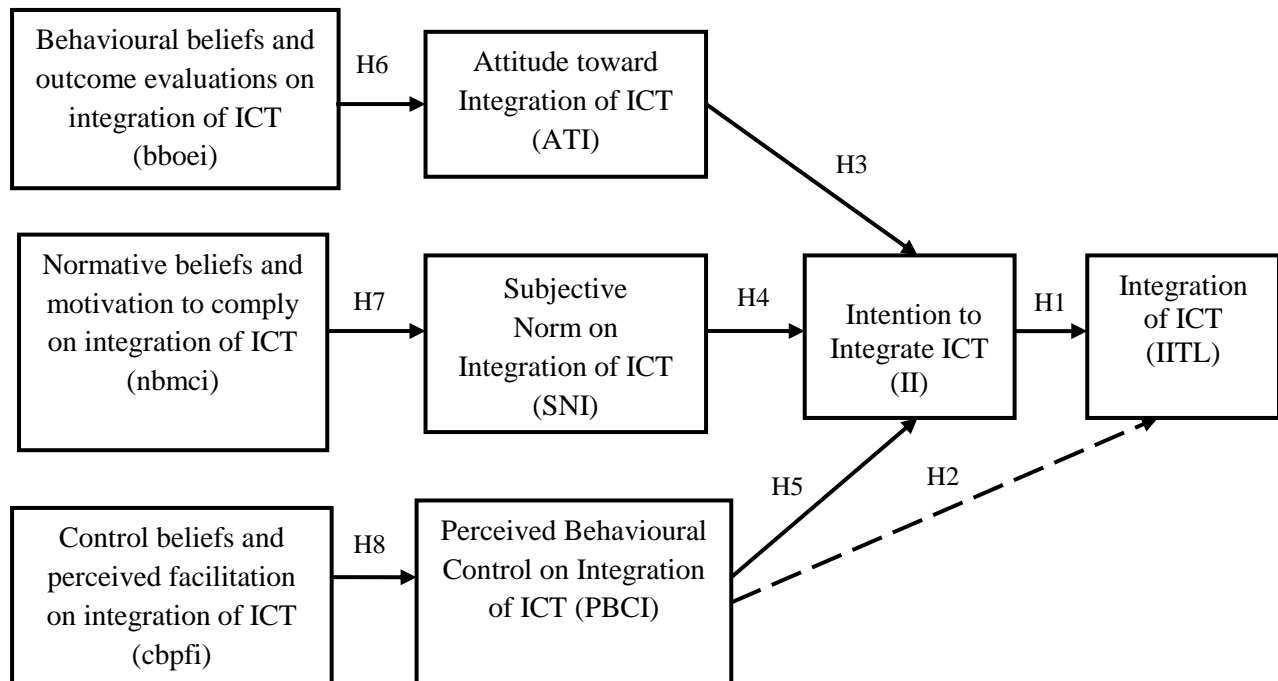


Figure 2: Theoretical framework relating the main variable, IITL and the explanatory variables of the TPB

Source: Adapted from Figure 1 in this work

## **2. RELATED LITERATURE**

### **2.1 Studies that Applied the Theory of Planned Behaviour on the Integration of ICT in Teaching and Learning**

Several researchers have used the Theory of Planned Behaviour (TPB) in their studies on integration of ICT. For example Al-ghaith (2015) used TPB to understand the usage behaviour of an individual on social network sites (SNSs) in Saudi Arabia. Basing on TPB, he hypothesised that usage behaviour (UB) was predicted by behavioural intention (BI) and perceived behavioural control (PBC). In turn, he hypothesised that BI was predicted by each of attitude toward the behaviour (ATB), subjective norm (SN) and PBC. He collected data using a survey questionnaire from 657 respondents, and analysed them using regression. He hence established that while BI significantly predicted UB, PBC did not. In other words, while Al-ghaith supported our first hypothesis (H1), he did not do the same to our H2. He also found that while ATB and SN positively predicted BI, PBC did not. In other words, while Al-ghaith supported our third and fourth hypotheses (H3 & H4), he did not do the same to our H5. One gap that Al-ghaith left was that while he tested the first five hypotheses in our study (see Figure 2), he ignored those (H6-H8) related to the indirect explanatory variables of TPB.

Salleh and Laxman (2015) used what they termed, "the elaborated...TPB model" (p. 289) to identify factors that could "be used for designing intervention or mounting professional development workshops for... [ICT] implementation that... [would] effectively induce change in teachers' behaviour" (p. 289). Two of their four research questions were, "(1) How do the direct factors (teachers' attitudes, subjective norms, and perceived behavioural control [PBC]) predict and explain teachers' intention, and behaviour for the use of ICT in their teaching? (2) How do the indirect factors (behavioural beliefs, normative beliefs, and control beliefs) relate to the respective direct factors (teachers' attitudes, subjective norms, and PBC)...?" (p. 292). They raised 14 hypotheses inclusive of the eight we have in Figure 2. They hence surveyed "all local teachers teaching in the 18 government secondary schools in the four districts in Brunei Darussalam" (p. 296), who reacted to a questionnaire. Hence, using structural equation modelling (SEM) for analysis, they claimed that their study supported all their hypotheses inclusive of the eight hypotheses (H1-H8) - see Figure 2 - of relevance in our study.

Teo, Zhou and Noyes (2016) tested the validity of what they called an extended TPB to explain a teacher's intention to use technology in teaching and learning. Ironically their "extended" TPB only considered the following four constructs of the standard TPB (Figure 1): Usage intention (UI), attitude toward the use (ATU), subjective norm (SN) and perceive behavioural control (PBC), among other constructs than in TPB (Figure 1). They collected data from 592 teachers from 31 primary and secondary schools in Singapore, who filled a questionnaire. Using structural equation modelling (SEM) for analysis, they found that ATC had the largest positive influence on UI, followed by PBC. In other words, Teo et al. supported our third and fifth hypothesis (H3 & H5). However, in their study, SN "had a negative impact" on UI, meaning that Teo et al. supported our fourth hypothesis (H4) but in reverse. An obvious gap left by Teo et al. is that of the eight hypotheses of relevance in our study (see Figure 2), they only tested three (H3, H4, H5), and hence ignored the others (H1, H2, H6-H8).

Valtonen, Kukkonen, Kontkanen, Sormunen, Dillon, and Sointu (2015) focused "on how experiences of learning with ICT in pedagogically meaningful ways can affect pre-service teachers' intentions to use ICT for teaching and learning" (p. 49). They based their research "on the framework of... TPB" (p. 49). They hence designed an online questionnaire that among other variables, consisted of four constructs of TPB, namely behavioural intention, BI (three items); attitude towards the behaviour, ATB (five items); subjective norms, SN (four items); and self-efficacy, SE (four items) as a proxy variable for perceived behavioural control (PBC). They scaled each item using the six-point Likert. Using "a quasi-experimental... design... with pre- and post-testing" (p. 49), they investigated "the effects that a 12-week course using collaborative, inquiry based learning practices and several ICT applications... had on four areas of pre-service teachers' TPB" (p. 49). They hence analysed their data using "repeated measures t tests and structur[al] equation modelling (SEM)" (p. 49). In terms of results, "both models... indicate[d] that attitudes [ATB] were related to behavioural intentions [BI]: In both cases, the effect was strong: pre-test ( $\beta = 0.62, p < 0.00$ ) and post-test ( $\beta = 0.45, p < 0.00$ )" (p. 55). In other words, Valtonen et al. supported our third hypothesis (H3). In their study, "subjective norms [SN] were significantly related to... behavioural intentions [BI]: pre-test ( $\beta = 0.25, p < 0.00$ ) and post-test ( $\beta = 0.17, p < 0.05$ )" (p. 55). In other words, Valtonen et al. supported our fourth hypothesis (H4) also. However, while in the pre-test model, the relation between SE and BI was not statistically significant, "the post-test model show[ed] that the effect of SE on BI was statistically significant although the effect was rather

weak: post-test ( $\beta = 0.21, p < 0.01$ )" (p. 55). In other words, Valtonen et al. partially supported our fifth hypothesis (H5). A glaring gap left by Valtonen et al. is that of the eight hypotheses of relevance in our study (see Figure 2), they only tested three (H3, H4, H5), and hence ignored the other five (H1, H2, H6-H8)

However, as the above studies suggest, many of the other studies have only partially tested the eight hypotheses of interest in our study. In particular, some (e.g. Teo et al., 2016; Valtonen et al., 2016) ignored the main variable, actual behaviour (AB) in TPB in favour of behavioural intention (BI). Others (in our case all, except Salleh & Laxman, 2015) ignored the indirect explanatory constructs (bboe, nbmc & cbpf) of TPB. The present study reduces those gaps by considering those otherwise ignored constructs of TPB too. Moreover, the studies had controversial results. For example, while some studies (e.g. Salleh & Laxman, 2015) supported the second hypothesis (H2) in our study, others (e.g. Al-ghaith, 2015) did not. While some (e.g. Al-ghaith, 2015; Salleh & Laxman, 2015; Valtonen et al., 2015) positively supported our H4, Teo et al. (2016) supported the converse of our H4. While some studies (e.g. Salleh & Laxman, 2015; Teo et al., 2016) found our H5 plausible, Valtonen et al. (2015) supported it only partially, and Al-ghaith (2015) found it not to hold at all!

## **2.2 Literature Reviews on the Theory of Planned Behaviour (TPB)**

Researchers have conducted literature reviews of various kinds. For example, Riebl et al. (2015) carried out a meta-analytic review on the TPB model to determine how the TPB had been applied to explain dietary behaviours and to evaluate which constructs were associated with dietary behavioural intentions (BI) and actual behaviours (AB) in youth. They used electronic databases with key words and combination of words, contacting experts in the field and examining an evolving internet-based TPB-specified bibliography. They hence identified a total of 34 articles including three intervention studies for the meta-analysis. In addition, they only included studies that had participants aged 2-18 years with all TPB constructs discernible and measured, published in English peer reviewed journals and focused on nutrition related behaviours in youth. Riebl et al. used descriptive statistics together with quality assessment using tenants from the Consolidated Standard of Reporting Trials (CONSORT) and Strengthening the Reporting of Observational Studies in Epistemology (SROBE) statement for their analysis.

Regarding findings, Riebl et al. (2015) found dietary behavioural intention (DBI) to be the most common predictor of actual dietary behaviour (ADB). In particular, under the section titled, "The TPB in predicting behaviour" (section 3.5), they reported that, "when examining models of the TPB alone, intention [DBI] emerged as the most significant predictor of behaviour [ADB] in 18 studies... and PBC was strongest in [only] two...." (p. 171). Attitude toward diet (ATD) had had the strongest relationship with DBI. In particular, under the section titled, "The TPB in predicting intention" (section 3.4), they reported that, "when considering the predictors of intention [DBI], attitude [ADB] was the most consistently reported with highest beta coefficients in 13 studies.... Eight studies found PBC to be the strongest predictor of intention [DBI] ... and four [did the same to social norms,] SNs" (p. 170). The meta analysis unearthed a gap to the effect that many studies ignored the indirect explanatory constructs (bboe, nbmc & cbpf) of TPB - see our Figure 1. Another gap was that out of the 34 studies they reviewed, 13 had been on the UK, 11 on the US, three on Africa, two each on Australia, New Zealand, Iran and Canada and one on Hong Kong. These contextual, theoretical and conceptual gaps therefore made it necessary for this study to use the TPB in another context.

### **2.3 Hypotheses**

In order to reduce the gaps raised, this study sought to use the full TPB to explain IITL among educators in public TTCs in Tanzania. Thus as suggested in the theoretical framework (Figure 2), the following hypotheses guided the study:

H1: II positively predicted IITL

H2: PBCI positively predicted IITL

H3: ATI positively predicted II

H4: SNI positively predicted II

H5: PBCI positively predicted II

H6: bboei positively predicted ATI

H7: nbmc positively predicted SNI

H8: cbpfi positively predicted PBCI



## 4 METHOD

### 4.1 Instrument

Data were collected using Lubega, Mugisha and Muyinda (2014) measure of IITL, which operationalised IITL as having four levels namely the integration of substitution ICTs (S), augmentation ICTs (A), modification ICTs (M), and redefinition ICTs (R) constructs respectively. However, before data collection, validation of instrument was carried out using face validity. Thus, the items on substitution ICTs (S) reduced from 13 to 10; the items on augmentation ICTs (A) reduced from 16 to nine; the items on modification ICTs (M) reduced from 10 to three; and those on redefinition ICTs (R) were reduced from six to five. Hence, in total there remained 27 items measuring IITL of the original 45 items. Each item measuring IITL was scaled using the five-point Likert scale from a minimum of 1 (for very rare or never) to a maximum of 5 (for very regular). Apart from IITL, as its structure in Table 1 shows, the instrument also contained 32 items for measuring the explanatory constructs of the TPB. Of these, three items were on II, four items on ATI, two items on SNI, three items on PBCI and six items on each of bboei, nbmci and cbpfi respectively. Each item was scaled using the five-point Likert scale from a minimum of 1 (for strongly disagree) to a maximum of 5 (for strongly agree).

**Table 1: Variables in the Instrument**

| Variable  | Construct | Number of items<br>adapted | Source of instrument, number of items and their reliability ( $\alpha$ value) |
|---|-----------|----------------------------|---|
| Integration of ICT in<br>teaching and learning<br>(main variable) | S         | 10                         | Lubega et al. (2014), 13 items*   |
|   | A         | 9                          | Lubega et al. (2014), 16 items*   |
|   | M         | 3                          | Lubega et al. (2014), 10 items*   |
|   | R         | 5                          | Lubega et al. (2014), 6 items*  |
| Explanatory variables   | II        | 2                          | Taylor & Todd (1995), 3 items ( $\alpha = 0.91$ )                             |
|   |           | 1                          | Not applicable  |
|   | ATI       | 4                          | Taylor & Todd (1995), 4 items ( $\alpha = 0.85$ )                             |
|   | SNI       | 2                          | Teo & Lee (2010), 2 items ( $\alpha = 0.91$ )                                 |
|   | PBCI      | 3                          | Fusilier & Durlabhji (2005), 3 items ( $\alpha = 0.80$ )                      |
|   | bboei     | 5                          | Apeanti (2014) 15 items*  |
|   |           | 1                          | Not applicable  |
|   | nbmci     | 4                          | Taylor & Todd (1995), 8 items ( $\alpha = 0.92$ )                             |
|   |           | 2                          | Not applicable  |
|   | cbpfi     | 4                          | Taylor & Todd (1995), 18 items ( $\alpha = 0.78$ )                            |
|   |           | 1                          | Thompson, Higgins & Howell (1991), 4 items ( $\alpha = 0.86$ )                |
|   |           | 1                          | Lumpe & Chambers (2001), 13 items*  |

\* No reliability ( $\alpha$  value) reported

## 4.2 Sample

The sample comprised of 184 of 390 educators from seven public teacher training colleges (TTCs) in Tanzania. The seven public TTCs were Butimba, Kleruu, Monduli, Morogoro, Mpwapwa, Mtwara and Tabora. The males (63.0%) dominated the sample compared to the females (37.0%). The majority (64.1%) of the respondents were aged 30 but below 40 years as compared to those (31.0%) who were aged 40 years and above and those (04.9%) aged below 30 years. Thus, the majority of the respondents were middle aged. When it came to teaching experience at college level, the majority (55.4%) of the respondents had served for between five and 10 years as compared to those (34.2%) that had served for more than ten years and others (10.3%) that had served for up to five years. Almost all (94.5%) the respondents were equally divided among those with a bachelors degree (47.8%) and those with a Masters degree (46.7%) as their highest level of education, with very few holding a postgraduate (3.8%) or undergraduate (1.6%) diploma.

The respondents were almost equally distributed to the seven TTCs, as follows in descending order: Kleruu (16.8%), Morogoro (15.2%), Butimba and Monduli (each 14.7%), Tabora (14.1%), Mpwapwa (13.0%) and Mtwara (11.4%). In terms of areas of specialisation, the modal category (38.6) was that of the Sciences; followed by the Social Sciences or Humanities (33.7%) and Education (27.7%). Regarding terms of employment, all (i.e. 100%) of the respondents were permanent and pensionable; and none in the other categories of Probation; Part-time; and Contract. In terms of position in a given college, the majority (54.9%) were purely academic as opposed to 45.1% who held administrative responsibilities. With respect to academic rank, the modal category (49.5%) of the respondents were senior tutors; followed by tutors (39.7%); principal tutors (9.8%); and assistant tutors (1.1%).

### 4.3 Data Analysis

The data analysis was both descriptive and inferential. At the descriptive level, statistics such as percentages and means were used. At the inferential level, the study hypotheses (H1-H8) were tested using regression. In particular, one multiple linear regression (MLR) was used to test the first two hypotheses (H1 & H2). Another MLR was used to the next three hypotheses (H3 through H5). Lastly a simple linear regression (SLR) was used to test each of the remaining three hypotheses (H6 through H8).

## 5 FINDINGS

### 5.1 Integration of ICT in Teaching and Learning

The integration of ICT in teaching and learning (IITL) was operationalised using four constructs of the SAMR model namely the integration of substitution ICTs (S) (five items;  $\alpha = 0.757$ ); the integration of augmentation ICTs (four items;  $\alpha = 0.799$ ); the integration of modification ICTs (three items;  $\alpha = 0.608$ ) and redefinition ICTs (five items;  $\alpha = 0.811$ ). Each item had been scaled from a minimum of 1 (for Very rare or never) to a maximum of 5 (for Very regular). Tables 2-5 give the means and ratings of the items of each of the SAMR construct. According to Tables 2-5 the constructs S, A, M and R had means of 2.44, 3.47, 2.42 and 2.11 respectively. Apart from the mean of A that suggested fair levels of IITL, the other three (for S, M & R) indicated poor levels of IITL. An overall average index (from the 17 items in Tables 2 through 5) had a mean of 2.61 which suggested that the respondents fairly integrated ICT in teaching and learning.

**Table 2: Means for the Construct of the Integration of Substitution ICT (S)**

| Item* | Description   | Mean | Rating |
|-------|---|------|--------|
| S3    | I upload my teaching and learning materials on electronic learning environments (e.g. Moodle) for my students to access | 2.82 | Fair   |
| S4    | I use email as one of the means of communication when supporting my students  | 2.91 | Fair   |
| S7    | During my lessons, I use the smart/ interactive boards installed in lecture rooms for writing                           | 2.25 | Rare   |
| S8    | I encourage my students to submit their assignments to me through e-mail  | 2.05 | Rare   |
| S10   | I record my lessons on CD or other instructional media and give them to my students                                     | 2.16 | Rare   |
|       | Overall   | 2.44 | Rare   |

\* Other items (S1, S2, S5, S6, S9) were invalid

**Table 3: Means for the Construct of the Integration of Augmentation ICT (A)**

| Item ** | Description  | Mean | Rating  |
|---------|--|------|---------|
| A1      | I use research engines (e.g. Google, Yahoo) to look for content in my subject on the Internet  | 4.16 | Regular |
| A2      | I use the editorial tools (e.g. the spell checker) in my word processor to correct grammatical errors in any document that I process for the purposes of teaching and learning | 3.37 | Fair    |
| A3      | I use the editorial tools (e.g. Thesaurus) in my word processor to receive alternative words to use in my documents  | 2.99 | Fair    |
| A4      | I use online dictionaries and/ or encyclopaedias (e.g. Wikipedia) to make meaning of the words/ phrases that I do not understand   | 3.34 | Fair    |
|         | Overall  | 3.47 | Fair    |

\*\* Other items (A5 - A9) were invalid

**Table 4: Means for the Construct of the Integration of Modification ICT (M)**

| Item | Description   | Mean | Rating |
|------|---|------|--------|
| M1   | I assign my students topics to research about from the Internet                                     | 3.21 | Fair   |
| M2   | I use group discussion facilities (e.g. chat rooms) with my students when supporting their learning | 2.28 | Rare   |
| M3   | I use online assessment tools (e.g. RM Assessor) when evaluating students' work                     | 1.79 | Rare   |
|      | Overall   | 2.42 | Rare   |

**Table 5: Means for the Construct of the Integration of Redefinition ICT (R)**

| Item | Description   | Mean | Rating |
|------|---|------|--------|
| R1   | I ask my students to make their own notes from group discussion threads in e-learning platforms (e.g. Moodle) available to them           | 2.47 | Rare   |
| R2   | I use open education resources (e.g. massive open online courses, MOOCs) as my study material for pedagogical practices                   | 1.99 | Rare   |
| R3   | I use electronic learning platforms (e.g. Moodle) to assess my students' learning   | 1.82 | Rare   |
| R4   | I use e-learning platforms (e.g. chat rooms, discussion boards) to encourage online group discussions among my students                   | 1.74 | Rare   |
| R5   | I use sound and visual effects (e.g. games and simulation videos from YouTube) in my lessons to enhance my students' learning of concepts | 2.51 | Fair   |
|      | Overall   | 2.11 | Rare   |

## 5.2 Explanatory Constructs of TPB

The explanation constructs of TPB in the study were II (three items;  $\alpha = 0.712$ ); ATI (four items;  $\alpha = 0.925$ ); SNI (two items;  $\alpha = 0.865$ ); PBCI (three items;  $\alpha = 0.842$ ); bboei (six items;  $\alpha = 0.912$ ); nbmci (six items;  $\alpha = 0.904$ ) and cbpfi (three items;  $\alpha = 0.799$ ). All the items were Likert scaled from 1 (for Strongly disagree) to a maximum of 5 (for Strongly agree). Tables 6 through 12 give means and ratings of the items of each of the explanatory constructs of TPB. According to Tables

6 through 12, the means of the respective explanatory constructs were II (3.98), ATI (4.40), SNI (3.92), PBCI (3.76), bboei (4.15), nbmci (3.95), and cbpfi (3.93). These values suggest that educators rated themselves high on all the explanatory constructs of the TPB.

**Table 6: Means for the Construct of Intention to Integrate ICT (II)**

| Item | Description  | Mean | Rating |
|------|--|------|--------|
| II 1 | I need not be pushed to integrate ICT in my teaching and learning          | 3.53 | Agree  |
| II 2 | I intend to integrate ICT in my teaching and learning as often as possible | 4.10 | Agree  |
| II 3 | I intend to integrate ICT in my future teaching and learning assignments   | 4.32 | Agree  |
|      | Overall  | 3.98 | Agree  |

**Table 7: Means for the Construct of Attitude toward Integration (ATI)**

| Item  | Description   | Mean | Rating |
|-------|---|------|--------|
| ATI 1 | I feel that integration of ICT in my teaching and learning is a good idea | 4.44 | Agree  |
| ATI 2 | I feel that teaching and learning using ICT is appropriate                | 4.41 | Agree  |
| ATI 3 | I like integrating ICT in my teaching and learning                        | 4.43 | Agree  |
| ATI 4 | I find using ICT in my teaching and learning to be enjoyable              | 4.30 | Agree  |
|       | Overall   | 4.40 | Agree  |

**Table 8: Means for the Construct of Subjective Norm on Integration (SNI)**

| Item  | Description  | Mean | Rating |
|-------|--|------|--------|
| SNI 1 | People who influence my behaviour think that I should integrate ICT in my teaching and learning        | 3.88 | Agree  |
| SNI 2 | People who are important to me think that I should integrate ICT in my teaching and learning practices | 3.96 | Agree  |
|       | Overall  | 3.92 | Agree  |

**Table 9: Means for the Construct of Perceived Behavioural Control on Integration of ICT (PBCI)**

| Item   | Description   | Mean | Rating |
|--------|---|------|--------|
| PBCI 1 | I am capable of integrating ICT in my teaching and learning   | 3.88 | Agree  |
| PBCI 2 | I have the resources, knowledge and skills to integrate ICT effectively in my teaching and learning practices | 3.52 | Agree  |
| PBCI 3 | I am able to integrate ICT in my teaching and learning practices if I want to do so                           | 3.88 | Agree  |
|        | Overall   | 3.76 | Agree  |

**Table 10: Means for the Construct of Behavioural beliefs and Outcome Evaluation on Integration (bboei)**

| Item   | Description   | Mean | Rating |
|--------|---|------|--------|
| bboei1 | When integrating ICT in my teaching and learning, I will be able to tailor my students' work to their individual needs  | 3.84 | Agree  |
| bboei2 | If I integrate ICT in my teaching and learning, my students will be motivated to engage in a variety of learning tasks  | 4.17 | Agree  |
| bboei3 | I believe that integrating ICT in my teaching and learning would enable me to interact more with my students  | 4.24 | Agree  |
| bboei4 | Integrating ICT in teaching and learning is not time consuming to me  | 4.05 | Agree  |
| bboei5 | I believe that by integrating ICT in my teaching and learning, I am helping my students to acquire the basic computer skills needed in their future teaching and learning | 4.31 | Agree  |
| bboei6 | Integration of ICT in my teaching and learning practices promotes collaboration and self-directed learning among my learners  | 4.26 | Agree  |
|        | Overall   | 4.15 | Agree  |

**Table 11: Means for the Construct of Normative Beliefs and Motivation to Comply on Integration of ICT (nbmci)**

| Item   | Description  | Mean | Rating |
|--------|--|------|--------|
| nbmci1 | The College Management (e.g. Principal, Academic Dean, heads of department) think that I should integrate ICT in my teaching and learning activities | 4.05 | Agree  |
| nbmci2 | My colleagues (e.g. fellow teacher educators) think that I should integrate ICT in my teaching and learning  | 3.89 | Agree  |
| nbmci3 | My students expect me to integrate ICT in my teaching and learning practices   | 3.87 | Agree  |
| nbmci4 | I want to do what the College Management think I should do with respect to integration of ICT in teaching and learning                               | 4.00 | Agree  |
| nbmci5 | I want to do what my colleagues think I should do in regard to integration of ICT in teaching and learning   | 3.99 | Agree  |
| nbmci6 | I want to do what my students expect of me in respect to integration of ICT in teaching and learning   | 3.86 | Agree  |
|        | Overall  | 3.95 | Agree  |

**Table 12: Means for the Construct of Control Beliefs and Perceived Facilitation on Integration of ICT (cbpfi)**

| Item*  | Description  | Mean | Rating |
|--------|--|------|--------|
| cbpfi1 | I feel comfortable integrating ICT in teaching and learning on my own  | 4.15 | Agree  |
| cbpfi2 | If I want to, I can easily integrate any of the ICT equipment available in my College for teaching and learning purposes | 3.91 | Agree  |
| cbpfi3 | I am capable of selecting and using ICT tools in my teaching and learning activities                                     | 3.74 | Agree  |
|        | Overall  | 3.93 | Agree  |

\* Other items (cbpfi4- cbpfi7) were invalid

### 5.3 Testing the Hypotheses

The testing of the hypotheses as suggested in Figure 2 follows, using linear regression. The first two hypotheses (H1 & H2) were tested together using a multiple linear regression model (MLRM). Another MLRM was used to test the third through the fifth hypotheses (H3-H5). However, a simple linear regression model (SLRM) was used to test each of the last three hypotheses (H6-H8). The results are summarised in Table 13, where it is apparent that apart from H1 and H5, the rest of the hypotheses were upheld.

**Table 13: Results from the Linear Regression Models for Testing the Hypotheses**

| Hypothesis | Path                     | Measures of the goodness of the model        | Standardised Coefficients, $\beta$ ; and p value | Hypothesis supported? |
|------------|--------------------------|--|--|-----------------------|
| H1         | II $\rightarrow$ IITL    | Adj R <sup>2</sup> = 0.103                   | $\beta$ = -0.064; p = 0.396                      | No                    |
| H2         | PBCI $\rightarrow$ IITL  | F = 11.5; p = 0.000                          | $\beta$ = 0.353; p = 0.000                       | Yes                   |
| H3         | ATI $\rightarrow$ II     | Adj R <sup>2</sup> = 0.542                   | $\beta$ = 0.665; p = 0.000                       | Yes                   |
| H4         | SNI $\rightarrow$ II     | F = 73.0; p = 0.000                          | $\beta$ = 0.139; p = 0.027                       | Yes                   |
| H5         | PBCI $\rightarrow$ II    |  | $\beta$ = -0.030; p = 0.612                      | No                    |
| H6         | bboei $\rightarrow$ ATI  | R <sup>2</sup> = 0.611; F = 285.8; p = 0.000 | $\beta$ = 0.782; p = 0.000                       | Yes                   |
| H7         | nbmci $\rightarrow$ SNI  | R <sup>2</sup> = 0.462; F = 156.3; p = 0.000 | $\beta$ = 0.680; p = 0.000                       | Yes                   |
| H8         | cbpfi $\rightarrow$ PBCI | R <sup>2</sup> = 0.487; F = 173.1; p = 0.000 | $\beta$ = 0.698; p = 0.000                       | Yes                   |

II = Intention to integrate ICT; IITL = Integration of ICT in teaching and learning; PBCI = Perceived behavioural control on integration of ICT; ATI = Attitude towards integration of ICT; SNI = Subjective norm on integration of ICT; bboei = behavioural beliefs and outcome evaluation on integration of ICT; nbmci = normative beliefs and motivation to comply on integration of ICT; cbpfi = control beliefs and perceived facilitation on integration of ICT.

## 6 DISCUSSION

Multiple linear regression, MLR (Table 13) did not support the first hypothesis (H1) to the effect that the intention to integrate ICT (II) positively predicted the integration of ICT in teaching and learning (IITL). This finding was not only at variance with several earlier studies (e.g. Al-ghaith, 2015; Salleh & Laxman, 2015), but also surprising since it went against what TPB postulates. Nevertheless, it suggested that II was not very important as far as IITL was concerned. Thus, the

authorities responsible for IITL in public teacher training colleges (TTCs) in Tanzania need not prioritise II as a means of enhancing IITL.

However, the results (Table 13) upheld the second hypothesis (H2) to the effect that perceived behavioural control on integration (PBCI) was positively predicted IITL. This finding which was in agreement with researchers (e.g. Salleh & Laxman, 2015), was controversial in so far it was at variance with others (e.g. Al-ghaith, 2015). Nevertheless, it suggested that PBCI was very important as far as IITL was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to enhance PBCI among the educators therein as a means of enhancing IITL. Basing on the way PBCI was operationalised (Table 9), the authorities should train the educators to have the capabilities to engage in IITL; they should ensure the educators have the resources, knowledge and skills for IITL; and should train the educators to have the urge of integrating ICT in their teaching and learning.

The study (Table 13) supported the third hypothesis (H3) to the effect that the attitude toward integration of ICT (ATI) positively predicted the intention to integrate ICT (II). This finding which was in line with other researchers (e.g. Al-ghaith et al., 2015; Salleh & Laxman, 2015; Teo et al., 2016; Valtonen et al., 2015), suggested that ATI was very important as far as II was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to enhance ATI among the educators therein as a means of enhancing their II. Basing on the way ATI was operationalised (Table 7), the IITL change agents should ensure that the educators see IITL as a good, appropriate, likeable and enjoyable idea.

The fourth hypothesis (H4) to the effect that social norm on the integration (SNI) positively predicted the intention to integrate ICT (II) was upheld (Table 13). This finding was in agreement with researchers (e.g. Al-ghaith, 2015; Salleh & Laxman, 2015; Valtonen et al., 2015) who also found SN to have positive significant on behavioural intention (BI). The result, though expected, still raised controversy since it was at variance with Teo et al. (2016) who found that SN "had a negative impact" on the usage intention (UI) of teachers with regard to ICT in teaching and learning. Nevertheless, it suggested that SNI was very important as far as II was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to put in place good social norms (SN) on IITL to enhance the II among the educators. Basing on the way SNI was operationalised (Table 8), people (e.g. directors, commissioners, principals) who influence, and/



or are important to the educators should make it clear, say during their speeches, meetings and conferences with the educators that they think that the educators should integrate ICT in their teaching and learning activities.

According to Table 13, the fifth hypothesis (H5) to the effect that perceived behavioural control on integration (PBCI) positively predicted II was not supported. Such a finding, though congruent with some researchers (e.g. Al-ghaith, 2015) and to an extent Valtonen et al. (2015) who only partially supported it (H5), was at variance with others (e.g. Salleh & Laxman, 2015; Teo et al., 2016) who found it to hold. The result, though surprising since it went against what TPB postulates, suggested that PBCI was not of prime importance as far as IITL was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need not prioritise it (PBCI) as a means of enhancing II.

The sixth hypothesis (H6) to the effect that behavioural beliefs and outcome evaluation on integration of ICT (bboei) positively predicted the attitude towards the integration of ICT (ATI) was supported (Table 13). This finding was in agreement with researchers (e.g. Salleh & Laxman, 2015), and suggested that bboei was very important as far as ATI was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to enhance bboei among the educators as a means of improving their ATI. Basing on the way bboei was operationalised (Table 10) those responsible with IITL should see to it that educators see IITL as a means to tailor their students' work to their individual needs; as a means to motivate their students to engage in a variety of learning tasks; and to enable them to interact more with their students. The IITL change agents should ensure that the educators see IITL as not time consuming; that the educators see IITL as a means of helping their students to acquire skills needed in their future teaching; and as a way of promoting collaboration and self-directed learning among their learners.

Simple linear regression, SLR (Table 13) supported H7 to the effect that normative beliefs and motivation to comply with integration of ICT (nbmci) positively predicted social norms on integration (SNI). The finding in line with past studies (e.g. Salleh & Laxman, 2015) suggested that nbmci was very important as far as SNI was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to enhance nbmci among the educators as a means of

improving their SNI. Basing on the way nbmci was operationalised (Table 11), people (e.g. principals, academic deans, heads of department, fellow educators and students) should make it clear, say in meetings both formal and informal, staff rooms and class rooms that they think the educators should integrate ICT in their teaching and learning.

The eighth hypothesis (H8) to the effect that control beliefs and perceived facilitation on integration (cbpfi) of ICT positively predicted the perceived behavioural control on the integration (PBCI) was upheld by the results of simple linear regression, SLR (Table 13). This finding which was in agreement with other researchers (e.g. Salleh & Laxman, 2015), suggested that cbpfi was very important as far as PBCI was concerned. Thus, the authorities responsible for IITL in public TTCs in Tanzania need to enhance cbpfi among the educators as a means of improving their PBCI. Basing on the three valid items of cbpfi (Table 12), the authorities should see to it, say by way of training, that the educators are comfortable with IITL; that the educators see IITL as an easy thing to do; and are encouraged to engage in IITL.

## **7 CONCLUSION**

This study sought to explain the integration of ICT in teaching and learning (IITL) using the Theory of Planned Behaviour (TPB). Basing on TPB, eight hypotheses (H1-H8) were postulated. H1 and H2 were to the effect that IITL was positively predicted by the intention to integrate of ICT (II) and the perceived behavioural control on the integration of ICT (PBCI) respectively. H3 to H5 postulated that II was positively predicted by the attitude toward the integration of ICT (ATI), the subjective norm on the integration of ICT (SNI) and PBCI. H6 stipulated that ATI was positively predicted by the behavioural beliefs and outcome evaluations on the integration of ICT (bboei). H7 stipulated that SNI was positively predicted by the normative beliefs and motivation to comply on the integration of ICT (nbmci). H8 stipulated that PBCI was positively predicted by the control beliefs and perceived facilitation on the integration of ICT (cbpfi). Regression revealed that apart from H1 and H5, the rest of the hypotheses were supported. It was thus concluded that TPB was generally a good explanation of IITL in the study context. Hence TPB was a valid theory. Our study was significant in so far as it was among the very few to report findings on the validity of the TPB in a developing world context. Nevertheless, this study had limitations. For example, the study was applied to only seven public TTCs in Tanzania which were very few compared to

many that exist in the country, making generalisation hard. Thus future researchers should include more TTCs, both public and private. Second, in terms of sample size, only 184 educators were involved in the study, a small sample that makes generalisation to all educators in public TTCs in Tanzania difficult. Future researchers should use larger samples.

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