

TECHNICAL COMPETENCIES REQUIRED BY AGRICULTURAL SCIENCE TEACHERS FOR EFFECTIVE ADOPTION OF MODERN INSTRUCTIONAL DELIVERY APPROACHES DURING COVID- 19 PANDEMIC

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Abstract

Academic activities were inevitably grounded during COVID-19 world pandemic. In Nigeria for instance, this rendered classroom (face-to-face) instructional delivery approach ineffective. This calls for a more flexible instructional delivery approach that employs the use of ICT. It behooves on teachers to possess technical competencies that will facilitate adoption of these modern instructional delivery approaches that can stand the test of time. Hence the study identified Technical Competencies Required by Agricultural Science Teachers for Effective Adoption of Modern Instructional Delivery Approaches During Covid- 19 Pandemic. Two objectives and two research questions guided the study. The population for the study was 281 and it comprised of 241 teachers of agricultural science and 40 staff of Information/ Communication Technology (ICT) in the selected schools in Benue state. The entire population was used. A purposive sampling technique was employed to select two schools each from the three senatorial zones in Benue state. A 29 item questionnaire- Technical Competencies Required by Teachers for Instructional Delivery Questionnaire (TCRTIDQ) was validated by three experts. Cronbach Alpha method was employed to obtain reliability coefficient of 0.83. The data was analyzed using mean and standard deviation. The study revealed that e-teaching/learning, virtual teaching, podcasting, tele-conferencing and interactive radio teaching are modern instructional delivery approaches. It also revealed that ability to operate computer, browsing the internet, sending and receiving text/ pictures/ sound, participating in video conferencing, burning text/ video on compact discs and uploading text/ sound / pictures/ video on the are the technical competencies required for the modern instructional delivery approaches. It recommended ICT training for teachers adoption of modern instructional delivery approaches identified.

Keywords: Technical Competencies, Teachers, Agricultural Science, Instructional Delivery Approaches, COVID-19 Pandemic.

Introduction

Agricultural science at the secondary school level is passionately concerned with equipping secondary school students with employable skills for establishing and succeeding in various agricultural occupations. Agricultural science as enshrined in the National Policy on Education- Federal Republic of Nigeria- FRN (2014), is provided to impart knowledge, skills and attitude in agriculture to learners (Agbulu&Wever, 2011). According to Phipps, Osborne, Dyer and Ball (2008), Agricultural science is a systematic instruction that prepares secondary school leavers for entry into different agricultural occupations, job creation, entrepreneurship and agricultural literacy. Ekele (2019) noted that Agricultural science equips secondary school students with skills in specific areas of agricultural occupations such as fishery, animal production and crop husbandry. It is nonetheless apt to point out that Agricultural science curriculum emphasis is on competencies in various occupations in agriculture.

The Agricultural science curriculum is structured to cover critical areas of production, protection and economics (Nigerian Educational Research and Development Council-NERDC, 2017). It is on this premise that the objectives of agriculture at secondary school level of education are aimed at; stimulating students interest in agriculture, enabling students acquire basic knowledge and practical skills and preparing students for opportunities in the field of agriculture (Agbulu&Wever, 2011). These objectives as plausible as they seem, are only achievable when the teacher adopts the right instructional delivery approach at a given period to meet the educational needs of learners.

Instructional delivery approach as averred by Onu and Ezhim (2019) is the act of sending information and procedure to be comprehended and adhered to by learners. The authors noted that teachers have the responsibility of carefully selecting the method and technique of handing down learning

experiences to learners using appropriate medium of communication. According to Wordu and Akor (2018) instructional delivery approaches are methods, strategies and techniques that a teacher employs to present his/her subject matter of a lesson to the learners. The instructional delivery approach to be employed by a teacher must be in tandem with stated objectives of the lesson (Buseri & Dorgu 2011).

At the present, the instructional delivery approaches adopted by teachers of Agricultural science at the secondary school level are hinged on classroom instruction, laboratory instruction, supervised instruction and leadership development (Ikeoji, 2017). These instructional delivery approaches employ direct teacher-student interaction, which might not sufficiently meet the educational needs of students at all times especially when classroom instructions are not feasible. Thus, prompting Wombo, Lan and Odoma (2012), to advocate for adoption of modern instructional delivery approaches other than the traditional classroom instruction by the teacher of Agricultural science in the 21st century. These modern instructional delivery approaches include distance teaching-learning through information and communication technology platforms such as e-teaching/ learning, games and simulation, audio and podcasting, interactive television, tele-conferencing and radio teaching programmes. Mahmud (2012) opined that these modern instructional approaches are more likely to facilitate teaching and learning of Agricultural science because they are flexible in terms of place and distance.

Onu and Ezhim (2019) reported that the modern instructional delivery approaches have the prospect of eliminating the difficulty often associated with space and time and over dependence on hard copies (printed materials) in the library. Agbulu and Wever (2011) stated that the evolution of computers and ICT will in no small measures facilitate instructional delivery in Agriculture. Also, Isiaka (2007) reported that there was no statistical difference in learning due to the presentation of medium, whether face-to face classroom teaching learning or face to screen in a distance education setting. The merit of modern approaches is that, it provides an opportunity for the learner to be presented subject matter content even when schools are shutdown.

Agricultural science at the secondary school level will tremendously be promoted with the modern instructional delivery approaches. For instance, students required to master occupational skills in orange budding/ mango grafting or castration of farm animal stand a better chance of watching and practicing as many times as possible until such a particular skill is mastered when PowerPoint or CDs/DVD is used comparable to classroom instruction that often verbalized practical lessons. The proponents of this modern approach have cleared any possible doubt bordering on teacher- student interaction. According to Yenget *et al*, (2010) virtual classroom (a component of e-teaching/learning) has the potency of capturing students attention especially when a teacher employs a high sense of humor. Contributing on the advantages of the modern approaches (e-learning) of instructional delivery, Humphrey and Krols (2010); Arkorrul and Abaido (2014) extolled it's flexible in terms of space and time constraint comparable to face to-face interaction, it increases frankness on the part of learners, and it's as well cost effective and learner centered. Some of the e-learning packages are interactive in nature and have provided avenue for prompt feedback from students queries. The specific time for each content to be learned is also attractive enough to capture students' attention.

The major challenge of modern instructional delivery approach is the expensive production of materials and acquisition of soft/hard wares and cost of training for acquisition of technical competencies in ICT. These technical competencies are required for the teacher to properly package the materials to be learned and for learners to access the materials with ease (Halimatou & Yang, 2014). According to Olojo, Ademumi and Ajibola (2012) for a successful adoption of ICT learning platforms, availability of hardware (computers, iPhones, android), soft ware development, faster connectivity and training are required. Another challenge of this approach is that for students to take part in the lesson, they are required to log in to educational platforms (Krol, 2016). Learners on the other hand must have access to hardware and requisite knowledge to use them for the intended purpose without abuse. Contextually, instructional delivery approach connotes the adoption and utilization of modern instructional delivery approaches by the teacher of agricultural science for sending the subject matter content to students through distance learning using information and communication technology that is time and place friendly. The adoption of modern instructional

delivery approaches can not only ease teaching-learning but mitigate the hindered access to academic activities due to shutdown of schools occasioned by COVID-19 pandemic.

COVID-19 pandemic is a world pneumonia disease outbreak caused by severe acute respiratory syndrome coronavirus-2 (sars-CoV-2) reported to have originated from Wuhan, Hubei province, China in December, 2019. According to Helmy, Fawzy, Elasad, Sobieh, Kenney and Shehata (2020), COVID-19 disease is transmitted between humans through direct contact, aerosol droplets and fecal or oral routes. Its potency to spread very fast has since affected no fewer than 200 countries with 43,031,439 cases and 1,156,034 deaths, Nigeria accounting for 61,930 cases and 1,129 deaths. In an attempt to contain the disease and stop its spread, the Federal Government declared partial or total lockdown of major cities which adversely affected not just socioeconomic life of people but has also shutdown almost all academic activities at all levels of education for over five months. One is not even optimistic if full academic activities will resume any time soon. The implication is that many students can not have access to education and might be motivated by their peers to indulge in social vices since schools have complied to COVID-19 prevention and control protocols put in place by government. The need for adoption of modern instructional delivery approaches capable of engaging students during the COVID-19 is apt. These modern approaches no doubt require the use of ICT which demands specific skills to be efficient in its usage. It is therefore imperative especially for teachers of Agricultural science to possess technical competencies that will equip him to adopt modern instructional delivery approaches and be effective.

Technical competencies relate to knowledge, skills and abilities to fulfill job tasks, duties and responsibilities. In other words, technical competencies are the qualities acquired by using and gaining expertise in performing physical or digital tasks. For successful accomplishment of specific tasks, specific skills are also required. According to Awouter and Jans (2014), for successful e-teaching, teachers are required to possess skills for using hard and soft ware. Also, Bakere, Onah and Okereke (2018) reported that competencies required for the adoption of e-teaching include the ability to open a programme, booting of a computer, creating a document, formatting of CD plate and flash, ability to send text messages, ability to install video conferencing programme among other skills. In the contribution of Halimatou and Yang (2014), acquisition of technical competency is necessary for successful packaging of materials to be learned.

Technical competencies here imply knowledge, skills and abilities possessed by teachers of agricultural science for effectively using hard and soft wares/ ICT for packaging and delivery of instruction to students devoid of face-to-face classroom interaction. It is however sad that despite integration of ICT at secondary school level and emphasis on its relevance, most schools in the state are yet to make significant progress in improving education through this medium due to lack or absence of ICT infrastructure. Consequently, many teachers don't have ICT technical competencies essential for modern instructional delivery approaches required for teaching-learning during COVID-19 pandemic. This is therefore the motivation for the study; Technical Competencies Required by Agricultural Science Teachers for Effective Adoption of Modern Instructional Delivery Approaches during COVID-19 pandemic.

Statement of the Problem

The almost exclusive direct classroom instruction delivery approach seem inadequate in mitigating difficulties faced by the Benue-child (Nigerian students) during COVID-19 pandemic. This is because secondary school level of education is yet to take full advantage of the integration of ICT in its curricular for instruction delivery. In order to overcome challenges of the time, Benue state government is seeking alternative means of developing an e-learning platform for the Benue-child in the lockdown period. The present time obviously indicates how the classroom instructional delivery has failed to stand the test of time. This calls for adoption of modern instructional delivery approaches that make extensive use of ICT. Even if these approaches are to be adopted by teachers, it is expedient for them to possess technical competencies essential to be effective. The delay in adoption of modern instructional delivery approaches is an indication that teachers are deficient in technical competencies in the use of ICT. Hence motivation for the study to identify technical competencies required by Agricultural science teachers for effective adoption of modern instructional delivery approaches during COVID- 19 pandemic.

Aim and Objectives of the Study

The main aim of the study is to identify Technical Competencies Required by Agricultural Science Teachers for Effective Adoption of Modern Instructional Delivery Approaches During Covid- 19 Pandemic. Specifically, the study seeks to;

1. Identify modern instructional delivery approaches for Agricultural science at secondary schools level in Benue state.
2. Ascertain the level of teachers' of agriculture technical competency in adoption of modern instructional delivery approaches for agricultural science in Benue state.

Research Questions

1. What are the modern instructional delivery approaches for agricultural science in Benue state?
2. What are the technical competencies required by teachers of agricultural science for adoption of modern instructional delivery approaches in Benue state?

Research Methodology

The study was conducted in selected secondary schools in Benue state, Nigeria. The design employed for the study was a descriptive survey. The population for the study was 281 subjects. This comprised 241 teachers of agricultural science, 40 Information and Communication Technology (ICT) staff of the selected schools in Benue state. Two secondary schools from each of the three senatorial zones (six in all) were purposively selected for the study. This was to ensure that only secondary schools offering agricultural science with ICT facilities participated in the study. The instrument for the study was a 29 item questionnaire titled; Technical Competencies Required by Teachers for Instructional Delivery Questionnaire (TCRTIDQ). Section 1 of the instrument focused on; Modern instructional delivery approaches, it has 11 items with response options of Strongly Agree (SA= 4), Agree (S= 3), Disagree (D= 2), and Strongly Disagree (SD= 4), section 2 elicited information on technical competencies required by teachers of agricultural science for adoption of modern instructional delivery approaches, it has 18 items with response options of Highly Required (HR=4), Required (R= 3), Slightly Required (SR= 2) and Not Required (NR= 1) and were responded to by teachers of agricultural science and staff of Information and Communication Technology (ICT) of the selected schools. The instrument for data collection was validated by three experts from the Department of Agricultural Education, Federal University of Agriculture, Makurdi. The reliability coefficient of 0.83 for the instrument was obtained using Cronbach Alpha method. Data was collected with the assistance of three research assistants (one from each zone) and analyzed using mean and standard deviation. The benchmark of 2.50 was used. Any item with mean value of 2.50 and above was regarded as being a modern instructional delivery approach or technical competencies required by teachers for the adoption of modern instructional delivery approaches. However any item with mean value below the benchmark was considered as not required.

Results

Research question 1: What are the modern instructional delivery approaches for Agricultural science in Benue state?

Table 1: Mean Responses on Modern instructional delivery approaches for Agricultural science in Benue state.

(n=113)				
S/no	Item statement	Mean	SD	Remark
1.	e-teaching.	3.946	.294	agree
2.	Educational Compact disc (CDs).	2.840	.177	agree
3.	PowerPoint.	3.663	.775	agree
4.	Games and simulation.	3.132	.138	agree
5.	Audio and podcasting.	3.716	.619	agree
6.	Interactive tele-teaching..	3.628	.644	agree
7.	Virtual teaching.	3.876	.465	agree
8.	Tele-conferencing.	3.486	.974	agree
9.	Interactive radio teaching.	3.300	.904	agree
10.	E-mailing.	3.746	.234	agree
11.	Educational blogs.	2.810	.167	agree

SD= standard deviation

The respondents unanimously rated all the eleven items on modern instructional delivery approaches above 2.50 benchmark. This revealed that e-teaching (3.946), the use of educational compact discs (2.840), PowerPoint (3.663) and virtual teaching (3.876) among others are modern instructional delivery approaches.

Research question 2: What is the technical competencies required by teachers of Agricultural science for adoption of modern instructional delivery approaches in Benue state?

Table 2: Mean Responses on Technical competencies required by teachers of Agricultural science for the adoption of modern instructional delivery approaches in Benue state
(n=113).

S/no	Item statement	Mean	SD	Remark
1.	Ability to operate computer/ android phone/ iPhone/ Ipad/ tablet.	3.823	.522	required
2.	Ability to browse the internet using computer/ android phone/ iPhone/ Ipad/ tablet.	3.726	.747	required
3.	Ability to send and receive text/ pictures/ sound / video on social-media.	3.708	.863	required
4.	Ability to participate in video conferencing via skype and zoom among others.	2.522	.965	required
5.	Ability to participate in radio phoning (radio interactive) programme.	3.177	.054	required
6.	Ability to take pictures using computer/ android phone/ iPhone/ Ipad/ tablet.	3.894	.409	required
7.	Ability to record sound (audio) using computer/ android phone/ iPhone/ Ipad/ tablet.	4.000	.000	required
8.	Ability to make a short video using computer/ android phone/ iPhone/ Ipad/ tablet.	3.726	.644	required
9.	Ability to download text/ sound- audio/ pictures/ video using computer/ android phone/ iPhone/ Ipad/ tablet.	3.974	.161	required
10.	Ability to upload text/ sound (audio)/ pictures/ video on the internet using computer/ android phone/ iPhone/ Ipad/ tablet.	3.575	.864	required
11.	Ability to save downloaded text/ sound/ pictures/ video materials.	3.593	.913	required
12.	Ability to prepare PowerPoint slides	2.504	.240	required
13.	Ability to burn text/ video on compact discs (CDs) using computer.	2.606	.284	required
14.	Ability to share information with other internet users using computer/ android phone/ iPhone/ Ipad/ tablet.	3.000	.118	required
15.	Ability to print text material on the internet.	3.460	.973	required
16.	Ability to assess students on the internet.	2.578	.924	required
17.	Ability to upload students scores/ grades on the internet.	3.717	.674	required
18.	Ability to promote students on the internet..	3.310	.846	required

SD= standard deviation

The majority of respondents rated sixteen out of eighteen items above the benchmark of 2.50. This demonstrated that technical competencies required by teachers of Agricultural science for adoption of modern instructional delivery approaches are; skills for operating computer (3.823), taking pictures (3.894), recording audio (4.000), making short video (3.726), downloading (3.974) and uploading materials (3.575) using android phone/ iPhone/ Ipad/ tablet. The study however showed that few respondents lack competencies in preparing PowerPoint slides and burning text/ video on compact discs (CDs) using computer.

Discussion of Findings

Findings (Table 1 above) revealed that e-teaching, educational compact disc (CDs), audio/podcasting and virtual teaching are modern instructional delivery approaches. This is consistent with Sharma (2018) findings that identified CDs, power point, games and simulation, audio and podcasting, interactive television, virtual learning and interactive radio teaching and online packages as modern approaches of instructional delivery. The finding is also in agreement with Wombo, Lan and Odoma (2012) who reported that virtual learning, tele-conferencing and e-learning are the instructional delivery approaches for agricultural education in the 21st century. This finding further agrees with Yeng, Karahoca, Karahoca and Yucel (2010) who reported the potency of virtual classroom (a component of e-teaching/learning) in capturing students attention. This finding is also in agreement with Isiaka (2007) who posited that use of compact discs (CDs/ DVD) and power point gives a learner the freedom for repetition of a concept as many times as possible. The finding further supports the earlier finding by McCombs and Liu (2007) that podcasting delivery approach enhanced learning experiences and was more enjoyable. The implication of this finding lies in the fact that these approaches when adopted have the potency of eliminating the traditional classroom instruction that was obstructed by COVID-19 pandemic and students would have nothing to loss as the modern delivery approaches are attractive and enjoyable. The Problems associated with place and time will be effectively controlled in order to meet the academic needs of the Nigerian-child at all times.

Findings (Table 2 above) on abilities for operating a computer, browsing the internet, participating in video conferencing and burning text material on compact discs (CDs) are congruent with Bakere, Onah and Okereke (2018) who identified competencies for e-teaching to include ability to boot a computer, ability to create a document, format CD and ability to search for information. The finding also supported Halimatou and Yang (2014) assertion that, for a successful adoption of modern instructional delivery, the teacher is required to possess technical competencies to properly package the materials to be learned. The findings are also in agreement with Awouter and Jans (2014) position that for teachers to be effective they must possess skills for using hard and soft ware. The implication of the finding is that, it is only when one possess basic computer and internet skills that he can effectively adopt modern instructional delivery approaches, absence of such skills on the other hand can stall adoption of the approaches. With the advent of ICT and availability of hard and soft ware, secondary schools in Benue state can make extensive use of Information Communication and Technology to ease record keeping and computation of examinations and facilitate adoption of the modern instructional delivery approaches. Where teachers lack these competencies, efforts has to be put in place for capacity building of teachers in the use of ICT for effective adoption of modern instructional delivery approaches.

Conclusion

Findings of the study revealed that e-teaching, use of educational Compact disc (CDs), audio/podcasting, virtual teaching and tele-conferencing are modern instructional delivery approaches to be adopted during COVID-19. It also revealed that abilities required by teachers for the adoption of modern instructional delivery approaches include; ability to operate a computer, ability to browse the internet, ability to participate in video conferencing and ability to burn text material on compact discs (CDs).

Recommendations

Based on these findings, the following recommendations are put forward:

1. Authorities of Secondary schools are advised to adopt the modern instructional delivery approaches such as e-teaching, virtual teaching, PowerPoint, tele-conferencing and interactive radio/ television teaching programmes to mitigate difficulties the shutdown of schools has brought on teaching-learning due to COVID-19. This can be possible when schools acquire the necessary ICT infrastructure.
2. Management of Secondary schools are encouraged to organize a training programme for teachers in order to build their capacity in use of ICT/ hard and soft wares. This can be achieved by using school staff of ICT to train teachers or employing services of experts where the school does not have ICT facilities.

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