Digital Instructional Delivery Modes and Teacher-Trainees' Microteaching Performance at the University of Uyo, Uyo, Nigeria

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ABSTRACT

This study investigated the effectiveness and general acceptability of virtual, digital and conventional face- to-face lectures. These three delivery modes were compared when increasingly deeper learning was required based on Bloom's revised taxonomy of cognitive learning (Anderson and Krathwohl, 2001). In addition, participants' general acceptability of electronic lectures was considered where 515 third - year teacher-trainees at the University of Uyo, Uyo, Nigeria participated in the study during the 2013/2014 academic session. These were randomly split into three groups and taught three topics: Set induction, Use of examples and Questioning skills from the course coded and titled Education 312/Educational Technology respectively. Groups 1, 2 and 3 were taught using virtual, electronic and conventional face-to-face delivery modes respectively. Results showed no significant effectiveness of either of the delivery modes when all question types was collectively taken. There were however significant differences at different levels of Bloom's revised taxonomy of the cognitive domain. General questions on remembering achieved the highest scores consistently. This was followed by analysing, understanding, evaluating and applying. Participants in the conventional face-to-face lecture group achieved significantly lower scores for understanding. Those in the virtual lecture group scored high in remembering, understanding and applying though they were significantly lower in analysing and evaluating. Those in the electronic groups scored high in remembering and had the median scores in all other levels except evaluating. Analysis of the questionnaire showed that the respondents preferred traditional or conventional face-to-face lectures to the electronic based ones, though they were appreciative of the advantages of the latter. It was reasoned that the preference for the conventional mode may have been as a result of the absence of a widespread use of technologies in the society. It was therefore suggested among others that the general society should be encouraged to undertake the establishment of centres of educational technology to improve technology use in the society that will filter in the school system.

INTRODUCTION

The teacher has often been seen as the second most important factor after the learner in the education industry. This prime position of the teacher is justified by the prominent roles he plays in the execution of curriculum activities geared towards the realisation of the dreams and aspirations of the society that normally establishes the schools to further its aspirations. It is in furtherance of this view that the National Policy on Education of the

Federal Republic of Nigeria (2013) asserts that no education system can rise above the quality of the teachers and only professionally qualified and registered teachers shall be allowed to practice at all levels . Suffice it to say that the solid foundation to be laid for the desired high quality of teachers for education should be at the pre-service phase and continued progressively into post-service learning. The poor quality and quantity of teachers in the Nigeria educational system has often been referred to as the cause of the dwindling level of performance of learners at the various tiers of schooling. In fact, the teacher has been held responsible for all the woos of the education edifice in Nigeria. For instance, excerpts from the UNESCO (2014) report on teaching and learning shows that Nigeria has some of the worst education indicators in the world as she is among 37 countries that are losing money being spent in education as children in schools are not learning. Thus Nigeria loses 129 billion Dollars annually. This report is collaborated by Haddad (2004) and Omenazu (2014) who affirm that Nigeria has the least number of qualified teachers as 212,000 teachers are needed by this year 2015 (representing 13% of global total) which cannot even be filled by 2030. It also notes that teacher/pupil ratio is small due to low enrolment of pupils as only $\frac{2}{3}$ have minimum teaching qualifications. In certain states such as Kano, the teacher/pupil ratio was 1:100 during the 2009/2010 school year. The remote areas had 1:150 in 25% of the schools.

Perhaps to curb some of these shortcomings the National Policy on Education (2013) provides that all teachers shall be professionally trained for all levels of education. Those institutions charged with this responsibility include Colleges of Education, Schools of Education in the Polytechnics, Institutes and Faculties of Education in the Universities, etc. Each of these institutions is charged with the responsibility of producing highly conscientious, efficient, effective and motivated teachers for all levels of schooling.

The Faculty of Education, University of Uyo, Uyo – Nigeria has seven departments offering courses for the award of the Bachelor's Degree in Education in areas such as Arts, Science, Vocational/Technical education, social sciences and languages (B. A. (Ed.), B. Sc. (Ed) and B. Ed.). There are core or mandatory courses as well as required and elective courses for all candidates to register for and pass before qualifying for graduation. One of such core/mandatory courses is Educational Technology Coded Education 312 offered at the third year of the four-year programme prior to their engagement in the mandatory Teaching Practice. The crux of the course is the exposure of the student-teachers to the functional skills of teaching which include among others set induction, stimulus variation, use of examples, planned repetition, questioning, non-verbal communication, class management skills and lesson closure.

The University of Uyo, Nigeria like her counterparts nationwide suffers from acute shortage of infrastructure such as lecture theatres equipped with gadgets for large groups of students. This inadequacy has tended to frustrate the smooth teaching of the course to students who have always been in hundreds each year. Solace however came with the successful establishment of a modern micro-teaching laboratory in the Faculty of Education recently. The laboratory is equipped with modern communication gadgets and is linked to the university central internet- UNIUYO HOTSPOT. Lectures in this laboratory can either be relayed to other classrooms to be viewed simultaneously or recorded, downloaded to be played back at convenient times by students. As a pilot study, the 515 year- three students who registered for the course during the 2013/2014 school year were randomly split into three groups and assigned into virtual, electronic and conventional face-to-face instructional modes respectively. These three groups were taught three topics of set induction, use of examples and questioning microteaching skills.

The grouping of instructional delivery modes and their corresponding topics are as indicated in Table 1.

Table 1: Instructional delivery modes with corresponding topics and groups.

GROUPS	TOPIC 1 (SET INDUCTION)	TOPIC 2 (USE OF EXAMPLES)	TOPIC 3 (QUESTIONING)
Group A	Virtual lectures	e-lectures	Face-to-face
Group B	e-lectures	Face-to-face	virtual lectures
Group C	Face-to-face	Virtual lectures	e-lectures

Each of the groups was taught by a team of three professional teachers for a period of three weeks made up of a time duration of two hours per period.

To ascertain the efficacy of the two digital delivery modes (virtual lectures and e-lectures) as compared to the conventional face- to- face lectures, all the teacher –trainees responded to the same paper-based assessment test (Microteaching –Achievement Test) comprised of thirty multiple choice (five options) questions. Topics one, two and three were covered in the question ranges of 1- 10; 11- 20 and 21- 30 respectively. Each block of ten questions tested in an increasing order the form of learning from the lowest level of remembering to the highest level of creating (Anderson and Krathwol, 2001). This implies that while questions 1, 2, 11, 12, 21 and 22 tested remembering by simple single word response of factual recall questions, items 3, 4, 13, 14, 23 and 24 took care of their understanding by use of assertion questions. Questions 5, 6, 15, 16, 25 and 26 assessed their applying by questions requesting them to interpret unfamiliar concepts to the skills presented in the lecture. Analysing skill was tested with questions 7, 8, 17, 18 27 and 28. Questions 9, 10, 19 20, 29 and 30 tested the teacher trainees' creative skills by giving them a statement related to microteaching and asking them to give their opinion of what a reasonable teacher would do in such an instance. The Digital Instructional Delivery Mode Questionnaire (DIDMQ) was used to qualitatively determine the teacher–trainees' assessment of the delivery modes. It was segmented into three parts with the initial one investigating the respondent's previous computing experiences. The second and third parts asked respondents to simply order their preferred instructional delivery modes and state their opinions on which of these modes most effectively promotes learning. They were to indicate their opinions on a five point rating scale of "Strongly Agree", "Agree", "Neutral" "Disagree and   Strongly Disagree". Data collected were treated using the Statistical Package for Social Sciences (SPSS) for Windows, Release 17.00 (SPSS, INC). A mixed model Analysis of Variance (ANOVA) was applied to determine the relationship between the teacher-trainee's assessment scores on the microteaching achievement test, the groups, question sets and instructional delivery modes. To ascertain the increasingly deeper levels of learning, the teacher-trainee's t-test was employed.

Results: The results of the analysis of the microteaching achievement test by the three groups and all three topics are as contained in Table 2.

Table 2: Summary of the mean achievement of teacher-trainees, on all three topics and groups.

GROUP	QUESTIONS 1-10 (T1)	QUESTIONS 4-20 (T2)	QUESTIONS 21-30 (T3)	MEAN FOR GROUP
Group A	79.15	64.48	65.00	69.5
Group B	72.48	61.05	58.20	63.91
Group C	79.48	64.48	57.24	67.04
Mean for topics	77.03	62.03	60.18	

Regarding the topics (T1-T3), teacher-trainees engaged with topic one performed significantly higher irrespective of delivery modes with an overall mean percentage of 77.03% meaning that set induction was the easiest topic. Their performance in topics 2 and 3 were relatively alike. Table 2 also shows that overall results across groups were the same as Group A recorded a mean overall score of 69.5%, closely followed by Group C (67.142%), and finally Group B (63.91%). There was however no significant difference between the groups, implying that there was any evidence of higher academic ability of any group over the others.

Performance at Increasingly Higher Levels of Learning: The results of scores secured based on higher levels of the revised version of Bloom's taxonomy of comparative learning (Anderson et al, 2001), is as reflected in table 3.

Table 3: Summary of performance scores based on revised Bloom's levels of learning (Increasingly higher levels of learning - Anderson et al, 2001)

MODES	REMEMBER-ING	UNDERSTAN-DING	APPLYI-NG	ANALYSI-NG	CREATI-NG	TOTAL% MEAN
E-lectures	76.62	62.53	65.19	66.30	52.93	64.71
Virtual Lectures	71.86	73.49	54.20	75.03	55.83	66.08
Face-to-Face	78.11	58.22	62.78	77.46	65.61	68.43
Total % Mean	75.53	64.75	60.72	72.93	58.12	

It can be seen from Table 3 that there were no significant differences in the mean scores of the instructional delivery modes even as conventional face-to-face had (68.43%), followed by Virtual lectures (66.08%) and E-lectures (64.71%). However, regardless of delivery mode, questions or remembering (recall of facts) consistently recorded high scores with a total score of (75.53%) which was significantly greater than the mean scores of other question sets with the exception of analysing type questions. For understanding type of questions, teacher-trainees exposed to conventional face-to-face lectures gained lowest scores (58.22%) as compared to digital delivery modes. The scores of the creating type of questions were however lowest (58.12%).

Analysing the questionnaire (DIDMQ), a total of 502 copies of the Digital Instructional Delivery Mode Questionnaire (DIDMQ) were distributed to the respondents. The questionnaire had four segments with the first part investigating the previous computer-based experience of the respondents. This was followed by questions that required them to simply order their views on which delivery mode enhanced the best learning for them. The third segment had statements likely to be opinions of the respondents as to the probable enhancement of learning by computing in general and the digital instructional modes covered in this study specifically. Their responses were restricted to a three-point rating scale of 'strongly agree', 'neutral' and 'strongly disagree'. The last section requested for unreserved feedback from the respondents. The result is as reflected in Table 4.

Table 4: Teacher-trainees preference of delivery mode in rank order.

Delivery mode in order most preferred to least preferred.	Preferred order of delivery mode	Preferred order that enhanced learning
Face-to-face – Virtual – E-lecture	320	310

Virtual - Face-to-face – E-lecture	60	65
Face-to-face – E-lecture – Virtual	70	75
E-lecture – Face-to-face – Virtual	30	28
E-lecture – Virtual – Face-to-face	12	13
Virtual – E-lecture – Face-to-face	10	11
Total	**502**	**502**

The result as reflected in Table 4 shows that the respondents tended to accept that face-to-face lectures is the one that they most preferred and thought it to be that, which enhanced best learning. This was followed by virtual and e-lectures in the second and third positions respectively.

Analysing segment 3 of the questionnaire as to determine the most preferred instructional delivery mode, the result is as contained in Table 5.

Table 5: Respondent's Preference for Instructional Delivery Mode

S/N	Statement	Strongly Agree		Neutral		Strongly Disagree	
1	Computer-based-learning (CBL) allows me to learn materials the way I like	231	(46%)	166	(33%)	105	(21%)
2	Real lectures and CBL offer the same level of information	80	(15%)	181	(36%)	245	(49%)
3	I feel isolated learning through CBL	296	(59%)	141	(28%)	65	(13%)
4	CBL motivated me more to learn	45	(9%)	166	(33%)	201	(40%)
5	CBL can replace real learning entirely	45	(9%)	35	(7%)	422	(84%)
6	CBL is appealing as it allows me to learn at my own time and place	306	(61%)	131	(26%)	65	(13%)
7	I prefer to learn from real time lectures than from computer programmes	412	(83%)	45	(9%)	45	(9%)
8	I could have learned more if I was computer literate	10	(2%)	141	(28%)	351	(70%)
9	I would prefer real lectures with CBL as a supplementary for revision	472	(94%)	10	(2%)	20	(4%)
10	Learning from computers in boring	13	(26%)	87	(37%)	185	(37%)
11	CBL programmes are easy to use	306	(61%)	110	(22%)	86	(17%)

It is glaring from the results presented in Table 5 that most 412 (83%) of the teacher-trainees preferred to learn from the traditional face-to-face lectures rather than either of the digital modes. Strangely however, 306 (61%) of the respondents felt that the digital approaches were appealing as they could do their studies at their own time, place and pace. Again, the same number 306 (61%) found the use of the digital lecture easy to use. Another 472 (94%) stated that they would prefer to attend real-time lectures and have computer-based ones as supplements for the purpose of revision.

Discussion of findings

Existing literature is replete with advantages of digital learning over conventional face-to-face learning. For instance, it has been established that digital instructional modes can augment students' learning by allowing students to 'rewind' or 'play back' sections of the lecture they feel were not properly grasped initially, also offer greater flexibility and empowers the learners into learning at his most convenient time and place, thus offering a dynamic and interactive environment generally absent in the conventional face-to-face lectures (Greenhalgh, 2001).

It has been established by this study that traditional face-to-face was the most popular of the three instructional strategies, though each was equally effective as reflected in the mean test scores. This result is in consonance with the findings of Derohurst and Williams (1998), Williams, Aubin, Harkin & Coterell (2001) and Maki and Maki (2002). It is however invariance with the results of Tvedten, Walter, Stickle, Hendel & Anderson (1993) and Holt, Miklaszewicz, Cranston, Russel-Jones and Sonksen (2001), whose students valued electronic lectures more than traditional lectures. The results of Susskind (2004) in which traditional lecture was compared with power point multimedia format also presents a parallel report. It was observed that though students thought they would learn equally in electronic and traditional lectures, the test scores in an examination that seemed unrelated to the presence or absence of multimedia delivery did not reflect or support their thoughts.

From these examples, it can be said that there are issues in learning that are group and teacher dependent. Example, a class of learners for which digital learning is a relatively new phenomenon may not be as receptive as that that has been exposed to it far more extensively. In like manner, an entertaining and vibrant teacher may be more popular in the lecture room than in cyberspace, so also, a shy lecturer who mumbles but writes clearly may appeal differently to the learners. In spite of all differing popularity, it is gratifying to note that the overall test scores did not differ significantly by delivering mode.

There are evidences from this study to suggest that different modes of instructional delivery affect different depths of learning as postulated by Bloom's digital or revised taxonomy of cognitive learning. Thus, the significantly different mean scores in specific areas tend to lend support to delivery mode. This may be explained by the difference between the traditional face-to-face and e-lectures on one hand, and the virtual lectures on the other. While the former were dominated by the teacher's voice, the latter had text and interactive activities. The consistent good performance of virtual lectures across three levels of learning (remembering (71.86%), understanding (73.49%) and analysing (75.03%) can be explained in terms of the mode providing a high level of interaction through series of exercises that ensured that students understood the concept. The put- into- practice attribute Race, (2005) absent in the other two delivery modes could have made for their low performance.

Conclusion

It can be deduced from the result of this study that all delivery modes are distinct and potentially effective in enhancing learning. Again, no single strategy is absolute in all situations and with all learners. Thus, the general notion that a wide range of strategies 'real, and 'virtual' be used in instruction sometimes in isolation and in combinations at other times is reinforced and encouraged. This assertion is supported by Riffel and Sibley (2005) who developed a high hybrid course format made up of face-to-face and online lectures in which three hours of lectures per week was replaced by two-thirds of the time with online assignments. The hybrid format was found to be better than the traditional face-to-face as the active learning exercises were more efficient. This paper support this notion with an additional view that based on certain circumstances, different techniques of instruction

(digital or otherwise) may enhance learning in specific settings depending on learners characteristics, content, and depth of learning involved.

Finally, it should be re-emphasised that there are different learning styles and various instructors adopt different instructional techniques, either singlinly or in combination. Hence, the fear for the end to traditional face-to-face mode is not in sight even as the multimedia faceted models are gaining prominence. It is the ardent view of this paper that since the digital instructional models have the potentials of reaching out efficiently and effectively to diverse learners, these should continue to be combined with other formats to achieve the more desired success in the teaching- learning process.

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