



## Performance and students' effectiveness in genetics using two teaching methods

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### Abstract

This study is a comparison of students performance taught genetics using Youtube instructional method and demonstration approach. Quasi-experimental design was adopted using purposive sampling technique to select two schools, one experimental and one control groups. The population of the study was 160 SS2 Biology students from public secondary schools in Rivers State. 84 (46, 38) in their intact classes constituted the sample size. Three research questions and three hypotheses guided the study. The instrument for data collection was a teacher-made test tagged "Genetics Performance Test (GPT) containing 50 items. The instrument was validated and found reliable with coefficient of  $r = 0.81$  using test-retest methods. The two groups were pretested with GPT before being taught with validated lesson packages prepared by the researcher. The experimental group was taught with YouTube while the control was taught using demonstrative method. The two groups were post tested with GPT. The data obtained were descriptively analyzed using mean and standard deviation for research questions and t-test for the hypotheses at 0.05 level of significance. Results shows that students taught genetics using YouTube performed better than those taught using demonstrative method, irrespective of gender. There was a significant difference between the mean score of students taught genetics with YouTube and those taught using demonstrative method. Thus, the null hypotheses were rejected. Based on the findings, it was recommended that Biology teachers should explore the use of YouTube in teaching certain Biological concepts.

**Keywords:** Youtube, collaborative, genetics, performance

### Introduction

An attempt to shift from traditional method of teaching that is characterized by face-to-face in the classroom has given birth to a more alternative teaching method that involves an online learning where the on-line component becomes a natural extension of the traditional classroom learning approach. One of the alternative methods is the Blended learning which uses a combination of traditional face-to-face contact with on-line learning (Taylor, 2007) [7]. Blended learning is a hybrid of traditional face-to-face and on-line learning so that instruction occurs both in the classroom and on-line, and where the on-line component becomes a natural extension of the traditional classroom teaching (Falconer & Littlejohn, 2007) [4]. It is therefore, a flexible approach to course design that supports the merger of different times and places of learning. It also produces a stronger sense of community among students than other traditional approach such as discussion and collaborative methods.

The need to strengthen the teaching and learning of Biology at the secondary school level appears to be of great concern to Biology educators. To this effect, methods of delivery of instructions in science especially Biology by exposing students to a more humane classroom setting such as collaborative, discussion and YouTube approaches for students performance to be enhanced needs to be developed. The non-utilization of instructional resources by Biology teachers has been identified as one of the problems facing the teaching and learning of Science (Dike and Ugbe, 2011) [3]. This, to a high extent has contributed to the poor performance of students in Biology particularly at the secondary school

level (WAEC, 2003) [9]. Inadequate exposure of the students to ICT based teaching, laboratory practicals has been noted to have contributes to the poor state of science students' performance in schools (Nna & Arokoyu, 2015) [5]. However, Arokoyu and Nna (2012) [2] opined that the method of teaching adopted by Nigerian science teachers do not only encourage significantly in the sustenance and acquisition of useful skills that could enhance entrepreneurial abilities among science students but also enhances their performance in the subject area. Hence, Biology as one of the science subjects taught at the senior secondary school level, a stage when learners would have attained what Piaget referred to as the formal operational stage. The teacher's job according to Piaget is to provide the learners with situations or environment that encourages learners' active participation. Studies on blended learning pointed to be fact that blended learning results in enhancement of students' performance (Trowbridge, 2000) [8]. Educators prefer to involve computer in instructional delivery in education believing that using computer will be an advantage due to the fact that the computer is more effective as an educational device or tool compared with other tools (Okebukola, 2005; Agusiobio, 2004) [6, 1]. It is a known fact that the traditional educational system presents the teacher as the major reservoir and key player in teaching and learning, and that the entire operation of teaching falls completely on the teacher. In this study the blended learning approach considered is the YouTube. Poor instructional approaches adopted by science teachers especially Biology teachers, have posed a serious problem to students' understanding of some concepts in Biology. For instance, Genetics and hereditary are

seen as an abstract and complex concepts in Biology and thus an attempt to solve these problems, science educators continue to advocate for more problem-solving, student-centred and blended instructional method that will help to enhance students' performance.

**Objectives of the study**

The main objective of the study is to compare the effectiveness and performance of students taught genetics in secondary school using three teaching methods. Specifically, it seeks to:

1. Compare the performance of students taught genetics with YouTube and those taught using collaborative approaches.
2. Examine the performance of male students taught genetics using YouTube and their male counterparts taught using collaborative methods.
3. Establish the performance of female students taught using YouTube and their female counterparts taught using collaborative method.

**Research questions**

The following research questions were posed to guide the study:

1. what difference exist in the performance of students taught genetics using YouTube and those taught using collaborative approach using discussion method?
2. To what extent does the performance of male students taught using YouTube differ from their counterparts taught with collaborative method?
3. How does the performance of female students taught with YouTube differ from their female counterpart taught using collaborative method?

**Research hypotheses**

The following null hypotheses were generated to guide the study:

1. There is no significant difference between the mean performance of students taught genetics using YouTube

and those taught using collaborative approach.

2. There is no significant difference between the performance of male students taught genetics using YouTube and those taught using collaborative method.
3. There is no significant difference between in performance of female students taught genetics using YouTube and those taught using collaborative method.

**Research methodology**

This study adopted a quasi-experimental design as pretest-post test using experimental and control groups of students in their infant classes. The population comprised all the senior secondary school class two (SSSC2) Biology students in Eleme Local Government Area of Rivers State. Purposive sampling technique was adopted to select 2 schools. A total of 84 students constitute the sample size randomly assigned to three groups; one experimental and one control respectively. Genetics Performance Test (GPT) developed by the researchers made up of 50 items and was used as the research instrument for data collection. The instrument was validated by experts in Genetics and science education with a reliability coefficient of 0.81. A pretest tagged Genetic Performance Test (GPT) was administered before treatment. The samples were taught concept of Genetics using a prepared and validated lesson packages in the three schools for three (3) weeks. At the expiration of the three weeks, the three groups were post tested with (GAT) to assess the students' performance in the concept on the spot. Data collected were analyzed using mean, standard deviation for research questions and t-test for the test of significance difference.

**Results**

The following results were obtained

**Research question 1**

What difference exist in the performance of students taught genetics using YouTube and those taught using collaborative approach?

**Table 1:** Mean score of the students taught genetics with YouTube and those taught with collaborative method

Approach	N	Pretest mean	SD	Posttest mean	SD	Gain mean	SD
YouTube	46	28.39	11.92	57.65	14.39	29.26	20.89
Collaborative	38	22.21	8.18	43.68	10.98	21.47	15.12

The table shows that the mean gain of students taught using YouTube was 29.26, S.D = 20.89, whereas those taught using collaborative approach was 21.47 and SD = 15.12.

**Research question 2**

To what extent does the performance of male students taught genetics using YouTube differ from their male counterpart taught using collaborative method?

**Table 2:** Mean score of male students taught genetics using YouTube and their male counterpart taught using collaborative method

Approach	Sex	N	Pretest mean	SD	Posttest mean	SD	Gain mean	SD
YouTube	M	18	32.67	13.00	60.78	13.41	28.11	21.43
Collaborative	M	15	22.47	7.75	46.27	14.81	23.8	17.58

The male students taught using genetics had a mean score of 28.11 as against 23.8 for their counterpart taught with collaborative method.

**Research question 3**

How does the performance of female students taught with YouTube differ from their female counterpart taught using collaborative approach?

**Table 3:** Mean score of the performance of female students taught with YouTube differ from their counterparts taught with collaborative approach

Approach	Sex	N	Pretest mean	SD	Posttest mean	SD	Gain mean	SD
YouTube	F	28	25.61	10.48	55.82	14.86	30.21	20.36
Collaborative	F	23	22.00	8.66	41.96	7.43	19.96	11.08

Table 4 shows that female students taught genetics with YouTube had mean gain of 30.21 against their counterparts taught using collaborative with a mean gain score of 19.96.

**Hypothesis 1**

There is no significant difference between the mean performance of students taught genetics using YouTube and those taught using collaborative approach.

**Table 4:** t-test of students’ performance taught genetics using YouTube and those taught collaborative method

Approach	N	$\bar{X}$	SD	Df	t-cal	t-crit	Decision at p <0.05
YouTube	46	29.26	20.89	82	2.4483	1.840	Significant
Collaborative	38	21.47	15.12				

The table shows that t-cal (2.483) is greater than t-crit (1.840). This indicate a significant difference between YouTube and collaborative approach at df 82, p < 0.05, hypothesis 1 is therefore rejected.

**Hypothesis 2**

There is no significant difference between the performance of male students taught genetics using YouTube and those taught using collaborative method.

**Table 5:** t-test of male students’ performance taught using YouTube and those taught using collaborative method

Approach	Sex	N	$\bar{X}$	SD	Df	t-cal	t-crit	Decision at p <0.05
YouTube	M	18	32.67	13.00	31	2.043	1.246	Significant
Collaborative	M	15	22.47	7.75				

Table 5 shows that there is a significant difference between the performance mean score of male students taught genetics using YouTube and their male counterparts taught using collaborative method at t-cal (2.043), t-crit (1.246). Hence, the null hypothesis was rejected.

**Hypothesis 3**

There is no significant difference between the performance of female student taught genetics using YouTube and those taught with collaborative method.

**Table 6:** t-test analysis of female students’ performance taught genetics using YouTube and those taught with collaborative method

Approach	Sex	N	$\bar{X}$	SD	Df	t-cal	t-crit	Decision at p <0.05
YouTube	F	28	30.21	20.36	49	2.616	1.055	Significant
Collaborative	F	23	19.96	11.08				

The table shows that there is a significant difference between the performance of female students mean score taught with YouTube and their female counterpart taught using collaborative method.

were rejected. This result was in consistent with the findings of Arokoyu & Nna (2012) [2] which reported that the method of teaching a particular concept in science could enhance the performance of the students under investigation.

**Discussion**

The study reveals that students taught genetics using YouTube performed better than their counterparts taught using collaborative method (Table 1). This was consistent with the findings of Wang *et al.* (2013) [10] which opined that YouTube possess a great potential in the learning and teaching of Science subjects. Table 2 and 3 revealed that both male and female students taught genetics using YouTube performed better than their counterparts taught with collaborative method respectively. The mean gain variation observed could be due to the fact that YouTube method did not subject to the position of passivity due to the use of ICT. Table 4, 5 and 6 shows that there is a significant difference in performance of students taught genetics using YouTube and collaborative methods regardless of the gender. Thus, the null hypotheses generated

**Conclusion**

The following conclusions were made from the findings: YouTube method enhances students’ performance in genetics than collaborative method. There is significant difference in the mean performance scores of students taught with YouTube than those taught using collaborative method regardless of gender. The study thereby recommends that Youtube method of introduction should be introduced to secondary school curriculum as to enhance the teaching of some complex concepts in science subjects especially Biology.

**Reference**

1. Agusiobio BC. Inducing higher level of resources utilizations on the Integrated Science teacher. Unpublished Ph.D. Dissertation. University of Lagos,

- 2004.
2. Arokoyu AA, Nna PJ. Creativity and process skills for self-reliance using demonstrative approach of teaching. *ARPJ Journal of Science and Tech*, 2012, 2(1).
  3. Dike JW, Ugbe AU. Natural environmental resources: Effects on students' cognitive ability in learning the concept of diffusion in Chemistry. *Nigerian Journal of Empirical Studies in Psychology and education*, 2011, 1(12).
  4. Falconer I, Littlejohn A. Designing for blended learning and reuse. *Journal of further and Higher Education*. 2007; 31(1):41-52.
  5. Nna PJ, Arokoyu AA. Innovative instructions for enhancement of scientific skills on qualitative analysis in Chemistry. *Science and Industrial Technology Education Journal*. 2015; 3(1):133-141.
  6. Okebukola PAO. Making Science learner friendly: A challenge for Teachers. *STAN Bullentin*. 2005; 3(4):99-104.
  7. Taylor S. Narrowing the distance: Implementing a hybrid learning model for information security education. *The quarterly review of distance education*. 2007; 8(1):47-57.
  8. Trowbridge LW. *Teaching Secondary School Science*, Upper saddle River. NJ: Merrill/Prentice Hall, 2000.
  9. WAEC. West African Examination Council – Chief Examiners Report (May/June), 2003.
  10. Wang M, Wu B, Chen NS, Spector JM. Connection problem-solving and knowledge-construction processes in a visualization-based learning environment. *Computers & Education*. 2013; 68:293-306.