EFFECTS OF INFOGRAPHICS AND INSTRUCTIONAL VIDEOS ON ACADEMIC ACHIEVEMENT IN LANDFORMS CONCEPT AMONG SENIOR SECONDARY SCHOOL STUDENTS IN JIGAWA STATE, NIGERIA

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Abstract

The study investigated the effects of Infographics and instructional videos on academic achievement in land forms concept among senior secondary school students in Jigawa state, Nigeria. Two research objectives, research questions and hypotheses were raised. The study employed quasi experimental and control group design involving pre and post-tests. The population for the study comprised of 3,987 senior secondary school students in the study area. A total number of 158 students from three intact classes of SS II were selected and used as sample of the study. Two schools were selected as the experimental groups, while the other one served as the control group. The instrument used in the study namely Landforms Concept Performance Test (LCPT) was validated by two experts and the reliability coefficient of 0.84 was obtained. Hypotheses were tested using ANOVA and ANCOVA. Findings revealed that significant difference exist in the mean academic performance scores of students taught using Infographics and instructional videos and those taught using lecture method in favor of experimental groups. Findings revealed that significant difference exist between the mean academic performance scores of male and female students taught using same strategies which implies that the strategies are not gender friendly. Based on the findings, the study recommended among others that using Infographics and instructional videos should be used in teaching physical geography particularly landform concept in senior secondary schools and teachers should be encouraged by state ministries of education through training inform of seminars, workshops and adequate monitoring on how to use Infographics and instructional videos and in teaching geography.

Key words: Infographics, Instructional Videos, Academic performance.

Introduction

Geography is a subject that studies natural phenomena, human-environment interactions, and socioeconomic issues (Fitri, Kamarul Zaman & AbdulRashid, 2025). Geography studied location and distribution of phenomena and natural resources on the earth's features. Geography is concerned with the location, spatial and distribution of living and non-living things patterns and relations, regional characteristics of these elements on human life and settlement, the forces that change the Earth's features and processes, preparation of thematic maps for planning and development, analyses of satellite images for various purposes (Lawal, & Salisu, 2023).

The basic understanding of Geography always starts with the study of Physical Geography, which focuses on the Earth in the solar system. The Earth's physical systems like atmosphere, biosphere and geospheres, land forms and processes, working of various

ecosystems, their relationship with one another (Lacy, 2021). It is an integrated study of the Earth's visible natural environment and understanding the characteristics of land, water and climate, geomorphology, land forms of various locations, landscapes, movement of continents and plate tectonics.

Landform according to Stanley (2020) is a feature on the Earth's surface that is part of the terrain. Mountains, hills, plateaus, and plains are the four major types of landforms. Minor landforms include buttes, canyons, valleys, and basins. Lawal and Salisu (2023) revealed that the tectonic plate movement under the Earth can create landforms by pushing up mountains and hills. Erosion by water and wind can wear down land and create landforms like valleys and canyons. Both processes happen over a long period of time, sometimes millions of years. Landforms can exist under water in the form of mountain ranges and basins under the sea. The Mariana Trench, the deepest landform on Earth, is in the South Pacific Ocean.

The teaching of land forms remains an essential component that develops the skills of observation, recording, experimenting and making inferences of geographic data among students (Lawal, & Salisu, 2023).The information obtained from land forms has much relevance on physical and human activities that that make up the physical and biological landscape of the region. Unfortunately, despite the importance of teaching land forms to human and physical activities, many research findings revealed that geography students find geography concepts especially physical geography (land forms concept) difficult and performed poorly in the final examination. Student's performance in physical Geography particularly landform concepts has declined in recent years **(**Lawal, & Salisu, 2023). WAEC as an examination body have outlined some weaknesses resulting to poor performance of students in the final year geography examination. The students' performance in questions related to landforms was relatively not satisfactory in both at the internal and external examination as majority of candidates could not answer correctly which are all questions related to landforms (WAEC chief examiners report, 2024). This consequently generates low academic achievement of geography students.

To address these problems of teaching and learning of geography, some researchers suggest a shift to go beyond conventional teaching approaches in teaching science, technology and mathematics for better academic achievements, retention and interest in secondary schools (Dalladi & Ibrahim 2020). Thus, going beyond conventional teaching approach means adopting the innovative approach like concept mapping, cooperative learning, problems solving, info graphic, among others. Suuprting this, Fitri, Kamarul Zaman, and AbdulRashid (2025) revealed that geography being an interdisciplinary subject, thus, it requires the use of holistic approaches.

Scholars have outlined the strategies for teaching science subject including geography for instance, Dalladi and Ibrahim (2020) revealed the concept mapping strategy among the most effective strategies of teaching because students' cognitive achievement, interest, and retention of weather and climate concepts. Ibrahim (2020) revealed that cooperative learning enhances academic achievement of students in map reading and interpretation concepts of

geography. While Jibril (2020), Gotip, Onuoha and Iorliam (2025) among others recommended the use of info-graphic and instructional videos respectively.

Infographics are an emerging method that is gaining popularity in education. It is now widely used across various sectors (Jaleniauskiene & Kasperiuniene, 2023). Infographics combine text and visual components to provide information in a concise and engaging approach (Gotip, Onuoha, & Iorliam, 2025). In geography education, info-graphics are a useful tool to assist students understands complex concepts like landforms while stimulating their creativity. Fitri, Kamarul Zaman and AbdulRashid (2025) posited that Geography being a subject that studies natural phenomena, human-environment interactions, and socioeconomic issues. It requires the use of effective teaching practices to ensure that students grasp and utilize what they have learned. Infographics offer an appealing method for delivering information via visuals, charts, and illustrations. Utilizing info-graphics enables students to visualize the interconnections among geographical subjects more clearly consequently enhancing their understanding of the subject. Moreover, the incorporation of info-graphics in education provides students with an opportunity to develop both technical and creative skills (Gotip, Onuoha, &, Iorliam, 2025).

Academic performance is the knowledge gained which is assessed by marks by a teacher and or educational goals set by students and teachers to be achieved over a specific period of time. Moya (2020) posited that academic performance is a key feature in education. It is considered to be the center around which the whole education system revolves. Anthony (2018) asserted that students' academic performance serve as bedrock for knowledge acquisition and the development of skills. Thus academic performance of students is the top most priority of all educators. It is therefore a goal that is measured by using continuous assessment or examinations results. Scholars such as Waziri, Yusuf and Muhammad (2023), Gotip, Onuoha, and Iorliam, (2025), and Lawal, et al, (2023) found persistent poor academic performance in geography education, but with the use of info-graphic and instructional videos on students' academic performance could be improved.

Instructional videos are one of the most frequently used media in classrooms (Sthembile & Joseph, 2022).Instructional videos are considered to be powerful learning tools in comparison to static representation because they can present visual and auditory information at the same time (Hong, Pi & Yang, 2018). Instructional videos could induce higher levels of cognitive load because students have to continuously integrate incoming information with previous information that also needs to be maintained in working memory (Van der Meij, 2017). Merkt, Weigand, Heier, and Schwan (2020) posited that it is important that the learner engages in adequate information processing while watching the instructional video. When instructional videos are aligned with the working of the human mind, better learning outcomes are expected (Mayer & Mayer, 2017)

Gender difference on performance in science has been long debated issue. Some studies found male students performing on average, better than female counterpart; some found female performing better than male while others found no significance difference. However, few researchers focused on gender differences in use of info-graphic and

instructional videos in teaching and learning of Geography for instance (Jibril 2020: Gotip, Onuoha, Iorliam 2025) studies revealed significant difference in the achievement of male and female in favor of male.

Statement of the Problem

The achievement of geography students in SSCE over the past few years in the study area has not been impressive. On the various studies cited (Tarisayi, 2022; Waziri, Yusuf & Muhammad, 2023; Gotip, Onuoha, & Iorliam 2025), it was observed that the problems of teaching and learning geography more especially at senior secondary school level still persist. Landforms concept has been identified by the researchers as one the most difficult aspects of geography in which students have been woefully performing .This is evident in the six years analysis of students' achievement in the subject as reported by Chief examiners of West African Examination Council (2020, 2021, 2022, 2023, 2024 and 2025).

However, many instructional approaches have been proffered by psychologist like Bruner, Piaget, Gagne, for improved performance, in science subject. Despite various innovations on the use of effective activity based teaching strategy, the low student's poor performance still persist in geography at secondary school level. To reduce this drawback, the researcher tried to use info-graphic and instructional videos strategy and see its effectiveness toward improving the situation. The problem of the study therefore investigated how effective is info-graphic and instructional videos strategy in improving students' academic performance of landforms in secondary schools of Jigawa state, Nigeria. Also would info-graphic and instructional videos strategy has gender influence on the students' academic performance?

Objectives of the Study

The main objective of this study is to investigate the effects of info-graphic and instructional videos on academic performance in landforms concept among geography students in Jigawa state, Nigeria. In specific terms, the objectives of the study are to determine:

1. The mean achievement scores of senior secondary school geography students in landforms concept when taught using info-graphics and instructional videos strategy and conventional method.
2. The mean achievement scores of male and female senior secondary school geography students in landform concepts when taught using info-graphics and instructional videos.

Research Questions

Based on the stated objectives the following research questions are raised:

1. What is the difference in the mean academic performances scores of students taught landforms concept using info-graphics and instructional videos and those taught with lecture method?
2. What is the difference between the mean academic performance scores of male and female students taught landforms concept using info-graphics and those taught using instructional videos?

Hypotheses

Based on the stated research questions the following null hypotheses were formulated to guide this study:

HO1: There is no significant difference in the mean academic performance scores of students taught landforms concept using info-graphics and instructional videos and those taught using lecture method.

HO2: There is no significant difference in the mean academic performance scores of male and female students taught land forms using info-graphics and those taught using and instructional videos.

Methodology

The study employed a quasi-experimental control group design involving pre-test and post-test for both the experimental and control groups. The population for this study consists of all senior secondary year two (SSII) students offering Geography in Hadejia Zonal Education Quality Assurance. There are sixteen (17) senior secondary schools offering Geography. The schools have a total population of four thousand two hundred and eleven (3,987) students consisting of one thousand nine hundred and ninety (1,890) male students and two thousand two hundred and twenty one (2,096) female students. The sample of this study consisted of a total number of 158 SSII students selected from three public senior secondary schools offering Geography in the study area. Out of this number, 83 are males and the remaining 75 are females. Initially, the schools were selected using purposive sampling technique in consideration of the gender (male and female students) and subsequently employed simple random sampling and assigned to experimental and control groups. An intact class of SSII were used from each school.

The study utilizes one instrument Landform Concept Performance Test (LCPT). The LCPT instrument consists of forty (50) items test adapted from West African Senior School Certificate Examination (WASSCE) conducted by the West African Examination Council (WAEC) from 2024 to 2025. All the 50 questions adapted for this instrument are objective (multiple choice) items in Physical Geography with four options (A-D) out of which only one option is correct for each of the items. The items are based on the topics selected from SS II Geography syllabus relating to landform concepts. Landforms Concept Performance Test (LCPT) was validated by two experts from Geography department, Bayero University Kano state. The instrument was pilot tested at GDSS Gumel. An intact class with total number of (62) SSII Geography students was used for pilot testing the instrument. The students were tested twice with an interval of two weeks using test-retest method. The scores obtained were analyzed using Pearson Product Moment Correlation (PPMC) and 0.84 was established indicating that the instruments was reliable**.**

Results

HO1: There is no significant difference in the mean academic performance scores of students taught landforms concept using info-graphics and instructional videos and those taught using lecture method**.**

Table 1: ANOVA of Performance Scores of the Experimental and Control Group

Grouping	Sum of squares	Df	Mean squares	F	Sig.
Between groups	692.24	2	298.85	35.99	0.01
Within groups	1343,92	156	8.497		
Total	20,035.56	158			

Table 1 presents ANOVA of significant difference between the mean performance scores of geography students taught landform concepts using instructional videos, info-graphics and those taught the same concept using lecture method. From the result, sum of squares between groups is 692.24, sum of squares within groups is1343, 92. F-Value recorded is 35.99 and p-value obtained is 0.01. The P-value is less than alpha value of 0.05, hence there is significant difference. Consequently, null hypothesis which stated that there is no significant difference between the mean academic performance scores of students taught landforms concept using and info-graphics and instructional videos and those taught using lecture method is rejected. To determine the direction of disparity, the researcher run post-hoc test using sheffer and the result is presented in table 2:

Table 2: Shaffer's Post-hoc Test of Direction of Difference Among Groups

1 Grouping	J Grouping	Mean Difference (I-J)	Std Error	Sig	Remarks
instructional Videos	Graphics	1.68061	.60413	.04	*Sig
	lecture Method	4.73899	.56734	.00	*Sig
Graphic	Instructional Videos	-1.68061	.60413	04	*Sig
	Lecture Method	3.08759	.59507	00	*Sig
Lecture method	Instructional Videos	4.73899	.56734	00	*Sig
	Graphics	3.08759	.59507	.00	*Sig

Table 2 present Shaffer's Post-hoc test of direction of differences among groups. The result revealed a significant differences between geography students taught landforms concept using info-graphics and those taught same topic using instructional videos at p=0.00<005. Significant difference also exist between the experimental groups and control groups at P=0.00<0.05

HO2: There is no significant difference in the mean academic performance scores of male and female students taught land forms using Infographics and those taught using and instructional videos

Table 2: Result of ANCOVA of Mean Performance Scores For The Landform Concept Between Male and Female Experimental Groups

source	Type III sum of squares	DF	Mean Square	F-value	P-value	Remarks
Corrected Model	259.978	4	64.827	10.827	0.00	
Intercept	1857.499	1	1857,499	311.398	0.00	
Perfect	131.765	1	131.765	21.874	0.00	
Gender	142.227	3	47.091	7.879	0.00	Significant
Error	541.257	88	5.991			
Total	83979.000	93				

Table 3 presented ANCOVA of significant difference in the academic performance scores of male and female geography taught landforms concept using info-graphics and those taught same topic using instructional video. Result disclosed that the sum of squares of the gender is 142.227, mean square is 47.091, f-value is 7.879 and p-value is 0.00. Since the p-value is less than the alpha value 0.005, therefore, the null hypothesis which stated that there is no significant difference in the mean academic performance scores of male and female students taught land forms using info-graphics and those taught using and instructional videos is here by rejected. Thus, to determine the direction of the disparity, the study run pairwise comparison test of differences in table 4:

Table 4 Pairwise comparison test of differences among groups

(1) Gender	(J Gender	Mean difference (1-J)	Std	Sig
Male exp.1	Female exp,1	257	.715	1.000
.	Male exp, 2	1.810	.715	.082
	Female exp.2	3,057	.723	.000
Female exp.1	Male exp.1	-.257	.715	1.000
	Male exp.2	1.543	.708	.191
	Female exp.2	2.800	.715	.001
Male exp.2	Male exp.1	-1.810	.715	.082

	Female exp.1	-1.543	.708	.191
	Female exp.3	1,257	.715	.494
Female exp.2	Male exp.1	-3,057	.723	.000
	Female exp.2	-2,800	.715	.001
	Male exp.2	-1.257	.715	.494

Table 4 present pairwise comparison test of difference among male and female geography experimental groups the result indicates that male experimental group 1 show no significant difference to female experimental group 1 at p-value 1.00, and male experimental group 2 at p-value 0.082, but shows significant difference to female experimental 2 at p-value 0.00. Then female experimental group 1 shows no significant difference to male experimental group 1 and male experimental group 2 at p-value 0.01. Moreover, male experimental group 2 shows no significant difference to both male and female experimental groups at p-value 0.082, for male experimental group1, then 0.91 for female experimental group 1 and 0.494 for female experimental group 2 respectively. Lastly female experimental II shows significant difference to male and female experimental I at P-value of 0.00 and 0.01 but shows no significant difference to male experimental II at P-value of 0.494. This implies that there is no significant difference between male experimental I, female experimental 1 and male experimental 2 but significant difference only exist between male experimental 1 and female experimental 2 and also between female experimental 1 and female experimental 2.

Discussion of the Findings

The first findings disclose that there is significant difference between the mean performance scores of landforms concept students in the experimental groups and that of control groups. This agreed with finding of Lawal, and Salisu (2023) who conducted a study on the Impact of instructional videos and info-graphics on academic performance in physical geography among senior secondary school students in Katsina state, Nigeria and found a significant difference between the performances of experimental taught with instructional videos and info-graphics groups and control group taught with lecture method. The finding is also in line with Elaldı, and Çifçi (2021) in their study on the effectiveness of using info-graphics on academic achievement and disclosed that info-graphic is an effective teaching strategy.

The second findings indicated a significant difference between the mean performance scores of male and female Geography students of the experimental groups. This finding concur with the finding of Gotip, Onuoha, Iorliam (2025), Elaldı and Çifçi, (2021) and Fitri Md Nor, Kamarul Zaman, and AbdulRashid (2025) who found a significant difference between the mean performance scores of male and female Geography students of the experimental groups.

Conclusion

Based on the findings of this study, the study concluded that info-graphic and instructional videos are effective teaching strategy that could improve student's academic performance better than lecture method. Infographics and instructional videos could also help

to improve male student's academic performance better than female students.

Recommendations

Based on the findings of this study, the researcher recommends that:

1. The use of info-graphic and instructional videos in teaching geography particularly landforms concept in should be encouraged by state ministries of education through training of teachers periodically using seminars and workshops to teachers on how to use instructional videos and Infographics in teaching.
2. The teacher training institutions and professional bodies such as Science Teachers' Association of Nigeria (STAN), National Institute of Teachers (NTI) Nigerian educational research and development council (NERDC) Association of Nigerian Geographers (ANG) to organize a special re-training, workshops, and seminars to Geography teachers on how to use instructional videos and Info-graphic.

References

Anthony, A. (2018). Factors Contributing to Academic Performance of Students in a Junior High

Cameron, C. (2021). Integration of an Information Technology of Graphics Instructions. International Journal of Multidisciplinary Sciences and Engineering. 5 (1), 201-214.

Dalladi, I.I & Ibrahim N.B.K (2020) Effect Of Concept Mapping On Academic achievement in Weather And Climate Concept Among Secondary School Student In Kankia Katsina State. Bayero Journal Of Education in Africa Vol.8 (2) p208-218

Elaldı, Ş. & Çifçi, T. (2021). The effectiveness of using infographics on academic achievement: A meta-analysis and a meta-thematic analysis. *Journal of Pedagogical Research, 5*(4), 92-118. https://doi.org/10.33902/JPR.2021473498

Gotip, N.W, Onuoha, J.C, Iorliam, E.I.V (2025 Effects Of Infographics Instructional Strategy on students' Achievement In Senior Secondary School economics In Pankshin Local Government Area Of Plateau State. International journal of economics education research vol. 4 (1), 2021 website: https://iafee.org/ijeer

Hong, J., Pi, Z., & Yang, J. (2018). Learning Declarative and Procedural Knowledge via Video

Hong, J., Pi, Z., & Yang, J. (2018). Learning Declarative and Procedural Knowledge via Video Lectures: Cognitive Load and Learning Effectiveness. *Innovations in Education and Teaching International, 55(1), 74–81*. Doi: 10.1080/14703297.2016.1237371

Ibe, H. N. (2019). Effects of Guided Inquiry and Expository Teaching Methods on Senior Secondary School Students' Performances in Biology in Imo State. Journal of Education Research and Technical Sciences 2(4), 51-57.

Ibrahim N.B.K & Dalladi II (2020) Effect Of Cooperative Teaching Strategy In Geography Map Reading And Inter pretation Concept On Academic Achievement Among Senior Secondary School Student In Kankia Katsina State. Fudma Journal of Educationasl Foundations Fujef Vol.3 (1) P135-144.

Jinril, S (2021) Effect Of Infographics On Academic Performance Of Senior Secondary School Students In English Language In Katsina State, Nigeria. A Master Theses Submitted

To Department Of Educational Foundations And Curriculum, Faculty Of Education, Ahmadu Bello University Zaria, Nigeria

Lawal, B & Salisu, A (2023) Impact Of Instructional Videos And Infographics On Academic Performance In Physical Geography Among Senior Secondary School Students In Katsina State, Nigeria. Global Scientific Journal GSJ: Volume 11, Issue 9, September 2023, Online: ISSN 2320-9186 www.globalscientificjournal.com

Mayer, R., & Mayer, R. E. (2017). The Cambridge Hand book of Multimedia Learning. New York, NY, US: Cambridge University Press.

Merkt, M., Weigand, S., Heier, A., & Schwan, S. (2020). Learning with Videos vs. Learning with Print: *The Role of Interactive Features. Learning and Instruction, 21, 687–704. Doi:* 10.1016/j.learninstruc.2011.03.004

Mgona, N. S. (2018). Using Video Content in Teaching Geography Among Secondary Schools in Tanzania. Dodoma: *The University of Dodoma*. Doi 20.500.12661/1624

Moya, E. J, (2014). Effects of Fieldwork on Students' Achievement and Interest in Map Readingin Senior Secondary School Geography. Unpublished PhD Thesis Submitted to the Department of Science Education, Faculty of Education, University of Nigeria Nsukka.

Salisu, A. (2022) Laboratories and Sustainable Teaching and Learning Geography among Senior Secondary School Students in Nigeria. *Journal of Educational and Social Research. 2 (4), 55-64*

Stanley, P. (2020). Land Forms Surface of the Earth: National Geographic Science: USA.

Tanzania. Dodoma: The University of Dodoma. Doi 20.500.12661/1624GSJ: Volume 11, Issue 9, September 2023ISSN 2320-9186 2475GSJ©

Tarisayi, K.S. (2022). Using TikTok, memes, and YouTube in the geography classroom, *Journal of Geography Education in Africa* (JoGEA), 5: 125 - 146.

The West African Examination Council. (2024). Regulation and Syllabuses for West Africa SeniorSchool Certificate Examination (WASSCE) Abuja. Federal Government Press.

Van der Meij, H. (2017). Effect of Demonstration Videos in Elementary and Secondary SchoolsStudents in Rotterdam, Netherlands. Journal of Computer Education. 103,312-350. Doi:10.1016/j.compedu.2017.07.00

Waziri, K., Yusuf, A. A. and Muhammad, M. (2023). Effect of Field Trip on Geography Students' Academic Performance in Secondary Schools in Adamawa State, Nigeria. *International Journal of Research in Commerce and Management Studies (IJRCMS)* 5 (4): 75-85