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DEVELOPMENT AND VALIDATION OF COMPUTER-SUPPORTED ONLINE COLLABORATIVE LEARNING INSTRUCTIONAL PACKAGE FOR TEACHING CHRISTIAN RELIGIOUS STUDIES AT SENIOR SECONDARY SCHOOL IN NIGERIA

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Abstract

Technology integration in education has led to the integration of Instructional Packages to promote effective teaching and learning process. This study was conducted to develop and validate Computer-Supported Online Collaborative Learning Instructional Package (CSOCL-IP) on Christian Religious Studies for teaching Senior Secondary School students in Nigeria. A purposeful sampling strategy was adapted to select 67 Christian Religious Studies students who participated in the study from two Government senior secondary schools in Abuja, Nigeria. A Design-Based Research was adopted using mixed methods- qualitative and quantitative. The two- in- one package was developed using ADDIE model. The contents were developed, recorded, and edited using an Articulated-Story line 3 authoring editing Software as the overall platform. The validation of the package was done in three stages: content (university lecturers, secondary school teachers, and examination body), experts' (computer programmers & educational technologists), and field trial (one-on-one by students). Six research instruments: CSOCL-IP, MLAT, CRSEVR, ETEVR, COEVR, and CRSSFTVQ were employed for data collection. Data obtained from the pilot study were analyzed using Pearson Product Moment Correlation Coefficient and 0.723 reliability coefficient was obtained which was considered adequate for the research study. Experts agreed that the package was appropriate and suitable for enhancing performance in CRS. The observations, comments and suggestions from the experts were used to modify the package. The study concludes that educators should integrate technological activities into their learning activities to inculcate and consolidate basic ICT skills into their students and recommends integration of instructional packages for instructions in secondary school curriculum.

Keywords: *Computer-Supported Collaborative Learning; Christian Religious Studies; Instructional Package; Design Based Research; Nigeria Senior Secondary School.*

Introduction

Christian Religious Studies (CRS) is one of the statutory subjects in the Nigeria Curriculum designed to prepare the youth for effective living in the society with an emphasis on high moral conduct and youth empowerment (Federal Ministry of Education, FME, 2010). However, CRS teachers still adopt the conventional teaching method which has been identified as one of the major causes of students' poor performance in both internal and external examinations. Studies in CRS have identified several learning difficulties and one of them is discussion of concepts such as the concept of "Moses as Leader". The West African Examination Council (WAEC) Chief Examiners Report (2018) for example revealed that students perform poorly in examination especially in essay questions requiring discussion of concepts. Studies indicate that conventional method is teacher centered, inefficient and ineffective in meeting the demands of learning in this technology-driven age (Orji, 2015). Modern pedagogies like computer-supported instructions would help students to build mental representation of abstract religious concepts and by so doing, poor performance in CRS will be eradicated. Besides, students are expected to acquire modern knowledge and skills for productive life in the 21st century society. Hence, there is a disparity observed between the teacher's classroom instructional method and the expected demand of modern technological society, which this study seeks to fill by developing and validating Computer-Supported Online Collaborative Learning Instructional Packages (CSOCL-IP).

The computer-Supported Collaborative Learning (CSCL) is a pedagogy which combines computer technology, social interactions, and collaborative learning principles to enhance learning experience (Vega, Stanfield & Mitra, 2020).

The CSOCL-IP is an adaptation of CSCL which is supported with instructional package and has the ability to create instructional events in a blended environment which simplifies learning to the user (Alshahad, 2018). It comprises of multimedia elements; audio, animation or simulations, visual text, images, video, etc., designed to stimulate students' senses in the learning process that enhances understanding and learning (Yaki & Babagana, 2016). The package was developed to promote learning through sequential learning objectives, presented in an interactive and continual self-paced step in a fun learning environment (Chandra, Jennifer & Jean, 2011). The CSOCL-IP is, therefore, motivating and has diverse learning activities which students must successfully master at every stage before proceeding to another one. It also has special feature; link to Google Docs Online Collaborative Learning (OCL) environment. This environment enables student-led discussions intended to make the students become active participants of their learning process. The package is a portable technology software that is not limited to the computer, students can download it into their mobile phones, tablets, laptops, and other digital devices which can be accessed repeatedly after the lesson to help them learn at any convenient place or time. Thus, students practically can learn in dynamic ways that is effective and efficient which enhances learning outcomes (Agboh, 2015).

Studies show that different Instructional System Design (ISD) models are used in developing the IPs (Khalil & Elkhider, 2015). However, literature showed that most ISD models originated from ADDIE model which is considered the most used (Shibley, Amaral, Shank, & Shibley, 2011). The ADDIE model provides a behavioural and systematic approach for designing and developing a lasting learning experience (Gustafson & Branch, 2002). Thus, instructional models usually involve the five phases of ADDIE model- Analysis, Design, Development, Implementation, and Evaluation. In this research, there was a need for a researcher-based instructional package since professionally made instructional packages are not common in Nigeria. Besides, the few available ones on Christian religion though scholarly, are not suitable for secondary school level CRS, while a majority of these evangelize, others are not directly relevant to the topic or lesson objectives. Thus, developing a computer instructional package for this study was inevitable. Based on the above, this study focused on the development and validation of Computer-Supported Online Collaborative Learning Instructional Package on CRS for teaching Senior Secondary School students in Nigeria.

Purpose of the Study

The main purpose of this study was to develop, validate, and determine the effectiveness of the developed Computer-Supported Online Collaborative Learning Instructional Package (CSOCL-IP) for learning senior secondary school CRS. The specific objectives were to:

(i) Develop CSOCL-IP for learning "Moses as Leader" concept in CRS.
(ii) Ascertain if the content of the developed CSOCL-IP sufficiently and appropriately covered the validation instrument sequentially.
(iii) Determine whether CSOCL-IP conformed to acceptable standards by experts.

Research Questions

The following research questions were raised to guide the conduct of this study:

(i) What are the processes involved in developing CSOCL-IP for learning 'Moses as Leader' concept in CRS?
(ii) Does the developed CSOCL-IP sufficiently and appropriately cover the content of the validation instrument sequentially?
(iii) How do experts rate the developed CSOCL-IP for learning CRS?

Methodology

Mixed research method (qualitative and quantitative) was adapted for this study. The qualitative method adapted Design-Based Research (Anderson & Shattuck, 2012) approach. This involved the incorporation of the experts' observations into remodeling of the IP. The quantitative method used statistical tools including frequency and percentages. Intact classes and focus group interview were also used.

Sample and Sampling Techniques

The sample was made up of 67 male and female SS2 CRS students drawn from two selected Government senior secondary schools in Federal Capital Territory (FCT), Abuja tagged schools A and B. Purposive sampling technique was employed to select the two schools that participated in the study.

Research Instruments

Six research instruments: two of them were treatment instrument used to engage the students in the teaching strategies, while the remaining four were measurement scale used to collect relevant data. They included;

(i) Computer- Supported Online Collaborative Learning Instructional Package (CSOCL-IP).

(ii) Moses as Leader Achievement Test (MLAT): adapted from WAEC/NECO past examination questions (Anyaele, 2018). It was made up of 50 multiple choice items covering the concept of 'Moses as Leader'. Each question has four options lettered A-D, with one correct answer and three distractors. Students were required to indicate the correct answer by circling the right answer that corresponds to each question. Each correct multiple-choice item was scored '1' and '0' for each wrong answer.

(iii) Christian Religious Studies Experts' Validation Report (CRSEVR): this was used to evaluate the appropriateness of the IP for the learning of the selected 'Moses as Leader' concept.

(iv) Educational Technology Experts' Validation Report (ETEVR): this was designed to elicit experts' comments on the following: suitability of the package for instruction; unity among illustrations; emphasis on key concepts, the use of colours, the legibility of texts among others.

(v) Computer Experts' Validation Report (COEVR): it contains items that sought the opinion of computer experts on the suitability of the package and useful suggestion on how to improve on the package.

(vi) Christian Religious Studies Students' Field Trial Validation Questionnaire (CRSSFTVQ).

Validity of the Instruments

The developed CSOCL-IP was validated by nine (9) CRS subject experts including one measurement and evaluation expert from an examination body, three (3) computer experts, and three (3) educational technology experts. Based on their observations, comments and suggestions, a modified package was developed and field trial-tested on twenty-seven (27) SS2 CRS students from school A. This was to further determine the usability and functionality of the instructional package. The Moses as Leader Achievement Test (MLAT) was subjected to face and content validity by the same subject experts and pilot study conducted on 40 CRS students from school B. The final copy of the CSOCL-IP was produced based on their contributions.

Reliability of the instruments

The data obtained from the pilot study using Pearson Product Moment Correlation Coefficient yielded 0.723 reliability coefficient which was considered adequate for the research study.

Results

Research Question 1: What are the processes involved in developing CSOCL-IP for learning Moses as leader concept in CRS?

The five phases of ADDIE model, figure 1 was sequentially followed in the development of CSOCL-IP.

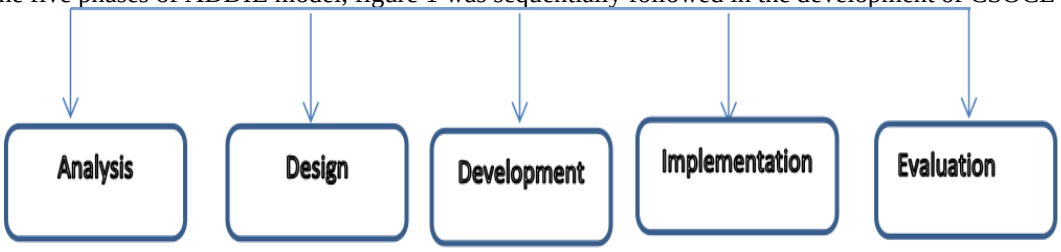

Figure 1: Analysis, Design, Development, Implementation and Evaluation.

Analysis Phase: At this stage, the researcher has seen the poor performance of students in CRS and having looked at the major emphasis of the WAEC chief examiner's report such as poor performance on essay questions and difficult concepts like Leadership, therefore, the researcher conducted an instructional analysis of the lesson to make sure it was appropriate for CSOCL-IP. The analysis identified the learners' (characteristics), age range, the context, content,

previous knowledge, media of instruction, purpose of instruction, etc., The learners were senior secondary two students (boys and girls), between the ages of 13 and 15 with different digital skills. However, prerequisite skills found to be a lacking knowledge during learner analysis, were taught before the start of instruction, to address any learning gaps. From the literature, teachers still adopt conventional teaching methodologies which contributed to poor students' achievement. Hence, the need to integrate innovative teaching methods particularly development of computer-supported instructional packages for CRS instruction by the researcher to enhance effective learning of CRS.

Design Phase: In this phase, the contents of the instructional package were derived from the senior secondary school curriculum: CRS *scheme* of work on Moses as Leader (FME, 2010). This was used to prepare the learning objectives written in measurable terms covered by each of the four lessons in this package. Also, the learning activities, suitable instructional strategies (media), and online collaborative learning tasks and other materials including validation instruments/questionnaire items were designed.

Development Phase:
The development of CSOCL-IP/Google Docs OCL environment is two-in-one package, co-designed and developed by the researcher and a computer programmer. The researcher wrote the script for the selected CRS concept, Moses as Leader and sent it to a computer animator for programming. The contents were developed, recorded, and edited using an Articulated-Story line 3 authoring editing Software as the overall platform. It utilized multiple graphical elements, media, simulation, video, and animations designed with CorelDraw X7 that assisted the interactive instructions. The text in paragraph was written with MS-Word 2016. The package presents with Hoy Somos Felices music by Christian Gospel Ensemble. The main page is the splash screen that "Welcomes the User'. To start the package, the user must double click the rectangular shape, to type–in name and then click the submit button. This action takes the user to the next page which identifies him/her as the learner and presents purpose of the package (Overview), Navigation tips including "Next", "Previous" Log-in", Log-out", and Objectives of the lesson under the Information (*i)* icon. It also lists the learning contents; lesson I, 2, 3, and 4.

The OCL environment on the other hand, was designed and developed with Google Docs software. A free web-based application package offered by Google Corporation that supports real time collaboration. This environment was built to assess the students on the ability to lead online discussion strategies; case-based discussion, structured-group discussion, and open-ended discussion in three different learning settings. The package adopts the drill and practice modes of computer-supported instruction. The main difference between the individualized instruction and the collaborative group-based instruction were the modifications in terms of being able to access the OCL environment except the user successfully completes the learning exercises.

Implementation Phase: The packages were implemented, and its impacts validated at different stages. First, the CSOCL-IP was field trial-tested on 27 SS2 CRS students from one Government senior secondary school in Abuja (school A). The 27 students from an intact class used the CSOCL-IP installed in the computers in the school computer laboratory. The students listened to the lessons 1-4, watched videos, simulation, animations, did exercises and linked the Google Docs environment to do the online collaborative tasks. At the end a questionnaire was administered to them which was retrieved immediately. The questionnaire was analyzed using simple percentage. Some of the students were also interviewed. All the students were in support of the use of the package for teaching CRS. The results obtained are presented in tables 1-6.

Second, the CSOCL-IP was pilot tested using 40 CRS students from another Government senior secondary school in Abuja (school B). The students were exposed to 'Moses as Leader' content projected in the computer laboratory using CSOCL-IP after training for 80 minutes duration for four weeks. The students watched the video and simulation and did the exercises to test their understanding of the package. The Google Docs online collaborative task link was connected after each student had successfully completed the exercises. The students used the package to ensure the functionality of the package in terms of content (visual quality), navigational direction, screen design, interactivity, students' preference towards the package and student's perception about the use of the package. At the end, MLAT was administered. The data obtained from the pilot study were analyzed using Pearson Product Moment Correlation Coefficient and 0.723 reliability coefficient was obtained which was considered adequate for the research study.

Evaluation Phase: this included both formative evaluation -at the end of every lesson with variety of exercises to help ensure mastery of the lesson before the student proceeded to the next lesson/sub-topic. The summative was at the

end of the learning process before the student was given a certificate of participation which was expected to motivate the student. The feedback from evaluation, determined the next actionable improvements, leading to another cycle of ADDIE process.

Research Question 2: Does the developed CSOCL-IP sufficiently and appropriately covered the content of the validation instrument sequentially?

Christian Religious Studies Students' Field Trial Validation Questionnaire (CRSSFTVQ): adapted from Gambari and Yusuf (2014), was administered on 27 students to seek their opinion about the content of the validation instrument of the instructional package under the following sub-headings: content, navigation, interactivity, feedback, and screen design. It also reflected on students' preferences toward the use of the package compared to traditional methods of learning. The questionnaire was analyzed using simple percentage. The results obtained are presented in tables 1-6.

Table 1: Content in the Package

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
1	The messages in the package are easy to understand	14	51.9	13	48.1	0	0.0	0	0.0	3.52
2	The content in the package has been well organized (arranged in order)	16	59.3	11	40.7	0	0.0	0	0.0	3.59
3	The pictures/illustrations in the package are very clear to me.	14	51.9	12	44.4	1	3.7	0	0.0	3.48
4	The examples used in the various sections of the lessons in the package are relevant.	12	44.4	15	55.6	0	0.0	0	0.0	3.44
5	It was easy to understand the lesson because information was presented from simple to more difficult one.	11	40.7	16	59.3	0	0.0	0	0.0	3.41

From Table 1, 40.7% of the students strongly agreed while 59.3% agreed that the content of the package was suitable for the learning of CRS. Students liked the content of the package because it is well organized and easy to understand. Therefore, none of the student disagrees with the statement items on the contents of the package.

Table 2: Interactivity of the Package

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
6	It is easy to operate the package with computer keys and icons.	13	48.1	13	48.1	0	0.0	0	0.0	3.50
7	This package permits me to repeat the section, enlarge animation, and exit the lesson at any time.	16	59.3	10	37.0	1	3.7	0	0.0	3.56
8	The frequent display of questions to the learners does not interrupt the learning process.	15	55.6	12	44.4	0	0.0	0	0.0	3.60
9	This package enables me to apply what I have learnt rather than memorize it.	10	37.0	16	59.3	1	3.7	0	0.0	3.33
10	This package allows me to discover information through active learning.	15	55.6	10	37.0	0	0.0	0	0.0	3.60

From Table 2, 55.6 % of the students strongly agreed while 37.0 % agreed that the package was interactive for the learning of CRS. Students liked the package because it enables them to apply what was learnt rather than memorize it. Meanwhile, none of the student disagrees with the statement items on the interactivity of the package.

Table 3: Navigation of the Package

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
11	From the main menu, students are allowed to register his/her name.	16	59.3	10	37.0	0	0.0	0	0.0	3.62
12	The EXIT key enables me to exit from the lesson/programme.	14	51.9	13	48.1	0	0.0	0	0.0	3.52
13	The PREVIOUS key enables me to revisit the previous section(s) of the lesson.	9	33.3	16	59.3	0	0.0	0	0.0	3.36
14	The NEXT key directs me to go to the next section of the lesson.	12	44.4	13	48.1	0	0.0	0	0.0	3.48
15	The OPTION keys allow me to select the correct option.	12	44.4	14	51.9	0	0.0	0	0.0	3.46

From Table 3, 44.4% of the students strongly agreed that the package option keys allow them to select the correct option while 51.9% agreed. Meanwhile, none of the student disagrees with the statement items on the navigation of the package.

Table 4: Feedback from the Package

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
16	This package provides immediate feedback after selecting the option.	9	33.3	16	59.3	0	0.0	0	0.0	3.36
17	This package displays the correct or wrong answer chosen with some sound.	15	55.6	10	37.0	0	0.0	0	0.0	3.60
18	This package allows me to proceed to the next lesson only if the chosen answer is correct.	17	63.0	10	37.0	0	0.0	0	0.0	3.63
19	This package terminates my activities if after three attempts I got the answer wrong.	11	40.7	15	55.6	0	0.0	0	0.0	3.42
20	This package appreciates my efforts by congratulating me after completing the lesson correctly.	12	44.4	15	55.6	0	0.0	0	0.0	3.44

From Table 4, a total of 44.4% of the students strongly agreed while 55.6% agreed that the package displays the correct or wrong answer chosen with some sound which allows feedback from the package. Meanwhile, none of the student disagrees with any of the statement items on the feedback of the package.

Table 5: Screen Design of the Package

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
21	The presentations of the information in the package attract my attention.	12	44.4	13	48.1	0	0.0	0	0.0	3.48
22	The use of proper lettering (fonts) in terms of style and size make the information legible.	15	55.6	12	44.4	0	0.0	0	0.0	3.56
23	The colours used for the various presentations are quite appealing.	12	44.4	15	55.6	0	0.0	0	0.0	3.44
24	The quality of the text, images, graphics, and video are interesting.	13	48.1	14	51.9	0	0.0	0	0.0	3.48
25	The animations (moving picture) in the package assist in understanding the lessons better.	13	48.1	14	51.9	0	0.0	0	0.0	3.48

Results from table 5 shows that 48.1% of students strongly agreed on the nature of the screen design of the package while 51.9% agreed. They also agreed that the presentation of information is attractive. Meanwhile none of the respondents had a negative view on the statement items concerning the screen design of the package.

Table 6: Learners' Preferences toward the Use of the CSOCL-IP Compared to Traditional Methods of Learning

S/No	STATEMENT	SA		A		D		SD		M
		F	%	F	%	F	%	F	%	
26	I prefer to learn CRS with CSOCL-IP and a teacher acting as a facilitator.	16	59.3	11	40.7	0	0.0	0	0.0	3.59
27	Learning CRS with an interactive package is preferable to me than using textbooks.	18	66.7	8	29.6	0	0.0	0	0.0	3.69
28	The activities provided in this package are more effective compared to normal classroom instruction.	17	63.0	10	37.0	0	0.0	0	0.0	3.63
29	I will suggest to my friends to use CSOCL-IP in learning CRS instead of textbooks.	17	63.0	10	37.0	0	0.0	0	0.0	3.63
30	I prefer the use of this CSOCL-IP method to normal classroom instruction.	14	51.9	13	48.1	0	0.0	0	0.0	3.63

Results from table 6 shows that 51.9% of students strongly agree while 48.1% on the use of CSOCL-IP than traditional methods of learning. They also agreed that the activities provided in this package are more effective compared to traditional methods of learning. Meanwhile, none of the student had negative view on the preference towards the use of CSOCL-IP.

Research Question 3: How do experts rate the developed CSOCL-IP for learning Christian Religious Studies?
The expert validation of CSOCL-IP was done in two stages: (i) content validation (CRS specialists); and (ii) experts' validation (computer programmers & educational technology experts).

Content Validation
The CRS contents of the package were validated by subject specialists. Three senior lecturers from the Department of Christian Religious Studies, one from Ahmadu Bello University, Zaria, one from University of Nigeria, Nsukka, and one from Imo State University, Owerri. This instrument was also validated by six senior officers from FCT Education Secretariat Abuja; (CRS Unit) – three teachers, two quality assurance evaluators from FCT Department of Quality Assurance and a measurement and evaluation expert from an examination body - FCT Education Resource Center Abuja before the package was developed. The specialists assessed the instruments to see; if all items are derived from the contents in the chosen topics that would be presented to the students (Content Validation), if the subject matter of the CSOCL-IP are relevant to the constructs to be measured (Construct Validity), how presentable they are (Face Validity), and how related they are to the set criteria (Criterion Related Validity). The validation reports and suggestions were noted, and corrections were affected where applicable, to ensure the instrument met the required standard based on suggestions and recommendations of the experts.

Expert Validation
The CSOCL-IP was also given to three computer programmers from FCT Secondary Education Board, Abuja to determine the appropriateness of the package in terms of language, interface, legibility, navigation, typography, animations, durability, packaging, and functionality. Three senior educational technologists also validated the package in terms of simplicity of the instrument, clarity, background colour, voicing, text, spellings, font size, emphasis on key concepts, among others. Based on the experts' suggestions changes were made such as reduction in some font sizes, and changes in background colours, etc. The package was copied in flash-drive and burned on CD for safety.

Discussion of Findings
One of the findings of this study revealed that the use of ADDIE instructional design model in the development of CSOCL-IP significantly produced suitable package for teaching CRS. This finding agrees with that of Shibley, Amaral, Shank, and Shibley (2011) and Arum (2019) who found that the ADDIE instructional design model has been considered most commonly used in the literature by researchers. For instance, Nwokocha, Gambari and Tukur (2020) adopted ADDIE model to develop and validate edutainment instructional packages for teaching biology at senior secondary school in Nigeria. However, other instructional models such as Dick and Carey, Recursion, Reflective,

Design and Development Model systems have been adopted by researchers (Olafare, 2011; Anunobi, Gambari, Alabi, & Abdullahi, 2017).

This study also revealed that the CSOCL-IP was developed using Articulated-Story line authoring editing Software as the overall platform. This agrees with Arum (2019) who used Articulate Storyline 360 in the **development and validation of computer simulation for effective teaching of biology at senior secondary school in Lagos state. T**he text in paragraph was written with MS-Word 2016 as in Gambari and Yusuf (2014) who developed and validated a computer instructional package on physics for secondary schools in Nigeria using Microsoft Word. This package consisted of multiple media elements including simulation, animations and video designed to enhance interactive instructions and understanding of concept. This is in line with most instructional packages developed and validated in the literature such as Bolaji (2016) and Nwokocha, Gambari, and Tukur (2020). The CSOCL-IP also offers the students the opportunities of evaluating learned concepts through various exercises and reviewing answered questions as also found in Arum (2019). This study also revealed that the integration of CSOCL-IP in CRS improved students' achievement, retention, and motivation. This supports the findings of Arum (2019), and Nwokocha, Gambari, and Tukur (2020), studies that instructional package improves students' achievement, retention, and motivation. However, some studies found contrary results (Anyanwu, 2003). The study also found that the use of CSOCL-IP via Google Docs technology successfully enhanced online collaboration and discussions as found by Al-Chebani, (2016).

The CSOCL-IP was rated very high by experts and students and suitable for teaching and learning of 'Moses as Leader' concept in CRS. The results from the experts and students agree with Orji (2015) who noted that technology offers students powerful tools to learn and achieve high standard in Religious Education.

Conclusion

This era of technology and digital competence has made it mandatory for educators across disciplines to integrate technology into their learning activities to inculcate and consolidate basic ICT skills into their students. The students' performance in CRS increased as each student actively participated in the learning process using the CSOCL-IP. In addition, most experts rated it very high, suitable, and appropriate for learning CRS because it met the required standards. This enabled the researcher to conclude that CSOCL-IP will be very useful not only for improvement of students' achievement in CRS but will impart technology skills for effective living and participation in a 21st century society.

Recommendations

Based on the findings of this study, the following recommendations were made:

(i) Teachers should adopt CSOCL-IP for classroom instruction as it is student-centered instruction that engages the students to learn better.

(ii) Teachers should be trained on how to develop and use innovative technologies like CSOCL-IP to facilitate better teaching and enhance students' academic achievement.

(iii) The government should make the fund available to school management to develop CSOCL-IP in any subject area since students' academic achievement and retention could be enhanced through this medium of instruction.

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