

EFFECTS OF COVID-19 PANDEMIC ON THE USE OF INSTRUCTIONAL MATERIALS IN TEACHING AND LEARNING OF MATHEMATICS IN POLYTECHNIC EDUCATION DURING LOCKDOWN IN SOUTHWEST NIGERIA

¹ IBIKUNLE OLAJIDE, ² ELEYOWO ISRAEL OLUSEGUN, ³ OGUNMEFUN OLALEKAN PETER, ³ SOTONWA OLAWALE EMMANUEL, ³ BIYA EMMANUEL BABATUNDE

^{1 2} DEPARTMENT OF STATISTICS, GATEWAY ICT POLYTECHNIC, SAAPADE, OGUN STATE, NIGERIA

³ DEPARTMENT OF COMPUTER SCIENCE, GATEWAY ICT POLYTECHNIC, SAAPADE, OGUN STATE, NIGERIA

Corresponding Author's Email: eleyowo.segun@gmail.com

Abstract:

The study examined the effects of covid-19 on the use of instructional materials in teaching and learning of mathematics in polytechnic education during the covid-19 induced lockdown in south west, Nigeria. As a result of these, a total of five hundred (500) students and fifty (50) Mathematics lecturers were used for the survey from five selected polytechnics in south west, Nigeria. Questionnaires and interview schedule were used for data collection. Descriptive statistics and content analysis were also used in analyzing the quantitative and qualitative data respectively. A frequency table was deployed to present the quantitative data while qualitative data were presented mathematically. The study revealed that 65.3% of lecturers have strong opinion that visual based (34.9%) and audio based (65.3%) instructional materials were used to disseminate mathematics lectures during covid-19 pandemic. Summaries were made and recommendations were proffered on how to improve the use of visual instructional materials in teaching and learning process in schools in order to improve performance in mathematics.

Keywords: Covid-19, Pandemic, Instructional Materials, Mathematics, Students, Teachers.

Introduction

Instructional materials are materials which assist lecturers to make their lessons explicit to learners. They are used to transmit information, ideas and notes to students (Avinieri et al. 2020). Best (2020) opined that instructional materials can be referred to as the widely variety of equipment and materials used for teaching/learning by lecturers to stimulate self-activity on the part of the student. Instructional materials include both visual and audio-visual equipment. Visual equipment are those materials that you see. These include flashcards, posters, charts, textbooks, real objects, models, chalkboard, and so on, while audio-visual materials are those materials that stimulate both the visual (sight) and audio (hearing) senses. Examples are computers, tape recorder, radios, videos, televisions among others. Their importance in the teaching/learning process is not to be over-emphasized. The global education today is facing the biggest problem in which over 185 countries had the spread of Covid-19 pandemic which resulted to closure of over 92% of all primary, secondary and tertiary institutions in the country (Bolarin, 2020). The spread of this disease was so rapid which lead to the closure of schools in 2019/2020 academic session and the transition to online teaching of students was so swift that hardly gave any time to plan and to reflect on potential risks on the opportunities that such a sudden change could bring (El-Seoud et al. 2019). There was sudden change to online learning in Nigeria without any planning. The backbone of online learning was not ready and the curriculum was not designed for such a format. This has created the risk of most of our students becoming passive learners and they seem to be losing interest due to low levels of attention span (Kraemer et al. 2020). Lot of student's population has challenges due to digital divide in some parts of our countries which is under-developed. It could be realized that online learning could be a challenge as it is creating a new set of passive learners (Ngogi et al. 2019). Transition from classroom teaching to online method revealed that not all lecturers are good at it or at least not all were ready for this sudden transition. Thus, most of the lecturers are just conducting lectures on video platform such as Zoom which may not be real online learning in the absence of dedicated online platform designed for the purpose (Nguyen, 2019). There is a risk that in such a situation, learning outcomes may not be achieved and it may be only resulting in engaging the students outside the classroom learning, losses may translate into even long-term problems (Robutti et al. 2019). School closures gives challenges not only to students, lecturers and families but have far impact on economic and society in general. In response to school closures, online teaching platform was used by lecturers to reach learners and limit disruption on education. The role of instructional materials includes to promote meaningful communication, hence effective learning; it ensures retention, thus making learning more permanent; it helps to overcome the limitation of classroom by making the inaccessible accessible, this is especially true of films, filmstrips and so on and they provide a common experience upon which other learning can be developed. They stimulate and motivate students to learn.

The roles of instructional materials in the mathematics classroom

Instructional materials are highly important for teaching and learning of mathematics. The lecturers rely on instructional materials in every aspect of teaching. They need materials for background information on the subjects they are teaching. Some lecturers find

it difficult to express themselves when they enter the classroom therefore they need instructional materials to help them. Lecturers often use instructional materials for lesson planning. These materials are also needed by lecturers to assess the knowledge of their students. Lecturers often assess students by assigning tasks, creating projects and administering examinations. Instructional materials are essential for all these activities (Salamat et al. 2020). These materials can also help lecturers create assignment and project ideas for students. Lecturers are required to use several different methods to assess their students in order to provide the most accurate assessments. Instructional materials often provide innovative and creative ways to assess students' performance. It is hard to imagine any lecturers who is capable of teaching effectively without the use of instructional materials

Effect of instructional materials in teaching and learning process

The age at which children enter primary school today makes the use of instructional materials very expedient. This age between 3 and 9 years falls within Piaget concrete and preoperational stages of intellectual development. However Best (2020) asserted that various devices exist that can be employed to assist in the teaching/learning process especially in the higher institution. Such devices vary from simple locally made to complex and sophisticated instructional media like radio sets, televisions, film trips, projectors, computers, and so on. Some of them are designed and cannot be available in the child's ordinary classroom experience (Ngogi et al. 2019). The teacher's task as a communicator, facilitator, modeling identification of figures, can be supported by a wise use of a variety of instructional materials that expand significantly. Most research findings emphasized the use of instructional materials as aids for effective learning. Kraemar et al. (2000) noted that availability and application of instructional materials is advancement in teaching. He stated that instructional materials do not only help to bring about an enhanced respect for the lecturers knowledge of the subject but instructional materials are important because with them learners have a clear view of what is being taught. It helps in getting attention of the students. With instructional materials the class is more lively and it gives clearer a view point on the topic. Instructional materials help the teacher to teach well as to make the lesson clear and understandable to the students. However, a professionally qualified science lecturer no matter how well trained, would be unable to put his ideas into practice if the school setting lacks the equipment and materials necessary for him or her to translate his/her competence into reality. Thus, science is resource intensive, and in a period of economic recession, it may be very difficult to find some of the electronic gadgets and equipment for the teaching and learning of basic science courses in schools.

Statement of the Problem

The lackadaisical attitude of the students toward online teaching/learning process of mathematics in schools during Covid-19 pandemic has reach such an extreme pitch that every lover of education, growth and development of Nigeria cannot afford to keep mute on the happenings in the automated education. The overwhelming personal observation on the type of students and lecturers found in classes of our higher institution can be better imagined to engage as ones study. This may have struck our students into avoidance of using adequate instructional materials which lead to poor performance in Mathematics. The statements below contributed to the poor performance in teaching/learning process in mathematics in polytechnics/universities in Nigeria as a whole: These statements are: non availability of instructional materials for teaching/learning process in mathematics; lackadaisical attitude of students toward teaching and learning of mathematics; and environmental factors (socio economic background of the students).

Methodology

Research Questions

The following are the research questions formulated in this study;

1. Do your lecturers make use of instructional material during mathematics teaching/ learning process?
2. Do you have laptop or smart phone or any other gadgets to access the materials sent to you online?
3. Do internet facilities in your place good for online teaching/learning process?
4. Do you always have constant supply of electricity in your place?
5. Do you always have mathematics textbooks at home?

The study required questionnaires and interviews with both lecturers and students from the selected polytechnics in southwest, Nigeria. Simple random methods are used in selecting the items. Fifty (50) mathematics lecturers and five hundred (500) students were selected. (5) mathematics lecturers and fifty (50) students from Gateway (ICT) polytechnic, Twelve (12) mathematics lecturers and one hundred and twenty (120) students from Federal polytechnic Ilaro, Seventeen (17) mathematics lecturers and one hundred (100) students from Yaba College of Technology, Lagos, Ten (10) mathematics lecturers and one hundred and forty (140) students from The Polytechnic Ibadan and Six (6) mathematics lecturers and ninety (90) students were selected from Lagos City Polytechnic, Isolo, Lagos for the study. The questionnaires were grouped using descriptive statistics and interview schedule. Descriptive statistics and content analysis were used in analyzing the qualitative and quantitative data respectively. Out of fifty (50) questionnaires sent to mathematics lecturers in the five polytechnic institutions in Southwest, Nigeria, only 47 mathematics respondents were retrieved. A total of five hundred (500) students were used for the study, only 497 questionnaires were retrieved from the respondents. Please note that A = Gateway (5) lecturers, B = Federal poly Ilaro (12) lecturers, C = Yaba Tech Lagos (17) lecturers, D = The Polytechnic Ibadan (10) lecturers and E = Lagos City Polytechnic (6) lecturers.

Results and Discussion

The results of perspective of lecturers on the use of visual and audio instructional materials and perspective of students on using instructional material during Covid-19 pandemic are presented in Tables 1 and 2 respectively.

Table 1: Perspective of lecturers on the use of visual and audio instructional materials.

S/N	Items	Institution	S/A	A	D/A	S/D	% of S/A	% of A	% of D/A	% of S/D
1	I made use of instructional materials to teach the students.	A	0	1	3	1	00.00	20.00	60.00	20.00
		B	2	2	5	3	16.67	16.67	41.67	25.00
		C	2	3	8	4	11.8	17.06	47.06	25.53
		D	1	2	3	4	10.00	20.00	30.00	40.00
		E	0	1	2	2	0.00	20.00	40.00	40.00
2	I have laptops or smart phones to lecture my students.	A	2	2	1	0	40.00	40.00	20.00	0.00
		B	5	4	2	1	41.67	33.33	16.67	8.33
		C	7	5	3	2	41.18	29.41	17.65	11.76
		D	5	3	1	1	50.00	30.00	10.00	10.00
		E	2	3	0	0	40.00	60.00	0.00	0.00
3	I have good internet facilities in my area for all networks to browse and to teach my students.	A	1	0	2	2	20.00	0.00	40.00	40.00
		B	2	2	4	4	16.67	16.67	33.33	33.33
		C	3	2	5	7	17.65	11.74	29.41	41.18
		D	2	2	3	3	20.00	20.00	30.00	30.00
		E	1	1	2	2	20.00	20.00	40.00	40.00
4	I used audio – visual devices to lecture my students.	A	0	1	3	1	0.00	20.00	60.00	20.00
		B	2	2	4	4	16.67	16.67	33.33	33.33
		C	3	2	7	5	17.65	11.76	41.18	29.41
		D	2	2	3	3	20.00	20.00	30.00	30.00
		E	1	1	2	2	20.00	20.00	40.00	40.00

In Table 1, item 1, majority of the mathematics lecturer affirmed that they did not made use of instructional materials to teach their students during online covid-19 pandemic. Item 2 shows that most of the lecturers have smart phone and computer system to lecture their students during the online the online covid-19 pandemic. Item 3 affirmed that some of the lecturers did not have good internet facilities in their area to browse and in item 4, most of the mathematics lecturers strongly agreed that they used audio method of teaching during the online lectures.

Table 2: Perspective of students on using instructional material during Covid-19 pandemic.

S/N	Items	Institution	S/A	A	D/A	S/A	% of S/A	% of A	% of D/A	% of S/A
1	My mathematics lecturers made use of improvised instructional materials during online lectures.	F	4	5	14	27	8.00	10.00	28.00	54.00
		G	10	25	30	64	8.33.	20.83	25.00	54.17.
		H	6	7	27	59	6.06	7.07	27.27	59.60
		I	4	16	40	79	2.88	11.51	28.78	56.83
		J	4	6	25	55	4.44	6.67	27.78	61.11
		TOTAL	24	59	136	284	4.83	11.87	27.36	57.14
2	There were adequate	F	9	7	10	24	18.00	14.00	20.00	48.00
		G	10	11	30	68	8.40	9.24	25.21	57.14

	electronic materials where I did my online lectures.	H	8	6	37	48	8.08	6.06	37.37	40.33
		I	8	12	50	69	5.76	8.63	35.97	53.07
		J	14	16	23	37	15.56	17.78	25.56	41.11
		TOTAL	49	52	150	246	9.86	10.46	30.06	49.50
3	We had adequate mathematics textbooks to consult during Covid-19 pandemic online lectures	F	2	8	8	32	4.00	16.00	16.00	64.00
		G	12	8	32	68	10.08	6.72	26.89	57.14
		H	12	9	49	69	8.63	6.47	35.25	49.64
		I	8	12	32	47	8.08	12.12	32.32	47.47
		J	7	13	23	49	7.78	14.44	25.56	52.22
		TOTAL	41	50	144	265	8.25	10.06	28.97	53.11
4	There were adequate computer systems in my house.	F	4	5	14	27	8.00	10.00	28.00	54.00
		G	10	26	29	64	8.33	21.67	24.17	54.17
		H	6	7	27	59	6.06	7.07	27.27	59.59
		I	9	8	45	77	6.47	5.76	32.37	55.39
		J	7	6	15	52	7.78	6.67	16.67	57.78
		TOTAL	36	52	130	279	7.24	10.46	26.16	56.14
5	Only audio instructional materials have been used to teach	F	30	15	3	2	60.00	30.00	6.00	4.00
		G	77	22	12	8	64.71	18.49	10.08	6.72
		H	61	28	4	6	61.61	28.28	4.04	6.06
		I	81	48	4	6	58.57	34.29	2.86	4.29
		J	44	23	7	6	48.89	25.56	7.78	6.67
		TOTAL	293	136	30	28	58.95	27.70	6.00	5.63
6	My mathematics lecturers used visual instructional material to lecture in the online class	F	7	6	10	27	14.00	12.00	20.00	54.00
		G	16	24	23	47	13.33	20.00	27.50	39.17
		H	18	22	35	45	18.18	22.22	25.35	45.45
		I	16	4	36	83	11.51	2.88	25.90	69.75
		J	14	15	23	38	15.56	16.67	25.56	42.22
		TOTAL	71	71	137	240	14.29	14.29	27.57	48.29
7	Government did not provide free internet facilities to students during online learning	F	28	17	8	7	56.00	34.00	16.00	14.00
		G	68	32	12	8	57.14	26.89	10.08	6.72
		H	54	30	7	9	54.55	30.30	7.07	9.09
		I	69	51	12	8	49.64	36.69	8.63	5.75

		J	37	23	16	14	41.11	25.56	17.77	15.56
		TOTAL	256	153	55	47	51.51	31.16	11.07	9.55
8	There was no constant supply of electricity to power the lectures learning gadgets during online learning.	F	26	14	7	3	52.00	28.00	14.00	6.00
		G	68	32	9	10	57.14	26.89	7.56	8.40
		H	37	48	8	6	37.37	48.48	8.08	6.06
		I	72	47	12	8	51.80	33.81	8.63	5.75
		J	38	22	16	14	42.22	24.44	17.77	15.56
		TOTAL	241	163	52	41	48.49	32.80	10.46	6.88

Please note that, A = Agree; S/A = strongly agree; D = Disagree; S/D = strongly disagree. Also note that F = Gateway (50) students, G = Federal Polytechnic Ilaro (119) students, H = Yaba Tech Lagos (99) students; I = The Polytechnic Ibadan (139) students, J = Lagos City Polytechnic (90) students.

The results of the study in Table 2, item 1 showed that students from the selected institutions strongly believed that their mathematics lecturers did not use improvised instructional materials to teach their students. Item 2 showed that students from the selected institutions did not use adequate electronic materials where they live. In item 3, majority of the students did not have adequate mathematics textbooks to consult during online covid-19 pandemic, similarly item 4 shows majority of the students did not have computer system at home and some of them could not attend online lectures. In item 5, most of the mathematic lecturers only use audio method to teach their students during the pandemic. In item 6, the students in the selected polytechnics affirmed that their mathematics lecturers didn't make use of visual instructional materials to lecturer them during covid-19 pandemic. In addition, in item 7, through the response of the student, stakeholders in education sector did not provide free internet facilities for the students and the lecturers for online teaching during covid-19 pandemic. Item 8 shows that there was no constant supply of electricity to power the computer system, smart phone and other electronic instructional materials that aide teaching and learning processes. Hence, from the study above the analysis revealed that 65.3% of mathematics lecturers have strong opinion that visual based (34.9%) and audio based (65.3%) instructional materials were used to disseminate mathematics lectures during covid-19 pandemic.

Conclusion

Studies confirmed that limited internet connectivity and access to device for online learning (especially in rural areas), compounded by inadequate public support for distance learning, poses challenges. It is essential that education budgets be increased and the schools in need must be financially supported. To help the most vulnerable students, stakeholders in education sector should prioritize by directing much of the funds and resources to schools, particularly if those schools are facing high-poverty and high minority population challenges. Incentives such as scholarship may need to be implemented. Teaching aids and equipment need to be provided to mathematics lecturers, providing further support and social protection to lecturers through salary increase. Mathematics lecturers need to be better equipped to manage a wide range of IT devices in the event of future school closures. Offering short training courses to improve their digital skills will be helpful. The schools should be provided with internet facilities and equipment to allow greater use of blended learning approaches in schools. Based on the findings, stakeholders in education sector should; provide modern and functional mathematics laboratories; provide standard mathematics libraries with modern textbooks; provide enough computer system for both lecturers and students; support the mathematics lecturers and students with free internet facilities; improve on electricity generation (power supply); trained and qualified mathematics lecturers should be employed to each school and those lecturer already employed should be given appropriate short training courses to update their experience. Finally, these problems of poor performance will be solved if all points mentioned above were immediately tackled.

References

Avineri, T.; Lee, H.S.; Tran, D.; Lovett, J.N.; Gibson, T. (2020). Covid-19 and the disruptions of the new normal around the world , Hoyos, V., Eds.; Springer: Cham, Switzerland, pp. 185–200.

Best N. (2020): Teaching online during the covid-19 era: The prospect and the disadvantage, British Educational Research Journal. 14,51-63

Bolarin, T. A. (2020): The History and Development of online lectures. Ibadan: Olu Akin Publishers pg. 96.

El-Seoud, S.A.; Seddiek, N.; Taj-Eddin, I.A.T.F.; Ghenghesh, P.; Nosseir, A. (2019). E-Learning and Students' Motivation: A Research Study on the Effect of E-Learning on Higher Education. *International Journal of Emerging Technologies in Learning (IJET)*, Vol. 9, Issue 4, 20-26. <http://dx.doi.org/10.3991/ijet.v9i4.3465>

Kraemer E.J, Fennema E and Mutemeri K (2020) Covid-19 impact on Mathematics education. Delhi. Booler press.

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- Ngogi, P.A.; Utaya, S.; Astina, I.K. (2019). Increasing Student's Motivation and Geography Learning Outcome Using Active Debate Method Assisted by Ispring Suite. *International Journal Social Sciences and Management*, Vol. 4, Issue-4: 240-247. DOI: 10.3126/ijssm.v4i4.18336.
- Nguyen, V.A. (2019). The Impact of Online Learning Activities on Student Learning Outcome in Blended Learning Course. *Journal of Information & Knowledge Management*, Vol. 16, No. 04. <https://doi.org/10.1142/S021964921750040X>
- Robutti, O.; Aldon, G.; Cusi, A.; Olsher, S.; Panero, M.; Cooper, J.; Carante, P.; Prodromou, T. (2019) Boundary objects in mathematics education and their role across communities of teachers and researchers in interaction. In *International Handbook of Mathematics Teacher Education*, 2nd ed.; Lloyd, G.M., Chapman, O., Eds.; Brill-Sense Publisher: Leiden, The Netherlands, Volume 3, pp.211–240.
- Salamat, L., Ahmad, G., Bakht, I., and Saifi, I. L. (2020). Effects of E-Learning on Students' Academic learning at university Level. *Asian Innovative Journal of Social Sciences and Humanities*, 2(2), 1-12.
- Sari, H. P. (2020). Article with the title "Respond to WHO, Government Declares Corona Outbreak as National Disaster", <https://nasional.kompas.com/read/2020/03/14/21353071/respond-whogovernment-declare-plague-corona-as-national-disaster>. Accessed March 14, 2020.
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