EFFECTS OF GUIDED-DISCOVERY AND YOUTUBE INSTRUCTIONAL STRATEGIES ON PRE-SERVICE TEACHERS' MOTIVATION TOWARDS BIOLOGY LEARNING IN NORTH-CENTRAL, NIGERIA

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Abstract

This study investigated the effect guided-discovery and YouTube instructional strategies on pre-service teachers' motivation towards Biology learning in North-Central states, Nigeria. The research design adopted was a quasi-experimental design. The population was 44,663 pre-service teachers, with a sample size of 102 (48 males and 54 females) pre-service Biology teachers' from two Colleges of Education in North-Central, Nigeria were used for the study. The instruments titled: Guided-Discovery Motivation Questionnaire on Pre-Service Teachers (GDMQPSET) and YouTube Motivation Questionnaire on Pre-Service Teachers (YOTMOQPSET) were used for data collection. The instruments were validated by two experts from Federal University of Technology, Minna. A pilot test was conducted and reliability coefficient of 0.79and 0.84 was obtained respectively for the two instruments using Cronbach Alpha. Data collected were analyzed using mean and standard deviation to answer the research questions while Mann-Whitney U-test was used to test the formulated hypotheses formulated at 0.05 level of significant. It was found that, there was significant difference in the motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after using Guided-Discovery and YouTube Instructional Strategy. It was recommended amongst others that, Biology lecturers in colleges of education should adopt the use of Guided-Discovery and YouTube Instructional Strategies in teaching as they are more effective teaching strategies.

Keywords: Biology pre-service teachers, Guided-Discovery and YouTube Instructional Strategies

Introduction

There are different teaching methods or strategies used in teaching science courses, like chemistry, Physics, Mathematics, Agricultural science and Biology. Biological related courses are one of the science subjects studied at the tertiary level in Nigeria. Ganiyu, *et al.* (2017) defined Biology as a unique branch of natural science, however, like other natural sciences it is concerned with the search for an in-depth understanding of natural phenomena and events. The knowledge of Biology is widely used in all spheres of human life. This is because, Biology plays a significant role in shaping how individuals deal with the various spheres of private, social and civil life (Wibowo & Sadikin, 2019). This is the reason why Biology is classified as a core subject for all students at secondary school level of education in most countries of the world including Nigeria. And most of the time the lecture method is used in delivering instructions to pre-service teachers.

The lecture method is a traditional form of instruction commonly used at colleges and universities, including colleges of education. Here are some characteristics of the lecture method. One-way communication; in a lecture, the instructor delivers information to students in a one-way manner; lectures typically involves a large group of students listening to the instructor speak and few dozen students to hundreds in a lecture hall listening to the

instructor; lectures are usually well-organized and follow a structured outline or plan and the instructor may use visual aids such as slides or hand-outs to supplement the verbal presentation. Other characteristics include; limited students interaction is observed; passive learning and is efficient for conveying content to a large group of students in a relatively short amount of time (Gudu & Jesse, 2023).

Notwithstanding, the lecture method, which is teacher-centered instruction have characterised Biology instruction in Nigeria, especially in the North-central states. This strategy has not been successful in increasing students' motivation, in or comprehension of the subject matter (Kyle, *et al.,* 2021). Thus, the Nigerian tertiary educational system (especially, colleges of education) has attracted public concern and outcry because of the decline in the performance of biology students in public examinations. Several factors such as teaching strategy, coupled with students' attitude, gender biased, nature of the topics, students' learning and studying habits and their level of motivation among others have been attributed to this problem (Tambaya, *et al.*, 2016; Bosco, *et al.,* 2023; Moses, 2016). These factors encourage biology lecturers to resort to only lecture method most of the time; thereby could decrease the students' motivation.

It is in line with this that, the NCE Minimum Standard (2015) specify that biology courses at NCE level shall be taught by careful selection or combination of the following teaching strategies namely; lecture method, practical, project method, field trips and excursions, games and simulations, team teaching, demonstration method, tutorial, concept mapping and Computer Assisted Instruction (CAI), supervised projects of students, guided discovery method, excursion to bio-technological centers, seminar, and online or eLearning. Therefore, by adopting one or two of these teaching methods, could enhance the motivation of students. Apart from the above-mentioned methods of teaching, Information Communication Technology (social media) is used in the classroom. In view of the foregoing, Lazar (2015) asserted that there are different technological platforms that can be used to impact knowledge at all level of education especially in tertiary institutions therefore, there is need for teachers and students to learn how to make use of these technology platform for effective learning and teaching.

Furthermore, the teaching and learning of Biology may also require the adoption of technologies in the classrooms. These are dozens of e-learning platforms that are being used; the Facebook, Whatsapp, Tencent, and YouTube (YouTube, 2017). YouTube is a video sharing service where users can download, upload videos for educational and entertaining for purposes. There are many channels on which YouTube can be used as instructional platform in the educational or classroom environment, which include; Correspondence Courses, Tele-courses, CD-ROM Courses, Online learning, Mobile learning and so no.

YouTube has great impacts on the classroom environment which include: pre-service teachers can download and upload videos; it improves learning of any kind of skills needed and it enables the watching of business and educational career movies. Also, learners who like to learn on their self-regulated learning skills, frequently utilized time management, reviewed material (You and Kang, 2014). It means that learners can study at their own pace and review topics they may not have understood later. Another benefit is that schools that are frequently faced with the challenge of expanding opportunities for students while being faced with a declining budget year after year can adapt the YouTube. It is also good for large introductory courses, and has the potential to significantly reduce instruction expenses/costs in the long run (Bowen, *et al.,* 2014). Therefore, the YouTube platform can be effectively used as Instructional medium for teaching and learning process.

There are different ways to incorporate YouTube Instructional Strategy (YIS) as a supplementary medium in the teaching learning process to improve students' motivational level and one of the ways is in the form of watching videos to understand difficult concepts or topics (where mere oral explanations could not be understood by the students). Habes, *et al.* (2021) argued that YouTube learners could create, use, and share educational videos, contributing to the overall effectiveness and success of teaching and learning. Additionally, they stated that watching YouTube videos enhances children's creativity while studying. It can be used to disseminate notes, tutorials, and presentations; it was very helpful during the COVID-19 pandemic, whereby most teaching and learning was done through YouTube platforms. Therefore, by adopting Guided-Discovery and YouTube Instructions as strategies for teaching and learning in the classroom, it could enhance students' motivation towards Biology in Colleges of Education.

Motivation is a psychological construct which determines student's behaviour towards teaching and learning instruction. According to Motervalli, *et al* (2020) motivation is the process whereby goal-directed activity is instigated and sustained. In simple terms, motivation can be divided into four groups; Extrinsic Motivation (a student being motivated by external source), Intrinsic Motivation (motivation coming from the students themselves). Other forms of it are; Introjected Motivation and Identified Motivation. When students are motivated, it goes a long way to bring about learning and when learning takes place, it promotes good performance. In the research work of Sopian, *et al.* (2022), the Influence Use of Social Media on the Learning Motivation of High School Students; the results obtained showed that the influence of the use of social media by 66% on students' learning motivation and after the direction and instruction increased to 81%. So the existence of social media greatly affects students learning motivation. And with good performances, students' foster positive motivation to learning process.

Statement of problem

Over the years, tertiary institutions in Nigeria have faced various challenges. The school curriculum offers a student-centered teaching-learning approach as students are encouraged to take up the science related subjects including biology, which occupies a unique position in the school curriculum and is central to many science related courses (Momoh, 2017).Poor performance in science subjects in colleges of education has been a serious concern to educationists, business organizations and government at large (NCCE Digest, 2015). This problem has been due to a lot of factors which include unavailability of the needed teaching and learning resources and facilities, absence of incentives and motivation on lecturers so as to increase their efficiency and effectiveness in order to bring about improved performance of students. This performance can also be linked to the method of teaching.

Thus, the increase of poor performance and failures in science courses and Biology in particular in tertiary institutions may lead to a big loss for both individual students whose aim was to continue with higher education and pursue a career, but all of that may be compromised as a results of poor performance in science courses, and this may affect the nation, whose aim is to have professionals in various science fields like medicine, communication, industries, geology, building and construction, just to mention a few, in order to achieve its technological developmental goals (Akbari, *et al.,* 2018). Thus, improvement may occur in the performance of pre-service Biology teachers' if there is shift in method of instruction used in teaching the students from lecture method to innovative strategies like Guided-discovery or YouTube.

Objectives of the Study

The study strived to achieve the following specific objectives by determining the:

1. Effects of Guided-Discovery and YouTube Instructional Strategy on NCE 1 Pre-service Biology teachers' motivation in Invertebrates diversity in North-Central, Nigeria;
2. Effects of the difference in the Mean motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after Using Guided-Discovery and YouTube Instructional Strategy in North-Central, Nigeria.

Research Questions

From the above objectives the following corresponding research questions were raised:

1. What is the difference in the Mean ($\bar{X}$) motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity using Guided-Discovery Instructional Strategy and those taught with YouTube Instructional Strategy among colleges of Education in North-central, Nigeria?
2. What is the difference in the Mean ($\bar{X}$) motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after Using Guided-Discovery and YouTube Instructional Strategy?

Research Hypotheses

For the purpose of the research study, the following null hypotheses were formulated and tested at 0.05 level of significant

HO_1: There is no significant difference in the motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity using Guided-Discovery Instructional Strategy and those taught with YouTube Instructional Strategy among colleges of Education in North-central, Nigeria.

HO_2: There is no significant difference in the motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after using Guided-Discovery and YouTube Instructional Strategy.

Methodology

Quasi- experimental design was research design adopted for this study. The population of the study comprised all the pre-service teachers' in North-central, Nigeria, which Federal Capital Territory (FCT), Kogi, Kwara, Plataeu, Benue, Nasarawa and Niger state. And the target population was NCE 1 pre-service Biology teachers.

The sample size comprises of 102 (48 male and 54 female) pre-service Biology teachers' selected by simple random sampling techniques from the above mentioned colleges of education for 2023/2024 academic session. The research instrument used for data collection was a 5-point like scale questionnaire which consist of Highly Motivated (HM), Motivated (M), Moderately Motivated (MM), Slightly Motivated (SM) and Not Motivated (NM) options. HM = 5, M = 4, MM= 3, SM = 2, NM= 1. The scores are; HM = 5, M = 4, MM = 3, SM =2 and NM = 1 with decision rule of 3.0. Questionnaires titled, Guided-Discovery Motivation Questionnaire on Pre-Service Teachers (GDMQPSET) and YouTube Motivation Questionnaire on Pre-Service Teachers (YOTMOQPSET), with reliability coefficient of 0.79 and 0.84, were used for data collection. The instrument was made up of two sections A and B. Sections A was concerned with bio- data of the students while section B contained 20-items on Guided-Discovery and YouTube Motivation on students' towards the study of Biology. The instrument was validated by two experts from Federal University of Technology, Minna.

Results

Research Question One: What is the difference in the Mean $(\bar{X})$ motivation scores of NCE 1 Pre-service Biology teachers' taught Invertebrates' diversity using Guided-Discovery Instructional Strategy and those taught with YouTube Instructional Strategy? To answer this research question, Mean and Standard Deviation were used and the result presented in Table 1.

Table 1: Mean and Standard Deviation of the Motivation of Pre-service Biology Teachers' Taught Invertebrates Diversity with Guided-Discovery and YouTube Instructional Strategies.

Groups	N	Pre-test	SD	Mean ($\bar{X}$)	SD	Mean Difference
Guide-Discovery	54	9.37	2.382	84.22	7.973	3.22
YouTube	48	9.54	2.449	81.00	6.888	

Table 1, presents the mean and standard deviation of pre-test and motivation scores among pre-service Biology teachers' who learned about invertebrates' diversity through Guided-Discovery and YouTube instructional strategies. For the Guided-Discovery group (N=54), 9.37 (SD = 2.382) in the pre-test and the mean motivation score was 84.22 with a standard deviation of 7.973, while the YouTube group (N=48) had a pre-test mean of 9.54 (SD = 2.449) and mean score of 81.00 with a standard deviation of 6.888. The mean difference between the groups is 3.22, suggesting that pre-service Biology teachers' taught with the Guided-Discovery strategy demonstrated slightly higher motivation compared to those taught with YouTube.

Research Question Two: What is the difference in the Mean $(\bar{X})$ motivation scores of NCE 1 Pre-service Biology teachers' taught Invertebrates' diversity before and after using Guided-Discovery and YouTube Instructional Strategy? To answer this research question, Mean and Standard Deviation were used and the result presented in Table 2.

Table 2: Mean and Standard Deviation of Motivation of NCE 1 Pre-service Biology Teachers' Taught Invertebrates' Diversity Before and After Using Guided-Discovery and YouTube Instructional Strategy.

Group	N	Motivation Before		Motivation After		Mean Difference
		$\bar{X}$	SD	$\bar{X}$	SD	
GDIS	54	72.76	8.351	84.22	7.973	11.46
YouTube	48	75.15	9.972	81.00	6.888	5.85

Table 2 displays the mean and standard deviation of motivation scores for NCE 1 Pre-service Biology teachers' before and after being taught invertebrates' diversity using the Guided-Discovery Instructional Strategy. For the group of 54 participants, the mean motivation score increased from 72.76 (SD = 8.351) before the intervention to 84.22 (SD = 7.973) after using Guided-Discovery, yielding a mean difference of 11.46. Also, the mean and standard deviation of motivation scores for pre-service Biology teachers' taught invertebrates' diversity before and after using the YouTube instructional strategy. The table shows that before the intervention, the mean motivation score was 75.15 with a standard deviation of 9.972, while after the intervention, the mean motivation score increased to 81.00 with a standard deviation of 6.888. This indicates an improvement in motivation, with a mean difference of 5.85, suggesting that the YouTube instructional strategy had a positive effect on the teachers' motivation in learning invertebrates' diversity.

Hypotheses One (HO_1)

HO_1: There is no significant difference in the motivation scores of NCE 1 Pre-service Biology teachers' taught Invertebrates' diversity using Guided-Discovery Instructional Strategy and those taught with YouTube Instructional Strategy among Colleges of Education in North Central, Nigeria. To test the formulated hypothesis, Mann-Whitney U-test was used and the results is presented in Table 3.

Table 3: Summary of Mann-Whitney U-test of the Difference in Motivation of Pre-service teachers taught Invertebrates' Diversity with Guided-Discovery and YouTube Instructional Strategies.

GROUP	N	Mean Rank	Sum of Ranks	U-value	Sig. (2-tailed)
Guided-Discovery	54	58.95	3183.50	893.500	0.01
YouTube	48	43.11	2069.50		

Table 3, presents the results of a Mann-Whitney U-test comparing the motivation of pre-service Biology teachers' taught Invertebrates' Diversity using Guided-Discovery and YouTube instructional strategies. The "Guided-Discovery" group, has a mean rank of 58.95 and a sum of ranks of 3183.50, while the "YouTube" group, has a mean rank of 43.11 and a sum of ranks of 2069.50. The U-value is 893.500, and the p-value (Sig. 2-tailed) is 0.007. Since the p-value is less than the significance level of 0.05, the null hypothesis is rejected, indicating that there is a statistically significant difference in motivation between the two groups.

HO_2: There is no significant difference in the motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after using Guided-Discovery and YouTube Instructional Strategy. To test the formulated hypothesis, Mann-Whitney U-test was used and the result is presented in Table 4.

Table 4: Paired Samples test of the Difference in Motivation of Pre-service Biology teachers' Before and After Using Guided-Discovery Instructional Strategy and YouTube Instructional Strategies.

	N	Mean	SD	df	T	Sig. (2-tailed)
GD MOT BEFORE	54	72.76	72.76	53	-8.017	0.000
GD MOT AFTER	54	84.22	84.22			
YT MOT BEFORE	48	75.15	9.972	47	-3.634	0.001
YT MOT AFTER	48	81.00	6.888			

Discussion of the Findings

The result revealed that there was significant difference in the motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity using Guided-Discovery Instructional Strategy and those taught with YouTube Instructional Strategy. This is in support of the findings of Schulze and Van-Heerden, (2015) and Tokan, and Imakulata, (2019) who investigated the effect of motivation on students' achievement and discovered that motivation plays a vital role in students' achievement. Also, Amrai *et al.* (2014) state that motivational factors play a crucial role in academic achievement, since the academic achievement of students is related to the society's development. Based on these results, it can be argued that the stronger the intrinsic learning motivation, then the better the students' learning behaviour.

Thus, when a student has an inner drive to learn, it could improve such a student's performance academically.

The result was to examine the effects on the difference in the Mean motivation scores of NCE 1 Pre-service Biology teachers taught Invertebrates' diversity before and after been taught using Guided-Discovery and YouTube Instructional Strategies. The finding was in conformity with the findings of Binni and Saidu (2021), Shea and Sherer, (2014), Beck *et al.* (2017) and Jonassen *et al.* (2019) who investigated the effect of motivation scores before and after been taught using Guided-Discovery Instructional Strategy. For the Guided-discovery group, the t-value of -8.017 indicates a significant decrease in motivation scores from before to after using the instructional strategy, with a p-value (Sig. 2-tailed) of 0.000, which is below the conventional alpha level of 0.05, indicating a statistically significant difference in motivation before and after the intervention. Therefore, the null hypothesis is rejected, suggesting that there is a significant difference in the motivation scores of the pre-service teachers before and after using the Guided-Discovery Instructional Strategy. And for the YouTube group, since the t-value of -3.634 and the p-value of 0.001 (less than 0.05) suggest that the difference is statistically significant, leading to the rejection of the null hypothesis and concluding that the YouTube Instructional Strategy significantly increased the motivation of the pre-service Biology teachers'.

Conclusion

1 Pre-service teachers' motivation could influence their academic performance upon usage of guided-discovery instruction in teaching and learning process.

2 YouTube instructional strategy can serve as learning platform to learn sciences specifically biology at students pace.

Recommendations

1 Pre-service teachers' of colleges of education should adopt usage of guided-discovery to improve on the concept that is difficult to learners.

2 YouTube instructional strategy should be used in teaching and learning of biology in colleges of education in North-Central, Nigeria.

References

Akbari, E., Eghtesad, S., & Simons, R. (2018). Students' attitude towards the use of social media for learning. Retrieved on 3-12-2012 from http://conference.pixel-online.net/ICT4LL2012...

Amrai, K., Motlagh, S. E, Zalani, H. A. & Parhon, H. (2015). The relationship between academic motivation and academic achievement students. *Procedia Social and Behavioral Sciences*, 15:399–402. https://doi.org/10.1016/j.sbspro.2011.03.111

Baharundin, H., & Khodari, S. N. T. (2022). The use of youtube motivates students in improving their arabic listening skills. *International Journal of Academic Research in Business and Social Sciences. 12(6),* 1152 – 1164.

Beck, R. J., King, A., & Marshall, S. K. (2017). Video case construction and pre service teacher's observations. *Journal of Experimental Education,* 70(4), 345-362.

Binni, D. B., & Saidu, A. (2021). Impact of youtube based instruction on students' achievement and retention in school workshop management in colleges of education in North-central, Nigeria. *The International Journal Of Science & Technoledge,* 9(4) DOI No.: 10.24940/theijst/2021/v9/i4/ST2104-017.

Bosco, N. J., Ntawiha, P., & Alexis, A. (2023). Factors contributing to students' academic performance in biology state examination at upper secondary schools in Gitega Commune, Gitega Province in Burundi, *Universal Journal Of Educational Research* , Vol. 2, (3). *Www.Ujer.Org*

Bowen, W. G., Chingos, M. M., Lack, K. A., & Nygren, T. I. (2014). Interactive learning online at public universities: Evidence from a Six-Campus randomized trial. *Journal of Policy Analysis & Management, 33*(1), 94-111.doi: 10.1002/pam2178

Dajal, R. G., & Mohammed, & A., U. (2019). Effects of guided discovery method on students' attitude to, and achievement in biology in senior secondary schools, bauchi State. *International Journal of Research and Scientific Innovation*, (*IJRSI*) 6(7), 105-110.

Ganiyu, B., Adegboye, M. C., & Abimbola, I. O.(2017). Conceptions of the nature of biology held by senior secondary school biology teachers in Ilorin, Kwara State, Nigeria. *MOJES, Malaysian Online Journal of Educational Sciences*, 5 (3).

Gudu, B. O., & Jesse, N. W. (2023). Teaching methods and strategies in learner's motivation in English language lectures in higher education in Kenya. American Journal of Education and Practice. 7 (1): 36-60. Doi:10.476/ajep.1344

Habes, M., Elareshi, M., & Ziani, A. (2021). An empirical approach to understanding students' academic performance: YouTube for learning during the Covid-19 pandemic. *Journal on Linguistics Antverp*, 1518-1534.

Jonassen, D. H., Peck, K. L., & Wilson, B. G. (2019). Learning with technology: A constructivist perspective. Upper Saddle River, NJ: Prentice hall.

Kpolovie, P.J (2010), *Advance research methods*. Owerri : Springfield publishers

Kyle, R. M., Kaplan A., Michael, J. B., Jennifer, C., Cromely J., Tony, P., & Ting, D. (2021). How instructors can enhance Biology students' motivation, learning and grade through brief relevance writing and worked-example interventions. *American Journal of Microbiology,* 2 (2), 65-68. www. Journals.asm.org

Lazar, S. (2015).The importance of educational technology in teaching. *International Journal of English, (IJE)*. 12, 1-5.

Momoh, I. A. (2017). Guide to curriculum studies and instruction. Published by Joyce Graphic Printers and publishers V.V. 16, Nassarawa Road, off Lagos Street/ City House Kaduna Nigeria.

Moses, A. (2016). Academic performance in biology at secondary school certificate examination (SSCE) and the Influencing Factors among Students in Owerri Municipal of Imo State, Nigeria. *International Journal of Education and Evaluation, 2(1), 110.*

Motervalli, S., Perveen, A. & Tresa, M. (2020). Motivating students to learn: An overview of literature in educational Psychology. *International Journal of Academic Research in Progressive Education and Development.* 9(3) Doi: 10.6007/IJRPED/v9-i3/7779.

National Commission for Colleges of Education (2015). *Nigeria Certificate in Education Minimum Standard for Arts and Social Sciences Education.* NERDC Press.

Schulze, S., & Van Heerden, M. (2015). Learning ernvironments matter: Identifying Influences on The Motivation To Learn Science. *South African Journal of Education*, 35(2). https://doi.org/10.15700/saje.v35n2a1058

Sopian, A., Nandiyanto, A. B. D., Kurniawan, T., & Bilad, M. R. (2022). The influence use of social media on the learning motivation of high school students. *Indonesian Journal of Multidisciplinary Research,* 2(1), 137-142.

Tababaya, S. I., Sabitu, A., & Magaji, Y. M. (2016). Comparative analysis of gender performances in biology, chemistry and physics among pre-degree students of Federal University Dutsinma. *International Journal of Educational Benchmark (IJEB),* 5(1), 109-117.

Tokan, M. K., & Imakulata, M. M. (2019). The effect of motivation and learning behaviour on student achievement. *South African Journal of Education*, 39, (1). https://doi.org/10.15700/saje.v39n1a1510

Wibowo, Y. G. & Sadikin, A. (2019). The role of transformation of biology science and education for supporting sustainable development goals. Doi:10.20944/preprints201904.0251.v1

You, J. W., & Kang, M. (2014) The role of academic emotions in the relationship between perceived academic control and self-regulated learning in online learning. *Computers & Education, 77*, 125-133.

YouTube (2017). About youTube. Retrieved June 24, 2023, from https://www.youtube.com/yt/about/