



Development and Validation of Computer Assisted Instructional Package for Teaching and Learning Introductory Accounting for Universities in Nigeria

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ABSTRACT

Deficiencies and lack of computerised practical skills among business education students in universities led to this study which sought to develop and validate Computer Assisted Instructional Package for teaching and learning of Introductory Accounting in Universities in North-East Nigeria. Research and Development (R & D) design for developing the package was used for the study. Five CAIP development stages were followed based on the theory of Interaction Multimedia Computer Assisted Instruction (IMMCAI). The population of this study comprised of 87 respondents. An Introductory Accounting CAIP Validation Questionnaire (IACVQ) was developed and used by the researcher after undergoing face and content validation from three professionals in the field of Business Education, Accounting option from the Department of Vocational and Technology Education ATBU Bauchi. The instrument obtained an inter-rater reliability coefficient of 0.812. Descriptive Statistics were used to analyse the results of the study. It was concluded that once a CAIP is developed, it is supposed to be examined by course specialists, computer programmers and students who in turn will validate it before it is being used for teaching and learning in classrooms within universities and also the CAIP is expected to be installable, executed and used by the users with little or no intervention of the teacher or instructor. It was recommended among others that National University Commission should ensure that any CAIP used in universities are developed based on standard and related course contents are incorporated within the package for effective teaching and learning.

ARTICLE INFO

Article History

Received: March, 2019

Received in revised form: June, 2019

Accepted: July, 2019

Published online: August, 2019

KEYWORDS

Computer Assisted Instructional Package, Teaching, Learning and Introductory Accounting

INTRODUCTION

Due to the frequent usage of conventional teaching method, other teaching strategies were mostly ignored. One of such strategy is the use of computer in teaching and learning of accounting. Eventually, teaching and learning of Introductory Accounting using computer appears to be poorly utilized in many Nigerian universities resulting into business education students deficient in operating computers and having little knowledge of e-learning platforms (Omoni, Ifeanyichukwu, & Omoni, 2015). Other problems found constraining the effective utilization of computer assisted instructional packages in the teaching and learning of accounting education courses in Nigerian universities includes high cost of equipment, insufficient copies of accounting software and low level of ICT skills among accounting instructors (Ezeani & Akpotohwo, 2014). They further opined that many business education (accounting) students in Nigerian universities are

faced with challenges of being deficient in computer skills due to lack of required facilities and where ICT facilities are available, the effective utilization and realization of its educational values were not guaranteed. This is in line with a submission that university graduates from Faculty of Education in the labour market are ill equipped with technological skills to meet the trends of the labour market requirement of today and the future (Adamu & Abdul, 2014). It can be seen that ICT knowledge are not adequately provided in the present curriculum used in most accounting education programmes in Nigerian universities and have created a mismatch between what the accounting education students learned and the technological activities they are expected to perform after graduation.

The extensive utilisation of computer-based accounting instruction delivery by universities was as a result of increased availability and affordability of accounting software and hardware (Kanapathippillai,

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Shamlee Hasheem, & Dellaportas, 2012). Moreover, increasing global competition in the tertiary education sector provides more motivations for the university sector to participate in computer-assisted teaching, thereby enhancing effective teaching and learning of Introductory Accounting. Business students who solve accounting questions manually and then completed the same questions by computerized accounting technique, gained better knowledge acquisition, but students who solved accounting problems using only the software gained better knowledge experience than students who completed the same cases manually (Boulianne, 2014). This signifies that CAIP is effectively used and integrated into classes to improve the acquisition of accounting knowledge and serves as one of the best methods for students to acquire practical knowledge of accounting by solving accounting problems using the computer-based methods. Using computer in accounting education is seen as an integral part for helping accounting students to acquire the needed skills and experience in universities. Although minimal research attention has been given on CAIP in Introductory Accounting, there is still an existing gap on the development of Introductory Accounting CAIP using theory and practical application of the CAIP in the teaching and learning of both theory and practical of Introductory Accounting as well as examining the effect of CAIP on students' achievement in Introductory Accounting in most universities in Nigeria. It is in this regard that this paper presents a framework for the development, validation and testing the effect Computer Assisted Instructional Package (CAIP) on Students' achievement in Introductory Accounting in Universities in North-East Nigeria.

The teaching of Introductory Accounting in universities is now moving to a new dimension using modern computerized teaching strategies. Unfortunately, many business education students who graduated and passed the course over the years, lack the basic CAIP skills to technologically teach accounting in their places of works effectively as a result of the absence of required computer-based instructional packages for teaching accounting. This led to a mismatch between what the business education students learned and the practical CAIP skills they are expected to perform after graduation, thereby resulting into business education students ill equipped with the technological skills needed to meet up with the trends of the labour market requirement of today and the future. Part of the

contributive aspect was the absence of the required CAIPs and where available, not developed based on standard. This educational concern calls for another approach to address the issues, which this research study seeks to develop and validate a Computer Assisted Instructional Package (CAIP) for teaching and learning Introductory Accounting in Universities in North-East Nigeria.

Objectives of the Study

The main objective of the study is to develop and validate Computer Assisted Instructional Package for teaching and learning of Introductory Accounting in Universities in North-East Nigeria. The study specifically seeks to:

1. Identify the content areas of Introductory Accounting to be incorporated into the computer assisted instructional package for teaching Introductory Accounting in Universities in North-East Nigeria.
2. Determine the nature of computer assisted instructional package development using *PHP* computer language.
3. Determine the validity of the developed computer assisted instructional package for teaching Introductory Accounting in Universities in North-East Nigeria.
4. Ascertain the reliability of the developed computer assisted instructional package for teaching Introductory Accounting in Universities in North-East Nigeria.

METHODOLOGY

The study adopts the Research and Development (R & D) design for developing the package. The research study was carried out within the North-East, Nigeria and comprised of six states namely Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe state. The population of this study comprised of 87 respondents comprising of 4 Computer Programmers, 4 Course Specialists and 79 Students within Abubakar Tafawa Balewa University Bauchi (ATBU). The students were used for this study using their naturally formed intact classes. In selecting the universities for the study, a total population sampling technique was used based on the small manageable size of the population.

The instruments for data collection was Introductory Accounting CAIP Validation Questionnaire (IACVQ) developed by the researcher. The IACVQ was a structured closed ended Questionnaire that contained four sections. These

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sections included Section A for assessing the Introductory Accounting content areas, which were rated by the content validators (course specialists). Section B which was concerned with stages followed in the development of the computer assisted instructional was rated by all the participants while Section C was rated separately based on areas of the respondents' jurisdiction as contained on different headings consisting experts' validation rated by the computer programmers, content validation rated by the course specialists in ATBU and Field Validation rated by Students of the experimental group. The Instrument was designed on a five-point Likert scale of Strongly Agreed (SA) 5 points, Agreed (A) 4 points, Neutral 3 points, Disagreed (D) 2 points and Strongly Disagreed (SD) 1 point.

The instrument was given out for face and content validation to three professionals in the field of Business Education, Accounting option from the Department of Vocational and Technology Education ATBU Bauchi. The reliability of the instruments was obtained using inter-rater reliability because it helps in finding out the extent to which the ratings of different people about the CAIP are proportionate when expressed as deviations from their means. The result of the inter-rater reliability coefficient of 0.812 was obtained. Descriptive Statistics using mean and standard deviation were used to analyse the four research questions and how the validators examined and observed the CAIP used for teaching and learning of Introductory Accounting. All information gathered and analysed were presented in a tabular form using SPSS software package version.

Development of the CAIP

The treatment known as Introductory Accounting CAIP (IA-CAIP) was developed as a web-based application using *PHP* computer language. The web based application was chosen and used for the Introductory Accounting CAI package development because it is a JavaScript which enables sections using its prototypal structure with well-defined classes and procedures (Ashworth & Duncan, 2012; Suehring & Valade, 2013). Secondly, *PHP* was used because it serves as a server-side with HTML-embedded programming language that is used in creating dynamic Web pages applicable for almost all operating systems, Web servers and stores data in databases using *MySQL* (Oracle, 2018). It helps the CAIP to read and analyze designed pages when the user requests them at any point in time for accounting operations using local Hyper Text Transfer

Protocol (HTTP) on any Web servers and web browsers. The developed CAIP was made executable or installable using *XAMP*. *XAMP* is a development environment on a local computer and a popular all-in-one installation kit that contains Apache, *PHP*, and *MySQL* that helps in immensely simplifying the installation process, storing all information within a developed package and also contain installs *phpMyAdmin*, a path for managing *MySQL* databases (Suehring & Valade, 2013). This helps to allow the CAIP to run effectively on web browsers without using internet connectivity or web addresses, through providing a direct local host that works offline at any time.

CAIP Development Stages

The Introductory Accounting CAIP (IA-CAIP) was further designed on the web based application software using the guidelines and stages contained in the theory of Interaction Multimedia Computer Assisted Instruction (IMMCAI) which was developed by Trirathanakul, Sombunsukho, Lertkulvanich, and Buranajant (2008). The five stages followed in developing the CAIP from the IMMCAI theory were:

1. **Analysis Stage:** At this stage 3 relevant first semester Introductory Accounting course contents for undergraduate 100 level students were selected as follows:
 - a. Books of original entry.
 - b. Trading, profit and Loss Accounts
 - c. Balance Sheet of Sole Trader (NUC, 2007; Reviewed Curricula, 2011).

The three topics were selected because they contain both theory and practical as distinct with some of the same course content that are having only the theoretical aspect alone. The practical parts of the three selected topics outweigh their theoretical aspects and this allows the students to have a lot of practical accounting illustrations to solve on their own.

2. **Design Stage:** at this stage, the selected 3 topics from the course content were further expanded, containing theories and practical illustrations, which were designed into 3 lessons that were delivered in 3 weeks. Three hours (3hrs) per week were used. Out of the three hours, two hours were used to teach the theoretical parts and the remaining one hour for practical throughout the three weeks consecutively.

3. **Development Stage:** at this stage, the order and sequence of delivery was presented in 3 modules with each module containing an e-lecture note and 2 e-practical illustrations to be studied, practiced, saved, printed or downloaded to enable the students study at their convenient time or save an illustration at any stage and retrieved back or continue at an appropriate time.
4. **Implementation Stage:** at this stage, the CAIP was simplified and made accessible and executable to the users. This was to enable the instructor and the learners to easily locate the theoretical parts and the practical parts of the topics executable in line with the conventional method, principles and practice, but in a simplified way with less tediousness and less teacher interventions. The result of the operation is same with the conventional method.
5. **Evaluation Stage:** at this stage, a provision for evaluating the lesson outcome and learning efficiency of the package from the learners was obtained during the posttest. The test scores were accessed by the instructor from individual records of the students in their respective computers used for the test through the admin control panel restricted to be accessed by the researcher and the research assistants.

Validation of the IA-CAIP

The validation of the CAIP made use of the three stages of CAIP validation provided by Gambari and Yusuf (2014) which are as follows:

1. **Experts' validation:** At this stage, 4 Computer Programmers from Directorate for Information and Communication Technology (DICT), ATBU were given the Introductory Accounting CAIP Validation Questionnaires to respond to Section B only after executing the CAIP practically. The Computer Programmers are computer analysts, software developers and web designers. Their feedbacks and suggestions were adequately applied before the teaching and learning of Introductory Accounting using the IA-CAIP. Their major task was to look into the language design,

functionality, navigation, interface, packaging and durability of the CAIP and rate them at the end.

2. **Content validation:** At this stage, 4 Course specialists from the department of Vocational and Technology Education were given the Introductory Accounting CAIP Validation Questionnaire to respond to Section C after proper executing the CAIP practically. The Course specialists are professionals in Business Education with a minimum of master's degree. Their feedbacks and suggestions were sufficiently applied before the teaching and learning of Introductory Accounting using the IA-CAIP. Their major role was to look at the CAIP and ensure that the development stages stated in the IMMCAI theory for development of the CAIP were followed extensively and whether the package has a Face validity before making their final ratings.
3. **Field validation:** At this stage, 79 students trained under the experimental group, taught and learned using the CAIP were given the Introductory Accounting CAIP Validation Questionnaire to respond to Section D after their posttest. Their major role was to give their satisfaction level of the CAIP in term of sentence difficulty incorporated in the package's e-note, illustrations, demonstrations within the e-note and ease of learning Introductory Accounting practically using the IA-CAIP.

All the validators' suggestions by both the Experts and Content validators were implemented into the CAIP before the Field validation by the students in the experimental group. The Field validation was the last stage carried out, while the Experts and Content validation were done before the initial pretest.

RESULTS

Research Question One: What are the content areas of Introductory Accounting to be incorporated into the Computer Assisted Instructional Package for teaching Introductory Accounting in Universities in North-East Nigeria?



Table 1: The Content Areas of Introductory Accounting to be incorporated into the Computer Assisted Instructional Package N = 4

S/N	Items	Mean	S.D.	Decision
1	Books of original entry is one of the content areas of Introductory Accounting and it is to be incorporated in the computer assisted instructional package	3.59	.606	Agreed
2	Trading account is one of the content areas of Introductory Accounting and it is to be incorporated in the computer assisted instructional package	3.61	.601	Agreed
3	Profit and loss account are parts of the content areas of Introductory Accounting and it is to be incorporated in the computer assisted instructional package	3.76	.597	Agreed
4	Balance Sheet is one of the content areas of Introductory Accounting and it is to be incorporated in the computer assisted instructional package	3.43	.609	Agreed
Valid N (list wise) / Grand Mean		3.60	0.60	Agreed

Source: Field Study (2018).

Table 1 above shows the content areas of Introductory Accounting to be incorporated into the Computer Assisted Instructional Package for teaching introductory accounting. All the mean responses were above the average mean benchmark of 3.0 ranging i.e., 3.43 to 3.76 with standard deviation of 0.597 to 0.609 respectively. The general grand mean of all the items was 3.60 with a standard deviation of 0.60. This implies that all the items were agreed and

accepted as the content areas of Introductory Accounting to be incorporated into the Computer Assisted Instructional Package for teaching Introductory Accounting in Universities in North-East Nigeria.

Research Question Two: What is the nature of computer assisted instructional package development using *PHP* computer language?

Table 2: The Nature of Computer Assisted Instructional Package Development Using PHP Computer Language N = 87

S/N	Items	Mean	S.D.	Decision
Analysis				
1	The computer assisted instructional package contains topics relevant to Introductory Accounting course content	3.31	.720	Agreed
2	The behavioral objectives of the topics were contained and seen within the computer assisted instructional package	3.48	.790	Agreed
3	The practical parts of the three selected topics outweigh their theoretical parts	3.52	.760	Agreed
Design				
4	Three lessons were designed to be delivered separately	3.66	.679	Agreed
5	Every lesson is accompanied with two illustrations	3.61	.721	Agreed
6	Students have ease of access to their profiles	3.69	.752	Agreed
7	The computer assisted instructional package's graphic is adorable	3.45	.500	Agreed
Development				
8	It contains e-lesson notes can be accessed and study with ease	3.03	.184	Agreed
9	It contains e-illustrations that can be saved and downloaded	3.67	.474	Agreed
10	Every topic is accompanied with its separate e-illustrations	3.49	.503	Agreed
Implementation				
11	The package is accessible and executable by the users	3.79	.407	Agreed

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S/N	Items	Mean	S.D.	Decision
12	The package is less tedious and needs less teacher interventions.	3.29	.455	Agreed
13	The practical result from the exercises incorporated in the package produces same result when repeated over and over	3.72	.450	Agreed
Evaluation				
14	The package measures students' achievement at the end of the test	3.49	.503	Agreed
15	Students' evaluation outcomes are seen and stored within the package	3.41	.495	Agreed
16	The scores displayed truly reflects students' test achievements	3.59	.495	Agreed
Valid N (list wise) / Grand Mean		3.51	.556	Agreed

Source: Field Study (2018).

Table 2 above shows the nature of computer assisted instructional package development using *PHP* computer language. All the mean responses were above the average mean benchmark of 3.0 ranging i.e., 3.03 to 3.79 with standard deviation of 0.184 to 0.790 respectively. The general grand mean of all the items was 3.51 with a standard deviation of 0.556. Therefore, all the items were agreed and

accepted for the nature of computer assisted instructional package development using *PHP* computer language.

Research Question Three: What is the validity of the developed Computer Assisted Instructional Package for teaching Introductory Accounting in Universities in North-East Nigeria?

Table 3: The Validity of the Developed Computer Assisted Instructional Package for Teaching Introductory Accounting in Universities in North-East Nigeria
N = 4

S/N	Computer Programmers' Validation	Mean	S.D.	Decision
1	The language design is readable, not mixed up and effective	4.25	.500	Agreed
2	The computer assisted instructional package functions effectively	4.00	.816	Agreed
3	The computer assisted instructional package is easy to navigate within its sections and its effective	3.75	.500	Agreed
4	The computer assisted instructional package's interface is simplified and easy to use	4.00	.816	Agreed
5	The computer assisted instructional package packaging is good and no part is left hanging	3.25	.500	Agreed
6	The computer assisted instructional package is durable and can withstand long time usage thereby making it effective	3.25	.500	Agreed
Course Specialists' Validation		Mean	S.D.	Decision
7	The stages for the development of the computer assisted instructional package were followed extensively	4.00	.816	Agreed
8	The computer assisted instructional package contains the course title and parts course content	4.25	.500	Agreed
9	All the topics incorporated inside the computer assisted instructional package are parts of introductory accounting	4.50	.577	Agreed
10	The computer assisted instructional package contains both the theory and practical illustrations	4.00	.816	Agreed
11	The sequence of solving Introductory Accounting questions manually is same with that of the computer assisted instructional package	3.75	.500	Agreed
12	It is very easy to operate and input Introductory Accounting data	3.25	.500	Agreed

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13	The computer assisted instructional package is less time consuming and needs less teacher intervention	3.50	.577	Agreed
Students' Validation		Mean	S.D.	Decision
14	I am satisfied with the level of sentence difficulty incorporated in the package's e-note	3.56	.572	Agreed
15	The illustrations incorporated in the package are accessible and easy to use	3.68	.671	Agreed
16	I am very satisfied the graphics incorporate in the computer assisted instructional package	3.77	.697	Agreed
17	The demonstrations incorporated within the package e-note are satisfying	3.94	.462	Agreed
18	I am satisfied with study and practice the course using computer at my convenient time	3.67	.548	Agreed
19	I learned both the theory and practical parts of Introductory Accounting with great ease	3.80	.404	Agreed
20	The computer assisted instructional package doesn't require much intervention from the teacher	3.76	.582	Agreed
Valid N (list wise) / Grand Mean		3.77	.598	Agreed

Source: Field Study (2018).

Table 3 above shows the validation of the developed Computer Assisted Instructional Package for teaching introductory accounting. All the mean responses were above the average mean benchmark of 3.0 ranging i.e., 3.25 to 4.50 with standard deviation of 0.404 to 0.816 respectively. The general grand mean of all the items was 3.77 with a standard deviation of 0.598. Therefore, all the items were

agreed and validated for the developed Computer Assisted Instructional Package for teaching Introductory Accounting in Universities in North-East Nigeria.

Research Question Four: What is the reliability of the developed computer assisted instructional package for teaching Introductory Accounting in Universities in North-East Nigeria?

Table 4: The Reliability of the Developed Computer Assisted Instructional Package N = 4

Raters	N	Mean	S.D.	r	% of Absolute Agreement	Decision
Computer Programmers	4	3.75	0.605	0.812	81%	Reliable
Course Specialists	4	3.89	0.612			
Students	79	3.74	0.562			

Source: Field Study (2018).

Table 4 above shows the reliability of the developed computer assisted instructional package for teaching Introductory Accounting as rated by set of raters including 4 Computer Programmers, 4 Course Specialists and 79 Students. The four Computer Programmers had a mean rating of 3.75 and a standard deviation of 0.605, the four Course Specialists had a mean rating of 3.89 and a standard deviation of 0.612 and the seventy-nine students had a mean rating of 3.74 and a standard deviation of 0.562. This result shows a high acceptable level of agreement between the three raters of 0.812 inter-rater reliability coefficient which represents 81% absolute agreement between the raters of the IA-CAIP. Therefore, the developed computer assisted

instructional package for teaching Introductory Accounting in Universities in North-East Nigeria is reliable.

DISCUSSION

It was found from research question one that all the respondents agreed the content areas of Introductory Accounting to be incorporated into the Computer Assisted Instructional Package for teaching Introductory Accounting in Universities in North-East Nigeria. This corresponds to the provision of the IMMCAI theory where it states that sorting out all relevant course content and titles related to the general topic of the subject chosen, for the project decided, through extraction from curriculum,

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brainstorming, consultation and discussion with experts must be carried out developing and to manifested within the package after the development is completed (Trirathanakul et al., 2008). This is part of the first requirement in developing a CAIP for teaching and learning any course in tertiary institutions where course specialists are required to go through and scrutinize the developed CAIP in order to ensure that all or parts of the relevant course content are captured within the package for effective usage in teaching and learning.

It was also found in research question two that all the items were agreed and accepted for the nature of computer assisted instructional package development using *PHP* computer language. Relevant computer languages are required in order to give direction on how the computer should recognise and execute the design program whenever it is executed. The condition meets up with requirements as postulated by Trirathanakul et al. (2008) who noted that the subject matter has to be comparatively stable and last for a reasonably long duration to justify the effort and investment in the development of the package and subject matter integrated with IMMCAI must constitute a completely new field having very few or no effort made so far. These new fields are only obtained after the basic and required programming language is used in the development of the teaching and learning software.

It was also found in research question three that all the respondents agreed over the developed Computer Assisted Instructional Package to be valid for teaching Introductory Accounting in Universities in North-East Nigeria. The respondents used are in line with requirements of CAIP validators which according Mappalotteng (2014); Richey and Klein (2005) include designers, developers, evaluators, clients, instructors and/or program facilitators, organizations, design and development researchers, theorists, as well as learners and other types of users who are concerned with product design and development, evaluation, validation and model usage. CAIPs validation techniques are often employed in the developmental studies that focused on a given instructional product studies to determine the effectiveness of the resulting product or the particular techniques used during the design and development project (Richey & Klein, 2005). This shows that Validation of CAIP is done to ensure CAIP's appropriateness and effectiveness in promoting the teaching and learning of any course of study.

It was also found in research question four that all the respondents agreed that the developed computer assisted instructional package for teaching Introductory Accounting in Universities in North-East Nigeria is reliable. This tally with the provision of the IMMCAI theory as postulated by Trirathanakul et al. (2008) who stated that developed CAIP should be applicable, consistence and accessible to be used by any number of users at any time. This is obtained after the CAIP is used and assessed by the users and validators for effective utilisation ant any time.

CONCLUSION

It can be concluded that a CAIP was developed and validated for teaching and learning of Introductory Accounting in universities. Once a CAIP is developed, it is supposed to be examined by course specialists, computer programmers and students who in turn will validate it before it is being used for teaching and learning in classrooms within universities. Any developed CAIP is expected to be installable, executed and used by the users with little or no intervention of the teacher or instructor and also to be able to pose questions for the user and presents feedback within short period of time. This makes CAIP to be an enhanced and effective instructional strategy for teaching and learning of Introductory Accounting in universities.

RECOMMENDATIONS

1. National University Commission should ensure that any CAIP used in universities are developed based on standard and related course contents are incorporated within the package for effective teaching and learning.
2. Universities directorate of information and communication technology should ensure the any CAIP is developed using appropriate computer language recognised by every computer and to be stable whenever it is executed.
3. Universities authorities should ensure that any CAIP to be use in any universities is validated by the required personnel in order to meet up with university standard.
4. Universities authorities should ensure that any CAIP to be used in the University Teaching and learning is reliable after installation and execution over a long period of time.



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