Assessment Of Computer Managed Instruction For IMO State University, Nigeria

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Abstract

Computer Managed Instruction(CMI) is a Computer Software whose primary purpose is teaching or self learning.This paper was motivated by the fact that Imo State University is under pressure to deliver an efficient and effective teaching process but constraints on staffing with increasing number of students have brought about unfavourable situations in most departments such that problem solving lectures have been an uphill task. This paper therefore seeks to investigate whether the use of Computer Managed Instruction (CMI) has impact on the learners. The methodology involved collection of Data through questionnaires and statistically analyzed using the Weighted Mean Average. The result showed among others that those who use Computer Managed Instruction learn faster and better than those who use the classroom Face me, I Face you learning, also showed the Computer Managed Instruction is an effective aid in the teaching/Learning process.

Keywords: Computer Managed Instruction (CMI), Computer Assisted Instruction (CAI), Teaching, Learning, Software, Students, Classroom.

Introduction

A Computer Managed Instruction (CMI) refers to the use of computer and its software to manage the instructional process. It is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, and assessment of learner performance. CMI aids the instructor in instructional management without actually doing the teaching. It encourages teaching and tracking process in which the learning environment is enhanced with the use of a computer.

According to *Encyclopedia of Multimedia Technology* [1], CMI functions can include a management administration system designed to track students' performance over a period of time, providing information concerning performance trends, recording individual and group performance data, scheduling training, and providing support for other training management functions.

Sabarish [2], posits that the term Computer Managed Instruction (CMI) simply stands for the instruction managed with the help of computer technology. In CMI the computer gathers, stores, and manages information to guide students through individualised learning experience. It directly calls for the services and applications of computers and applications of computers in the field of instruction. The information on a student's progress in working with the computerised program, namely his performance on every test

item, keeping track of his mistakes and strengths and providing a valuable feedback to the teacher etc. can all be managed effectively by the computer. Such a system which maintains this kind of book keeping along with the instructional programme is called as Computer Aided Instruction (CAI). Computer Aided Instruction (CAI) is more effective only when it is linked to CMI. It helps to assess the learners present level of knowledge, weaknesses or gaps in his learning and remedial action possible.

CMI is the systematic control of instruction by computer. It is characterised by testing, diagnostic learning, prescription and through record keeping. CMI includes all applications of the computer aid to the instructor in instructional management without actually doing the teaching.

Mosby [3], describes Computer Managed Instruction (CMI) as a system in which a computer is used to manage several aspects of instruction, including learning assessment through administration of pre-tests and post-tests; design and preparation of learning prescriptions; and calculation, analysis, and storage of student scores. It is part of Computer-Aided Instruction, which is a diverse and rapidly expanding spectrum of computer technologies that assist the teaching and learning process. Guided drill and practice exercises, computer visualization of complex objects, and computer-facilitated communication between students and teachers are parts of CMI.

Microsoft Encarta [4], posits that information that helps teach or encourage interaction can be presented on computers in the form of text or in multimedia formats, which include photographs, videos, animation, speech, and music adding that guided drill computer program poses questions to students, returns feedback, and selects additional questions based on the students' responses. According to it, recent guided drill systems incorporate the principles of education in addition to subject matter knowledge into the computer program.

Microsoft Corporation, in Encarta [4], believes that Computers can help students visualize objects that are difficult or impossible to view displays especially in human anatomy, molecular structures, or complex geometrical objects.

Exploration and manipulation of simulated environments can be accomplished with CMI ranging from virtual laboratory experiments that may be too difficult, expensive, or dangerous to perform in a school environment to complex virtual worlds like those used in airplane flight simulators.

CMI tools, such as word processors, spreadsheets, and databases, collect, organize, analyze, and transmit information. They also facilitate communication among students, between students and instructors, and beyond the classroom to distant students, instructors, and experts. CMI systems can be categorized based on who controls the progression of the lesson. Early systems were linear presentations of information and guided drill, and control was directed by the author of the software. In modern systems, and especially with visualization systems and simulated environments, control often rests with the student or with the instructor. This permits information to be reviewed or examined out of sequence. Related material also may be explored. In some group instructional activities, the lesson can progress according to the dynamics of the group.

Harden, Davis, & Crosby [5], believe that today, mission statement of tertiary institutions, with respect to inculcating efficiency in the teaching process should include involvement of key tools in its information management system that would help drive the process of curriculum development in faculties and departments of institutions. Creation of Computer Managed Instruction (CMI) should be the first stage towards that process. Curriculum development is not something static and permanent. Change is one of its key features and that change should be in the involvement of CMI.

Conceptual Discussion

Tertiary institutions in Nigeria and indeed many other countries have recently faced the pressures of reduced resource allocations especially this time around when crude oil prices have nose-dived throwing many countries into economic quagmire. In terms of teaching, this has meant increased student-staff ratios (due to reduced

employment of more staff for corresponding increase in number of students) coupled with pressures to reduce attrition on the part of students and hence increase graduation rates. The Imo State University (IMSU), Owerri has had to cope with this situation just like every other tertiary institution in Nigeria.

For the above-mentioned reasons, IMSU teaching departments have reacted to increased teaching loads in different ways. In the Computer Science and Physics Departments, for example, the traditional lectures and weekly practical classes were supported in the past by problem solving (tutorial) classes of 20-30 students. Even at this size, individual attention to students was difficult. Lately, funding restraints have forced the amalgamation of these classes into much larger groups of 100 or so students each in which the tutor works through assigned problems with individual attention impossible.

Tobias [6], believes that at no stage have resources allowed the marking of assigned problems for all first year students. The Department considers these classes to be crucial as proficiency at Physics science involves not only a knowledge of the content of the subject and competence at practical work, but, essentially, the ability to solve problems.

In an effort to make the teaching of problem solving more effective, attention turned to the possible use of the University computer network to which students have access because elaborate systems of computer managed instruction were not considered viable as they require extensive resources of finance and/or staff times which were just what was not available yet in the institution under review. Thus, it becomes necessary to use computer technology that can create, print and mark individual weekly student assignments and make minimal (but by no means initially zero) demands on staff time and on the University's computer facilities. This is a Computer Managed Instruction system. From the pedagogical point of view this system was expected to have a number of advantages.

First, the student must actively solve problems rather than passively speculate as the instructor goes through the problem. Independent learning is thereby encouraged. Second, the student can control the learning process more, by deciding (within limits) when to do the work, how much time to spend on each part of it, and whether to take the opportunity of further practice in weak areas.

Third, an automated system easily allows marking. Giving credit for this work in itself would provide an incentive to students to work at problems. Moreover, the marking is immediate, may include diagnostic feedback and is seen to be objective.

Stanford and Cook [7], posit that the implementation of this approach was encouraged by the publication of a report from a study at the University of Queensland showing how such a computer managed system of testing could simultaneously lessen staff teaching loads and improve student performance

The increase in student performance of as much as 40% claimed by this study was in comparison with performance on the final examination in the previous year. In addition, scores are reported which show superior examination results on the computer supported part of the course over that part not assisted by the computer system. While these results could well have been influenced by factors other than the computer managed system, there is some evidence of significant, if somewhat less spectacular, gains from the use of similar techniques elsewhere.

In a study of the use of computer assisted testing in pharmacology at the University of Leeds in the U.K., Tait and Hughes [8] found a gain of 13% in student scores on multiple choice items in the final examination as a result of an average of 9 hours work on such items at the computer. This

study stressed feedback as an important component of the technique as did a study of computers as an aid to the teaching of civil engineering at the Chisholm Institute of Technology in Victoria (see for example [9]). A recent review of the use of computers in teaching tertiary science confirms that their use specifically in testing can produce significant gains in student performance as reported by (see for example [10]).

Statement of Problem

It has been observed that most lectures given to students are not comprehensive and the syllabuses are not covered as a result of the Face Me, I Face You (FMIFY) method of teaching/learning.

In Imo State University as well as some other tertiary institution in Nigeria, considerable pressure is on the lecturer to deliver an efficient and effective teaching/learning process. However, constraints on staffing, which affects many universities in Nigeria in general and Imo State University in particular have meant that resources devoted to teaching have been severely stretched.

This paper therefore seeks to investigate whether the CMI has made any significant impact on the teaching/learning process.

Computer Assisted Instruction (CAI)

According to Microsoft Encarta [4], Computer Assisted Instruction (CAI) Terminology, the use of computer in education is referred by many names such as:

• Computer Assisted Instruction (CAI) • Computer Aided Instruction (CAI) • Computer Assisted Learning (CAL) • Computer Based Education (CBE) • Computer Based Instruction (CBI) • Computer Enriched Instruction (CEI) and • Computer Managed Instruction (CMI). This has culminated into New Terminologies of:

• Web Based Training • Web Based Learning and • Web Based Instruction.

Computer-based education (CBE) and computer-based instruction (CBI) are the broadest terms and can refer to virtually any kind of computer use in educational settings. Computer-Assisted Instruction (CAI) Computer Aided Instruction (CAI) is a narrower term and most often refers to drill-and-practice, tutorial, or simulation activities. CAI programs use tutorials, drill and practice, simulation, and problem solving approaches to present topics, and they test the student's understanding.

Typical CAI provides: (a) Text or multimedia content (b) Multiple-choice questions (c) Problems (d) Immediate feedback (e) Notes on incorrect responses (f) Summarizes students' performance (g) Exercises for practice and (h) Worksheets and tests.

Sabarish [2], pointed out four areas of computer management support to teachers as follows:

a. Constructing, scoring, and analysing tests.

b. Keeping records of student performance and progress through courses.

c. Providing guidance to students and advising them on the choice of next course module.

d. Reporting on the performance and progress of students to individual students, tutors and educational

administrators of the institutions.

Educational Softwares

According to Wikipedia [1], the free encyclopedia, educational software is a computer software whose primary purpose is teaching or self learning. Classifying these educational Softwares accordingly, we have as follows:

Science: Science Sleuths

Programming: (i) BlueJ (ii) Racket (iii) RoboMind (iv) Scratch (v) Hackety Hack etc.

Simulation: (i) Capitalism (ii) Caesar titles (iii) Civilization (iv) Colonization (v) Simcity etc

Touch-Typing Instruction: (i) Mavis Beacon Teaches Typing (ii) Mario Teaches Typing (iii)Tux Typing

Visual Learning and Mind Mapping: (i) CMAP – Concept map program (ii) Inspiration (iii) Kidspiration etc

Mathematics: (i) Matlab (ii) Mathematica (iii) Accelerated Math (iv) Compu-Math: Fractions (v) Geogebra etc

Dictionaries and reference: (i) Encarta (ii) Britannica (iii) Encyclopædia Britannica Ultimate Reference Suite etc.

Managed learning environments: (i) ATutor (GPL) (ii) Blackboard Inc. (iii) Chamilo (iv) Claroline

(v) eCollege etc.

Research Methodology

The survey research design was used in the study. The population consisted students (Computer and non Computer) and Admin Staff of the Imo State University. The sample size was 2000 respondents. Respondents were selected using a combination of a cluster, purposive and available sampling method. Data were analyzed descriptively using simple percentage results of frequency counts. The Weighted Mean method was used to analyse the questionnaire using Summated or Likert – Type Rating Scale.

Research Questions

1. How would the acquisition of this technology improve and make a difference in the teaching/learning process?
2. Is there any benefit derived from these Softwares?
3. What is the impact of such tools on transfer of knowledge to users?
4. Are these Softwares effective in teaching/learning process?

The first research question was posed to ascertain if actually the students are aware that such educational Softwares exist and their effect in the teaching/learning process. It was anticipated that where they don't exist, then a negative influence would have been established but where the reverse was the case, a positive influence would have been empirically substantiated. The second question was to ascertain benefits derived from the existing software which the students use. Question three tests whether these Softwares enhance the learning process, otherwise, no need for same. Similarly, questions four was to find if there is a significant impact of this educational software in the learning process. It was anticipated that where the results show that there is no significant impact, then a negative influence would have been established but if otherwise a positive influence would have been empirically substantiated.

Measuring Instrument

This impact study used the questionnaire since the sample size was large and covered most departments in Imo State University. A 5 – item questionnaire, containing closing end options used after a pilot study in the university confirmed reliability and validity of measuring instrument.

The Questionnaire

1. Does the application of CMI technology improve and make a difference in the teaching and learning process? (a)Strongly Agree (b) Agree (c) Strongly Disagree (d) Disagree (e) Undecided
2. Do you think staff and students actually benefit from this innovation?
 (a)Strongly Agree (b) Agree (c) Strongly Disagree (d) Disagree (e) Undecided
3. Is there any significant impact of Educational software on transfer of knowledge to users?
 (a)Strongly Agree (b) Agree (c) Strongly Disagree (d) Disagree (e) Undecided
4. Do the students understand faster and better using CMI tools than the conventional classroom Face me, I Face you method of learning?
 (a)Strongly Agree (b) Agree (c) Strongly Disagree (d) Disagree (e) Undecided

Data Presentation and Analysis

The obtained field data were tabulated and the Weighted Mean was applied as the inferential statistical method, to answer the research questions and test the research hypotheses using

the Summated or Likert – Type Rating Scale. Nworgu [11], is of the opinion that the construction of this scale entails generating a list of statement about what is being measured and providing a set of graduated response option. The valid copies of the completed questionnaires from 2000 produced and distributed to the respondents were collated, classified and categorized. The data obtained were analysed and discussed. Data collected in respect of the four research questions are shown in the tables 1 – 4 below. Using this set of graduated responses options, an individual is expected to indicate his degree of agreement or disagreement with the statements. These responses are weighted (i.e assigned numerical values) and by summing up an individual response to all the statements, a total score is obtained. This total score then provides an estimate of that persons standing on the variable or attribute being measured.

The response options or categories are weighted or scored in such a way that a higher value indicates a more positive/intense response or attitude. Thus, in this article, the options are weighted or scored as follows: Strongly Agreed (SA) = 5, Agreed (A) = 4, Strongly Disagreed (SD) = 3, Disagreed (D) = 2 and Undecided (U) = 1.

In this study the total percentage values and mean of the observed frequency were calculated.

The Weighted Mean is given by
$$X_w = \frac{\sum_{i=1}^{n}(f_i w_i)}{\sum_{i=1}^{n} w_i} \quad \ldots\ldots\ldots\ldots 1$$

Where:

    f_i = frequency of the responses

    w_i = The Weighted Mean of the responses, i = 1, 2, 3, ... m

Table 1: Distribution of respondents by the effectiveness of the software in the teaching/learning process.

Response	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided	Total
Observed Frequency	1092	600	100	114	78	1984
%	55.04	30.24	5.04	5.75	3.93	100

Source: Field Survey 2015

Table 2: Distribution of respondents by the benefits derived from the software.

Response	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided	Total
Observed Frequency	1117	572	100	94	101	1984
%	56.30	28.83	5.04	4.74	5.09	100

Source: Field Survey 2015

Table 3: Distribution of respondents by the level of improvement on the acquisition of this technology in the teaching/learning process.

Response	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided	Total
Observed Frequency	1089	620	80	105	90	1984
%	54.89	31.25	4.03	5.29	4.54	100

Source: Field Survey 2015

Table 4: Distribution of respondents by the impact of CMI tools on transfer of knowledge

Response	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided	Total
Observed Frequency	1099	600	80	105	100	1984

%	55.39	30.24	4.03	5.29	5.04	100

Source: Field Survey 2015

Answering Research Questions

Research question 1 was answered through the use of Item 1 in the questionnaire; "Does the application of CMI technology improve and make a difference in the teaching/teaching process? The result of the study was shown in table1. The table shows that out of 1984 respondents 1092 (55.04%) Strongly Agreed, 600 (30.24%) Agreed, 100(5.04%) Strongly Disagreed, 114 (5.75%) Disagreed, 78 (3.93%) were Undecided that the application of CMI technology bring about in teaching/learning process as shown in Table 1.

In research question 2, which was answered using Item 2 in the questionnaire "Do you think staff and students actually benefit from this innovation?", 1117(56.30%) Strongly Agreed, 572 (28.83%) Agreed 100(5.04%) Strongly Disagreed, 94(4.74%) Disagreed and 101(5.09%) were Undecided that users benefit from that innovation as shown in Table 2.

Similarly the research questions 3 and 4 were answered with the use of Items 3 and 4 in the questionnaire as shown in Tables 3 and 4 respectively.

Table 5: Summary of the Results.

Research Questions	Weighted Mean Xw	Remarks
1	4.3	Agreed
2	4.3	Agreed
3	4.3	Agreed
4	4.3	Agreed

Decisions: For all the research questions posed to the respondents as regards the respective Subject matter, they were in agreement to the research question raised. That is they all agreed that:

1. Computer Managed Instruction is effective in teaching and learning process.

2. Both Staff and Students benefit this innovative.
3. There is significant impact of this Educational software on Knowledge transfer of users.
4. Students and users understand faster and better using CMI tool than Conventional classroom Face me, I Face you method of learning.

Discussion of Findings

The study found that there is a significant relationship between CMI oriented method of teaching/learning process than the non CMI oriented method of teaching/learning, This result is confirmed by the use of Educational Softwares like science sleuths, Bluej, Capitalism, Caeser titles, Matlab, Mathematica, Atietor, Encarter, etc. It also shows that CMI tools facilitates communication among students, between students and instructors and beyond the classroom students, instructors and experts. The CMI is an effective aid in teaching/learning process. CMI encourages teaching and tracking process in which the learning environment is enhanced by the use of computer.

Conclusion

The computer managed instruction is the label **for** a broad category of computer based tool applications designed to assist the teacher or school administration in the management of the instructional process. Good instructional management decisions are based on accurate and up to date information on the performance and progress of each student. Applications of computer managed instruction can be used to gather data, store, update, retrieve, analyze, and report such information. Most computer managed instruction applications are special -purpose data management tools. Applications of computer managed instruction vary from simple student

grade record book programmes to sophisticated diagnostic and prescriptive systems.

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