

INVESTIGATION, DEVELOPMENT, AND IMPLEMENTATION OF ELECTRONIC TEACHING EVALUATION SYSTEM (e-TES): A CASE STUDY OF UMARU ALI SHINKAFI POLYTECHNIC SOKOTO

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ABSTRACT

e-TES is an electronic teaching evaluation system designed, tested, and implemented at the Umaru Ali Shinkafi Polytechnic Sokoto. The system is aimed at allowing students to evaluate their individual course lecturer's performance at the end of each semester. Nowadays, in order to maintain and checkmate the quality of teaching and learning in our tertiary institutions, there is need to evaluate course materials, course delivery, lecturer's performance, lecturer's attitude, and students-lecturer relationship. This kind of evaluation can no longer be done manually due to the large number of students and courses offered by tertiary institutions in Nigeria. As such, this paper was aimed at investigating the possibility of developing and implementing an online teaching evaluation system that will facilitate faster and easy evaluation process at the end of each semester. The system generate reports on each course lecturer's performance, overall lecturer's performance within the department and college, and overall Polytechnic lecturer's performance for the semester. In addition, this paper presents the student's ability and perception towards accepting using the e-TES application. An existing user acceptance theory involving UTAUT model was adopted to examine the level of student's acceptance of e-TES. A group of 100 students participated for the testing and evaluation of the e-TES. The UTAUT factors adopted to examine the user acceptance (i.e. use behavior) of e-TES system are: performance expectancy, effort expectancy, social influence, attitude toward using technology, facilitating conditions, all against the user behavioral intentions. The finding of this study showed little acceptance for using e-TES system among students. The interpretation could be because students are not familiar with this system because they are seeing it for the first time. Again, some might be scared considering they are asked to evaluate their own lecturers. Among the factors that were tested are behavior intention, social influence, behavior use, and expected influence. It is found that social influence is the least predictor of behavior use. Thus, it could be concluded that behavioral intention is a strong predictors of behavioral use, whereas facilitating conditions moderately predict behavior towards using e-TES system. Similarly, effort expectancy is a strong predictor of behavioral intention.

INTRODUCTION

The advancement in Internet technology has transforms the way many educational institutions evaluate the performance of their academic staff. Presently, several universities adopt the use of student's online teaching evaluation system. The adoption of this system is not only in developed countries but also in some developing countries such as Nigeria. However, Umaru Ali Shinkafi Polytechnic Sokoto is one of the State Polytechnics that has not yet adopted and benefitted from



the use of online teaching evaluation system for students to evaluate the performance of their lecturers and generic skills.

The proposed online teaching evaluation system coined as e-TES is an important means of measuring teaching effectiveness and performance. Since effective teaching is the core of the quality and value of education (Peterson & Peterson, 2006). The benefit of implementing e-TES are enormous as against the manual system of paper and pen. With the increasing concern for quality teaching in higher institution of learning. There is strong need for effective means to evaluate academic staff overall performance by their own students. Therefore, to ensure a successful and easy way to ask students to evaluate their teachers is to provide them with an electronic system. It is obvious that students may be bias when evaluating their lecturers in class in their presence. As students may fear to give their true feedback which may likely affect their relationship with the lecturer. So in most cases they opt to give feedback that may promote such relationship thus undermining the importance of the semester course rating standard.

Presently, student's evaluation in tertiary institution, has become the primary input for effective teaching and learning. Various studies detected a substantial connection between student attitudes towards the evaluation of teaching effectiveness and the success of teaching evaluation system (Chen & Hoshower, 2003). According to them, students' feedback regarding teaching process is a critical input for the improvement process that is conducted at the end of every academic year. Students' feedback helps to improve teaching, course content and structure. Effective implementation of students' feedback brings to students the feeling that their feedback is beneficial.

Therefore, the use of electronic system has over time been preferred due to its ease of use, convenience, accuracy, and ability to generate custom reports quickly. The system also helps to maintain the anonymity of those giving feedback. Moreover, utilizing a computerize information system in measuring teaching performance will enhance the quality of teaching process in terms of accuracy, time saving and transparency. The information system is capable to deliver information when it is requested rapidly and efficiently (Worthington, 2012).

Like other businesses, educational institutions supposed to measure their academic staff performance and efficiency each semester. These aspects are expected to be exhibited by each academic staff throughout the class period. In many instances, an online systems are the best option in investigating staff performance and efficiency. Thus, there is need for a research study to design and implement e-TES, also to examine whether the system will be accepted or rejected by the students especially when implemented to evaluate the performance of their respective course lecturers. Therefore, in addition to designing and implementing the e-TES, this study will measure the extent to which students' willingly and objectively evaluate their lecturer's performance online.

RESEARCH OBJECTIVES

The Electronic Teaching Evaluation System (e-TES) application is going to be independent of any platform. The e-TES will allow four categories of users to login (i.e. students, lecturers, admin, and faculty officers). First, the login window asks student users to fill in user-id, password and

select their faculty name. Second, the system displays the student's current semester. Third, the system displays the evaluation instruction for the users to begin the evaluation.

The objectives of this research project were divided into two: the development objectives and the research objectives. All the five objectives were fully achieved at the end of the research.

Development Objectives

These two objectives were achieved through the analysis of the existing system (i.e. by collecting the opinions of some students and lecturers, and developing a computerized teaching evaluation system using PHP MySQL),

- a. To investigate the possibility of developing an electronic teaching evaluation system (e- TES) for Umaru Ali Shinkafi Polytechnic Sokoto.
- b. To develop, and implement the e-TES application

Research Objectives

1. To identify factors influencing students, academic staff, and management' acceptance of the e-TES application.
2. To propose a model of students' acceptance of e-TES system based on UTAUT factors.
3. To test the proposed model of students' acceptance of e-TES system.

LITERATURE REVIEW

This section presents the review of related literature on e-TES and purpose of developing an online teaching evaluation system. The section will also review the Unified Theory of Acceptance and Use of Technology (UTAUT) with a view to adopting the most relevant factors for access student's acceptance and use of e-TES.

Review on Electronic Teaching Evaluation System

Online teaching evaluation system like other online systems needs to be accepted by its users. It is reported that people can simply resist to accept certain technology for unclear reasons (Davis, Bagozzi, & Warshaw, 1989). System designers need to know more about user requirements before developing any online system. Absence of user acceptance has long been an obstruction to the accomplishment of new information systems. Since the system performance impact will be lost whenever users reject the system. The considerable sign of system success is user acceptance (Davis, 1993a).

Systems evaluation have been used for many years to evaluate performance and while in many cases such systems have achieved the intended objectives, in some instance they did not. Institutions of higher education have to implement such system as it becomes part of education process (Chen & Hoshower, 2003). Sorenson (2003) explains how the preference of online evaluation systems increased among academic institutions with a variety of challenges related to the users of the systems.

System evaluation especially those targeting teachers' performance in higher institutions of learning often lack standardisation to allow comparisons between faculties (Hoyt & Pallett, 1999). They further argued that, some rating systems sometimes ask ambiguous questions to students making it difficult for them as some of these questions are not related to their performance.

In another hand, technological advancements have called for newer and efficient ways of doing repetitive operations and as Sorenson (2003) observes, many independent systems have been developed over the years to take over the evaluation process online. This is because online teaching evaluation system is evident that the compelling reasons why colleges and universities adopt online teaching evaluation systems. With a notable focus on improving student learning, the author offers research-based and ready-to-use information required fostering truly effective and equitable teaching evaluation at their institutions.

Moreover, other sources of teaching evaluation should be added to the student based evaluation but clarifies the importance of student evaluation (Berk, 2006). In order to obtain the best results, models such as purpose conceptualisation of teaching effectiveness which give weight to different sources of evidence of teaching performance should also be employed (Berk, 2006).

It is observed that the relationship created by the student teacher attachment can have an impact in both the performance of the teachers and their rating by students (Riley, 2010). Students are therefore most likely to accept rating systems, if they appreciate the impact the teachers had on their education (Riley, 2010).

Additionally, when they feel that the performance of their teachers is at an acceptable level, they are also likely to participate in the online teachers rating to show their satisfaction of the teaching methods employed by teachers (Riley, 2010). Although evaluating teaching systems is important for institutions, sometimes there is resistance from students on using such systems; in cases where they accept to use them, they sometimes do not give honest answers in fear that they may be intimidated (Riley, 2010).

In implementing online teaching evaluation system, there is the challenge of whether students would accept it partially due to the risks associated with the use of online system . Such risks could however be reduced by anonymising feedback and responses from students; a situation that may be hard to implement when using the manual system. This raises the question of whether students are more comfortable with manual or online systems and also creates the need to investigate the level of comfort when using each of the systems and more specifically, their level of acceptance of the online teaching evaluation system.

Moreover, an online teaching evaluation system should and usually does supply information and feedback regarding valuable practices and may offer a pathway for individual lecturer's teaching and professional skills. When lecturers are evaluated, the management are the ones that can compute the positive or negative result. This result determines the performance of individual lecturer in a particular course.

Purpose of Online Teaching Evaluation System

The importance of using e-TES application to evaluate individual lecturer's performance, skills, and course material cannot be overemphasize. The e-TES provides opportunity for lecturers' course evaluation as an important part of instructional improvement to all elements of the institution. Individual lecturers can use the information to evaluate the textbook used, reorganize course content, and to recognize personal traits that can either enhance or detract from the classroom presentation. The management (department, heads, deans, and promotion and tenure committees, etc.) often use the results of course evaluations in making decisions concerning rank advancement, tenure of individual lecturer, and Excellence in Teaching Awards. Students sometimes use the information to make scheduling decisions.

Assumptions can be made of the goals and objectives for adopting e-TES application, based on the general assumptions surrounding the system evaluation format. Prior to the idea of developing e-TES application, lists of criteria listed in a paper were frequently used for the evaluation by the quality assurance unit. The form is assumed to take 10-15 minutes to fill out; couple with the thousands of students filling the forms each semester. It is difficult to collect and analyze these data within short period of time, talk less of interpreting the results for decision making. This indicates the need for online computerized system that can generate these data and serve as an evaluation tool to be used for improvement of instruction and course characteristics.

The e-TES web-based application will be designed to collect data, analyze data, and generate a statistical report forms. These forms will generate statistically sound number with the effects of variables being minimal. The e-TES will generate three sets of information, "general skills information on course rating for lecturers, specific lecturer information, and general comments information from students. This form also had the option to contain space for open-ended instructor-specific questions about instruction or course content. Along with the differing forms for different courses, the instructor's questions option. Other evaluations includes suggestions for teaching improvement, which are to be written in comments textbox.

The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT resulted from a comprehensive review and empirical comparison of eight major competing models of technology acceptance and use. Venkatesh et al. (2003) empirically tested and subsequently combined the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), a combined theory of Planned Behavior/Technology Acceptance Model (TAM-TPB), the Model of PC Utilization (MPC), the Innovation Diffusion Theory (IDT), and the Social Cognitive Theory (SCT). At the time of their review, the eight models managed to explain between 17% and 53% of the variance in their respective dependent variable, use behavior. Given the results obtained through empirical testing of the UTAUT by Venkatesh et al. (2003)—about 70% of the variance in use behavior explained, the UTAUT is a comprehensive model that provides an ideal conceptual framework for exploring the acceptance behaviors of online teaching evaluation system such as e-TES web-based application.



UTAUT has four major independent constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). These constructs are direct determinants of usage intention and behaviour (Venkatesh et. al., 2003). Gender, age, experience, and voluntariness are posited to mediate the influence of the four major independent constructs on behavioral intention and actual usage (Venkatesh et. al., 2003). Figure 1 below illustrates UTAUT’s independent and mediating variables.

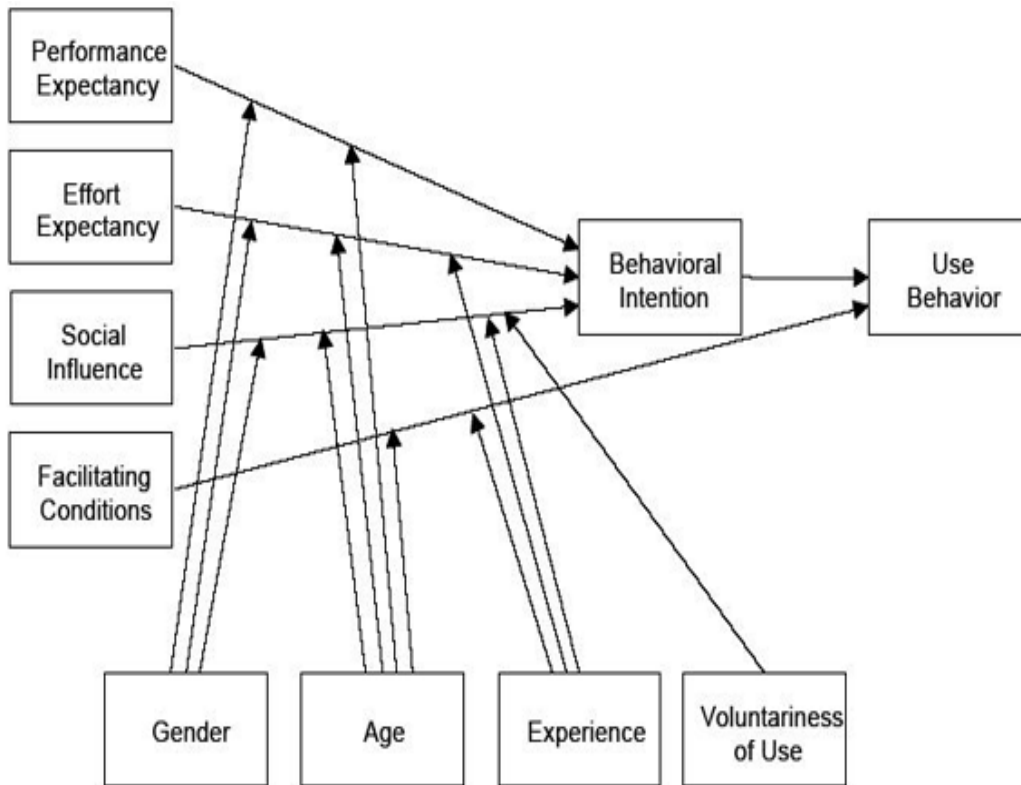


Figure 1: The Unified Theory of Acceptance and Use of Technology

METHODOLOGY

In order to achieve the main objective of this research, a suitable research design and method is required. The current system developed, the research objectives, and the respondents for this research, primarily influenced the selection of the methodology for this study (Sekeran, 2003). The aim of this section was to select the most suitable development methodology, data collection method, and data analysis methods in order to achieve the study objectives.

System Design/Development Tools

In order to design a web-based teacher evaluation system (e-TES), a more reliable, flexible, accessible platform is required. Therefore, e-TES application was developed as a secured database management information system. This is because the teacher evaluation records has to be securely processed, stored, retrieved, updated and managed for periodical decision making. Adobe Dreamweaver, an Integrated Development Environment, was used to create user interface and write codes while MySQL (My Structured Query Language), a Relational Database Management System (RDBMS) will be used to create the databases. To correspond with and control the databases, Hypertext Pre-processor (PHP) was used. PHP as a server-side scripting language is an Object-Oriented and a cross platform language. That makes the application be run across several platforms such as Microsoft Windows, Apple Macintosh and Linux operating systems. Moreover, it makes the system easily accessible via different web browsers such as Windows Explorer, Mozilla Firefox, Safari, Opera, and Google Chrome etc.

Research Process and System Testing

Since, the aim of this study was to investigate the possibility of developing and implementing online teaching evaluation system for Umaru Ali Shinkafi Polytechnic Sokoto and also to investigate the users' acceptance to use the system. According to Leedy and Ormrod (2010), investigating relationship between users and system can be regarded as evaluation study because it involves identifying variables from a theories and popular models. The research process adapted for this study is in five main stages:

1. Stage one involves the information gathering from interviewing the student's users and related literature on online teaching evaluation system, user acceptance models and theories.
2. Stage two describes the adopted research design which involves instrument development, population sample, data collection procedure (i.e. online survey), and data analysis procedure.
3. Stage three involves the several statistical analyses carried out such as normality test, descriptive analysis, reliability and validity tests, independent t-test, and model testing with partial least squares analyses.
4. Stage four involves the presentation of the main research findings, theoretical and empirical contributions, research limitations, and recommendations for future research.
5. Finally, stage five involves writing the overall report from the beginning till the end.

RESULTS AND DISCUSSION

The Electronic Teaching Evaluation System (e-TES) application was designed as an independent platform. The e-TES allows four categories of users to login (i.e. students, lecturers, admin, and faculty officers). First, the login window asks student users to fill in user-id, password and select their faculty name. Second, the system displays the student’s current semester. Third, the system displays the evaluation instruction for the users to begin the evaluation.

- (a) **The Login Section** is a form that enables the user to select his/her username and input his/her password. If the username selected and password entered is valid, the user will be prompted with the main menu to select their respective faculties and courses for evaluation. But if the username and/or password are/is not valid the user will be denied access to the application.
- (b) **The Main Menu Section** contains dashboard and panel, on the dashboard sub menu which serve as a link to all other modules in the application, the sub menu are going to be Home, Current Semester, and Evaluation Instruction. While the panel holds the forms for capturing data and display query result.
- (c) **The Evaluation Sub Menu Section** is going to be used for capturing data or record into the database such as student’s course assessment.
- (d) **The Registration Sub Menu** will contain modules such as registered students & courses, view courses, view registered students, compute evaluation results, and view evaluation results.
- (e) **The View Subject Module:** All courses registered into the database will be viewed in this module.
- (f) **The View Students Module:** All registered students in the database will be viewed in this module.
- (g) **The View Evaluation Results Module** will display each course evaluation result or report sheet according to faculty. The evaluation report can be printed from this module as well.
- (h) **The Exit Module:** This module allows the students to logout of the system after the evaluation.

Expected Results from User Testing

The descriptive data analysis was conducted to understand the respondent’s characteristics. This allow readers and researcher to understand what the data is like by examining statistics which help to identify any missing or incorrect values before data analysis process.

Therefore, the expected results from the data collected from the student’s respondent after evaluating the system was based on the following factors: Performance Expectancy (PE), Social Influence (SI), Effort Expectancy (EE), Attitude toward Using Technology (AT), Facilitating Conditions (FC), Behavioral Intention to Use the System (BI), and Use Behavior (UB)), the overall reliability and validity tests was conducted as shown in Table 1 below.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
.977	31



Table 2 shows the factor’s validity test results for the inter-construct correlations. The discriminant validity is supported because most of the Average Variance Extracted (AVE) values exceed 0.50 and are also greater than the variances shared by each construct and other constructs in the model (Chin,1998; Kim et al., 2009).

Table 2: Inter-construct correlations

	AT	BI	EE	FC	PE	SI	UB
AT	.892						
BI	0.886	.921					
EE	0.935	0.922	.870				
FC	0.917	0.864	0.930	.891			
PE	0.894	0.873	0.914	0.868	.900		
SI	0.940	0.886	0.941	0.911	0.910	.925	
UB	0.850	0.913	0.894	0.845	0.864	0.854	.931
* p<005							

Lastly, the model testing using partial least squares analysis revealed a good fit model with r-square greater than the threshold of the variance explained. The factor cross-loadings of all the items that are greater than the cut-off value of 0.70 are retained. Also, all the items that loads higher on their own factor than on other factors (Davis, 2003). Thus, the results indicate a satisfactory discriminant validity of all the factors. A factor loading greater than 0.70 is considered to be adequate and for this study. Therefore, items with an indicator loading greater than 0.70 were retained, as shown in Table 3.



Table 3: PLS construct cross-loading

Code	AT	BI	EE	FC	PE	SI	UB
AT1	0.904	0.815	0.841	0.81	0.784	0.833	0.744
AT2	0.912	0.792	0.853	0.838	0.811	0.845	0.781
AT3	0.906	0.787	0.838	0.845	0.805	0.847	0.754
AT4	0.845	0.765	0.803	0.78	0.793	0.829	0.753
BI1	0.77	0.925	0.824	0.767	0.801	0.782	0.817
BI2	0.851	0.922	0.852	0.781	0.809	0.825	0.849
BI3	0.827	0.919	0.873	0.838	0.805	0.841	0.857
EE1	0.771	0.785	0.867	0.808	0.768	0.798	0.765
EE2	0.799	0.782	0.871	0.808	0.781	0.805	0.758
EE3	0.845	0.859	0.9	0.844	0.827	0.843	0.814
EE4	0.839	0.782	0.844	0.776	0.806	0.829	0.773
FC1	0.787	0.782	0.829	0.902	0.804	0.795	0.774
FC2	0.819	0.745	0.825	0.889	0.769	0.808	0.733
FC3	0.831	0.751	0.837	0.915	0.782	0.816	0.742
FC4	0.806	0.714	0.779	0.853	0.716	0.803	0.734
FC5	0.82	0.829	0.847	0.869	0.772	0.813	0.755
PE1	0.771	0.807	0.808	0.745	0.897	0.812	0.813
PE2	0.831	0.807	0.822	0.771	0.918	0.806	0.781
PE3	0.83	0.771	0.852	0.824	0.917	0.83	0.771
PE4	0.76	0.728	0.779	0.763	0.835	0.803	0.715
SI1	0.827	0.775	0.814	0.8	0.809	0.882	0.771
SI2	0.803	0.775	0.775	0.751	0.791	0.887	0.742
SI3	0.855	0.798	0.865	0.851	0.814	0.89	0.767
SI4	0.818	0.763	0.851	0.798	0.785	0.855	0.722
UB1	0.789	0.836	0.821	0.791	0.809	0.81	0.929
UB2	0.791	0.862	0.841	0.78	0.799	0.78	0.932

The coefficient of determination, R² is 0.846 for the Use Behavior (UB) endogenous latent variable. This means that the two latent variables (Behavioral intention and Facilitating Conditions) significantly explain 84% of the variance in Use Behavior (UB). Performance Expectancy, Social influence, Effort Expectancy, and Attitude toward Using Technology together explain 85% of the variance of Behavioral Intention. The inner model suggests that Behavioral Intention has the strongest effect on Use Behavior (0.722), followed by Facilitating Conditions (0.221). Similarly, Effort Expectancy has the strongest effect on Behavioral Intention (.644). The hypothesized path relationship between Performance Expectancy, Effort Expectancy, and Attitude toward Using Technology with Behavioral Intention is statistically significant as the values are higher than standardized path coefficient (0.1), however, Social influence is not statistically significant, the

hypothesized path relationship with Behavioral Intention is not statistically significant. Similarly, the hypothesized path relationship between Behavioral Intention, and Facilitating Conditions with Use Behavior is statistically significant.

Thus, Behavioral Intention is strong predictors of Use Behavior, but Facilitating Conditions is moderately predictor of Use Behavior. Similarly, Effort Expectancy is strong predictor of Behavioral Intention, however Performance Expectancy and Attitude toward Using Technology are moderately predictors of Behavioral Intention, but Social influence does not predict Behavioral Intention directly. Figure 2 shows the proposed model.

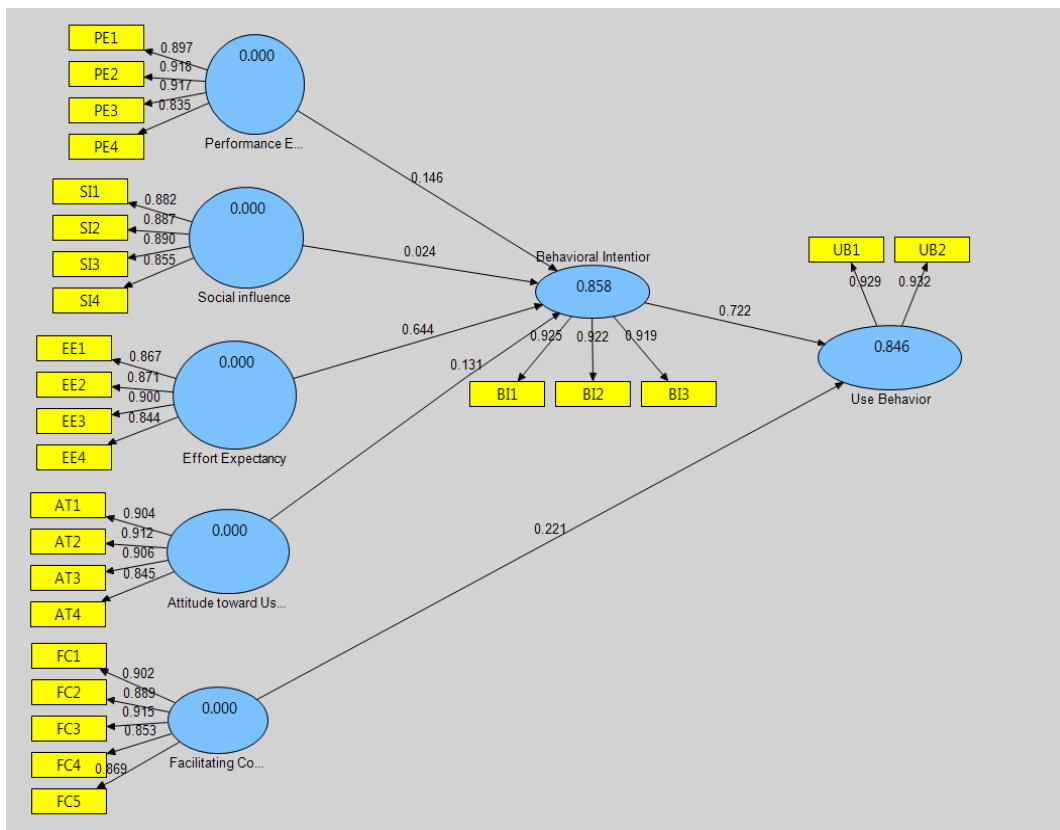


Figure 2: Proposed model tested by PLS software

Benefits of Implementing e-TES Application

- Teaching evaluation system: e-TES application will provide ready-made system and web applications for Polytechnic students and has built-in features to generate forms and evaluation surveys. The system can incorporate web 2.0 functionality, single sign-on, enhanced communication features, and a secure and scalable platform.
- Classroom Solutions: e-TES system will motivate lecturers to exhibit good teaching and moral skills. Makes lecturers to interactively deliver their lectures using an array of features that give cutting-edge tools to lecturers and students in order to achieve real results.

- Report Solutions: e-TES system will have an announcement system that allows the Polytechnic management to inform students to carry out their respective lecturers' assessment both in the beginning and the end of the semester. The main function of this system is to generate report at the end of the evaluation based on the individual course lecturer's scores, departmental scores, and overall faculty participation scores.
- Polytechnic Management Solutions: e-TES system will enable departments, faculties, and management to assess teaching performance in order to take decision that will improve the quality of teaching.

CONCLUSION

This paper presents the development, implementation, and testing of an electronic teaching evaluation system for Umaru Ali Shinkafi Polytechnic Sokoto. It also presents the results and model of students' acceptance of e-TES to evaluate their own lecturers. The major factors that were adapted from the existing model are Performance Expectancy (PE), Social Influence (SI), Effort Expectancy (EE), Attitude toward Using Technology (AT), Facilitating Conditions (FC), Behavioral Intention to Use the System (BI), and Use Behavior (UB). The result confirmed some outcomes from previous studies and come out with new outcomes as well. The new outcomes are that social influence is weak predictor for behavior intention and there is no significant difference among the groups gender and experiences.

RECOMMENDATIONS

Based on the findings of this study some recommendations can be made:

- i) The social encouragement and support to use e-TES system is found to be moderate. Therefore, it is recommended that the management should provide a socially encouraging environment that will improve students' acceptance of e-TES system.
- ii) It is recommended that the proposed model should be further tested using large number of students with experience using similar online teaching evaluation system.
- iii) The findings of this study can be applied by other tertiary institutions in Nigeria who intend to evaluate their system level of user acceptance.
- iv) It is recommended that future study should include additional variables such as ethnicity and religion in order to test the complete factors of UTAUT model.
- v) Also, it is recommended that future research should involve lecturers in order to improve the user acceptance and quality of the evaluation results.

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