

# Applying Gagne's Nine Events in Designing a Multimedia Programme for Teaching Elements and Principles of Design in Secondary School

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## Abstract

This study sought to evaluate the effectiveness of Multimedia Programme for teaching elements and principles of design in Demonstration Secondary School, Ahmadu Bello University, Zaria. Multimedia elements were employed to create the student-centred learning environment and were designed using Gagne's Nine Events of Instructions, which provide an appropriate theoretical framework of a good instructional design. The study also compared the effects of using multimedia teaching instruction versus conventional classroom instruction on students' Elements and Principles of Design achievement test scores. The duration of this study covered six weeks and experimental design (pretest/post-test) were used. The samples consisted of 20 students from JSS 2 classes, ten students as the control group, and the other ten students as the experimental group. Independent Sample T-test results showed that the students who were taught using multimedia teaching instruction demonstrated significantly higher achievement than that of the conventional classroom instruction. The findings revealed that a multimedia programme that is designed with Gagne's nine events of instruction is capable of improving learning by managing cognitive load in working memory, and supporting transfer of learning. It is recommended that the use of multimedia instruction must be given adequate priority in the Nigerian school system. Government and relevant private stakeholders need to be encouraged to supply all the essential multimedia equipment and facilities needed for training to improve teaching and learning of creative arts. More resource and media production centres should be established and the existing ones rejuvenated. Training and retraining of teachers on the selection and appropriate use of multimedia for teaching should be encouraged.

**Keywords:** Design, Elements and Principles of design, Multimedia Programme, Gagne's nine events of instruction, JSS 2 (Junior Secondary School, Class 2).

## Introduction

As stipulated in the Federal Ministry of Education Curriculum for Cultural and Creative Arts JSS1-3 (2007), the performance objectives for students is to enable them identify, differentiate and reflect the elements and principles of design in their individual design. However, this appears to be a challenge in schools, where conventional method is adopted in teaching students. This method, typically devoid of instructional materials, has made learning of elements and principles of design less effective. It is against this background that Adelekan (as cited in Afolabi (2012) recommends several measures, with the aim to improve students' attitude and achievement at the secondary school level. Amongst the measures recommended are the appropriate use of teaching methods, instructional media and other instructional resources (Oyedeji, 2002).

Multimedia is of vast importance as a resource in teaching and learning. As a more effective tool for education, Ibam (2007) asserts that multimedia provides wide range of information that can enrich the learning process in many subjects. A single definition of multimedia is difficult to find. Attempts to define the term appear to have various perspectives and definitions by different scholars. Mayer (2001) defines Multimedia as presenting words (such as printed text or spoken text) and pictures (such as illustrations, photos, animation, or video). Viewed from a different light, Dorin and McCormack (2000) hold that multimedia is the "combination of multiple media to effectively convey information." The concept of combining multiple media for effective communication is illuminated in Reddi's (2003) assertion, which defines multimedia as an integration of multiple media elements (audio, graphics, text, animation, etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media elements can provide individually. From the various definitions, it is glaring that multimedia is a blend of both words and pictures material accessible digitally. For the purpose of this study, multimedia is defined as a product that combines texts, graphics and animations integrated for the teaching of elements and principles of design.

Empirical studies have advocated the use of computer assisted instruction for instructional purposes in academic disciplines. Studies like Computer Assisted Instruction (CAI) by Cotton (1997), Effects of CAI on Secondary Schools' Performance in Biology by Yusuf and Afolabi (2010), and Animating to Improve Learning: A Model for Studying Multimedia Effectiveness, by Ellis (2001), Efficacy of Multimedia Teaching by Gee and Heng (2008) and others. All the above mentioned studies found that students who were taught with multimedia performed significantly better than students taught using conventional instruction. However, Adeyemi (2012) in

his evaluation of Computer Assisted Instruction and Conventional Methods, found no significant effect of treatment on students' achievement in the subject - Social Studies. This implies that students taught via CAI did not perform better in Social Studies than those taught with it. Even though the use of multimedia is justified by the above studies, one is not sure about the results because the setting is totally not in conformity with Gagne's nine events of instruction.

Additionally, studies have proven that multimedia enhances learning as ascertained in social disciplines; there is need for it to be established in the learning of elements and principle of design. Consequently, this need forms the basis for this research; hence the purpose of this study is to evaluate the effectiveness of Gagne's nine events of instruction in the design of multimedia programme for teaching and learning of elements and principles of design; to assess whether there is a difference between mean achievement test scores of students taught with multimedia programme that was designed with Gagne's nine events of instruction, compared to those taught using conventional method and also to examine the perception of the students taught with the multimedia programme that was designed with Gagne's nine events of instruction in Demonstration Junior Secondary School, Ahmadu Bello University, Zaria.

### **Gagne's Theory of Instruction**

This study was guided by Gagne's theory of instruction. Gagne appears to stand taller among prominent curriculum designers and theorists (Ngussa, 2014). Gagne's theoretical framework is based on the cognitive perspective of learning and emphasized largely on the effectiveness of the instructional design (Teoh and Neo, 2007). In his theory, he correlates the nine events of instruction with the associated internal mental processes and formulated these events as elements of a good lesson which promote effective learning (Gagne *et al*, 1992).

The findings of studies by Teoh *et al* (2007), Ngussa (2014), Zhu *et al* (2010) and Kutlu *et al* (2013) on the application of Gagne's 9 Events of Instruction in learning have proven that the multimedia learning environment is a good lesson design for promoting the transfer of knowledge or information from perception through the various stages of memory as far as it utilizes the nine events and instructions as put forth by Gagne's instructional theory. These events of instruction involve nine activities namely: Gaining attention, informing the learner of the objective, stimulating recall of prior learning, presenting the stimulus, providing learning guidance, eliciting performance, providing feedback, assessing performance and enhancing retention and transfer (Hanson and Asante, 2014; Ahmed, 2011; Reiser and Dempsey, 2007 and Gagne, *et al* 2005). The nine events of instruction are briefly discussed below:

#### **Gain attention:**

Learning is a process which requires attention. In order for learning to take place, capturing the attention of the students is therefore critical. Hasni 2016 asserts that the use of pictures, videos, case studies, news, storytelling, polls, or other ice breaking activities will quickly get students to focus their attention on the content.

#### **Inform learner of objectives**

Learning objectives should be made clear to the students at the start or early at each given lesson. Let the learners know what they will be learning. Objectives would initiate a conscious responsibility towards the learning process; hence this will help assist students to complete the learning programme (Teoh and Neo, 2007).

#### **Stimulate recall of prior learning**

Get the learners to think about what they already know. To help students recall prior knowledge, ask students about the subjects or activities from previous classes, or have them share their own content related experiences, or have students discuss the connections between acquired knowledge and the current topics (Hasni, 2016).

#### **Present stimulus material**

Stimulus presentation often emphasizes features that encourage learners to select what you want them to attend to. In an attempt to present the stimulus, "the teacher must determine what new stimulus information is required by an objective and how to present that new stimulus information so that students can perceive and retain it (Tuckman and Monetti, 2011, in Ngussa, 2014).

#### **Provide learner guidance**

Help the learners follow along as the topic is presented by providing examples using pictures, graphics and posters to guide learners. In providing learners guidance, teachers must plan the technique they will use to guide the learners in a given task and how they will present these techniques. "The essence of learning guidance is to provide support for learners in making connection between what they know and what is being learned" (Gagne, *et al*, 2005).

### **Elicit performance**

Ask learners to do what they have been taught. This might include having students work on real-life cases in groups, having hands-on lab practices, or asking students to elaborate their own understandings of the learning content.

### **Provide feedback**

Inform learners of their performance. According to Gagne, *et al* (1992) that it's not enough for only telling them "Good job" or "You are not right." Instead, tell them why they are right, why they are wrong and what must be improved. Use of rubrics helps students understand feedback better, if needed.

### **Assess performance**

Evaluate learners on their knowledge of the topic. Instructors can give students online or paper-based quizzes have them do presentations, give them individual/group projects, or give them the opportunity to demonstrate their knowledge and skills in a lab exercise (Gagne, *et al*, 1992).

### **Enhance retention transfer**

Retention is all about preventing forgetting and enhancing the learner's ability to recall the knowledge or skills at the appropriate time, transfer of learning sets some variety of new tasks for the learner, tasks that require the application of what has been learned in situations that differ substantially from those used for the learning itself (Gagne *et al*, 2005 in Ngussa, 2014). In order to help students retain and transfer the knowledge, give enough opportunities for students to practice the knowledge during or after class (Killpatrick, 2001).

The importance of Gagne's theory in this current study is anchored on the fact that it provides guides towards affective learning. This is in addition to his earlier proposed events designed to enhance the transfer of knowledge from one level of perception through the various stages of memory.

### **Statement of the Problem**

Anecdotal evidence from some selected secondary schools in the northern region of Nigeria reveals the difficulty faced by students to identify and differentiate between elements and principles of design. This was made evident following series of interviews carried out with Cultural and Creative Art teachers of secondary schools, within and outside Kaduna State. Such schools within Zaria include: God's Time Academy, Jesus is Life Academy and Demonstration Secondary School, Ahmadu Bello University Zaria. Other schools outside Kaduna State include: Concordia College, Yola; New Horizons College, Minna; and Isa Memorial Islamic Academy, Ajiolo Ojaji, Kogi State. Visitation to the aforementioned schools indicated the need to complement the conventional method with a more effective method, like multimedia programme that will enhance the teaching and learning of Cultural and Creative Arts in schools.

Numerous research findings have shown that learning is greatly enhanced through multimedia presentations, which in this context refers to both visual and verbal/acoustic aids to facilitate learning and direct selection of appropriate material for cognitive processing (Mayer, 2001; Ellis, 2001; Loew *et al*, 2014). It is in the light of this concern that the study attempts to develop a Multimedia Programme for teaching elements and principles of design in Junior Secondary Schools by using Demonstration Junior Secondary School, Ahmadu Bello University, Zaria as a Case Study.

### **Hypothesis for the Study**

In this study, one hypothesis was drawn for testing. The hypothesis states that:

*H<sub>0</sub>: there will be no significant difference between mean achievement test scores of students that learned with multimedia that was designed with Gagne's nine events of instruction, compared to those that learned using conventional method of instruction.*

### **Research Methodology**

The multimedia contents in this study were structured in compliance with Gagne's nine (9) events of instruction and were used as a research instrument to assess students' performance in learning of elements and principles of design. This study is made up of an experimental group and control group. The control group is the group that receives no experimental treatment, and the experimental group receives the experimental treatment. The essence of the control group is to ensure that what is observed in the experimental group has not happened by mere chance (Asika, 2009).

### **Population, Sample and Sampling Procedure**

The target population for the study is Junior Secondary School students - JSS II, between the age of 10–13 and offering Cultural and Creative Arts in Demonstration Secondary School Ahmadu Bello University Zaria, Kaduna

State. This population was chosen because the topic – ‘Elements and Principles of Design’ is first introduced to JSS II students, at the level of Junior Secondary School. A total of twenty students participated in this study. The twenty students were selected using the lucky dip method of random sampling from the target population of two hundred. Subsequently, the participants were randomly assigned to one of two groups: a control group of ten students and an experimental group of ten students as well. The two groups were separated; while the control group was led to a classroom, the experimental group was taken to the school computer lab.

### **Research Instruments, Validation of Instruments, Reliability of the Instruments**

The instruments used for the collection were pretest/post-test, written test on elements and principles of design, which was administered to the control and experimental group before and after instruction and also interview to ascertain the perception of the experimental group on the multimedia programme. The pretest and the post-test scores of students in the two groups were analyzed using t-test while the interviews were analyzed qualitatively. Before the multimedia programme was implemented, it was reviewed by two instructional design and subject matter experts. Based on their evaluation, a few modifications and amendments were carried out. In addition, end users’ usability evaluation was done through a pilot test on a small sample. The assessment was done, in order to ascertain the reliability of the instrument.

### **Method of Data Collection and Analysis**

The data from this study were collected using pretest/post-test, written test on elements and principles of design, which was administered to the control and experimental group before and after instruction. The scores of students in the two groups were analysed using t-test on the Statistical Package for the Social Sciences.

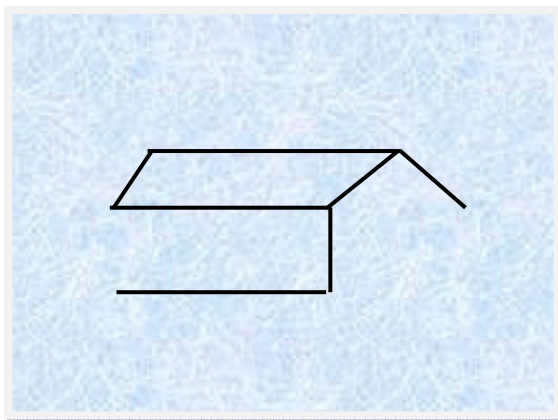
### **Presentation and Interpretation of Results and Findings**

The multimedia programme was developed using Gagne's Nine Events of Instruction and was tested during the experiment. The data from the experiment were collected using pretest – post-test, written test on elements and principles of design, which was administered to the control and experimental group before and after the instruction. Below is the application of Gagne's nine events of instruction on each unit of the Multimedia Programme modules.

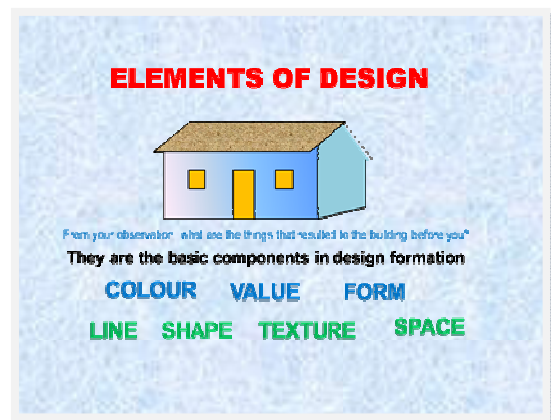
#### **Application of Gagne's nine events of instruction on each unit of the modules.**

##### **Event (1): Gain Attention**

Learning is a process which requires attention. In order for learning to take place, capturing the attention of the students is therefore critical. Gagne proposes that learning material should provoke learners to be inquisitive and motivated (Lawson, 2010). Therefore, screen design plays a key role in “arousal of learners” interest and maintaining the interest throughout the learning process. Thus, the multimedia programme module begins the first lesson “elements of design” using sound and object based animation to show appearance of lines, colour, shapes, value and texture at a click of the start button on the introductory page, which finally resulted to a house. A question is posed for students to mention the things they observed that resulted to the house on the screen. These were used to arouse learner’s attention and to also make connections of previous knowledge in order to prepare them for new information. (See Figures1 and 2)



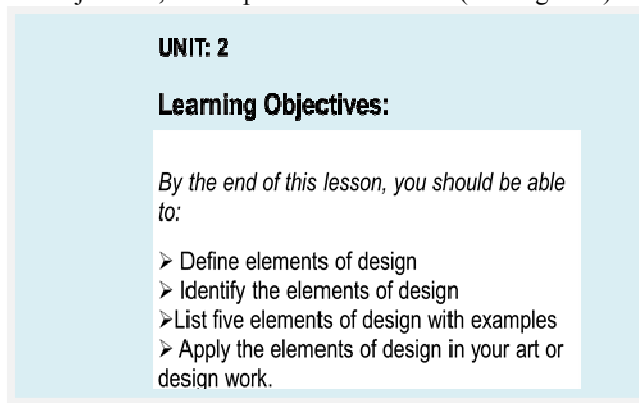
**Figure 1:**  
Gradual Appearance of Elements of Design.



**Figure 2**  
Appearance of Elements of Design  
That Resulted to a House.

**Event (2): Inform Learners of the Objectives**

Learning objectives should be made clear to the students at the start or early of each given lesson. As a result, the students were informed of the objectives, which precede the module (See Figure 3).



**Figure 3:** Learning objectives

**Event (3): Stimulate Recall of Prior Knowledge**

To prepare students for the content that they will find in the modules, the study poses a question before the lesson, and this helps to put students in the right frame of mind. The question posed for the students' was earlier mention in event (1) gain attention.

**Event (4): Present Stimulus Material (the content)**

In order to elicit a response from the learner, a clear, simple and direct stimulus is used to explain the elements of design. These are text, graphics and object based animations.

**Event (5): Provide Learner Guidance**

Within the multimedia programme module, learner's activities were built into the module for the students to interact with. Examples using images, graphics, and object based animation were also available for the students to use and understand the content being presented.

**Event (6): Eliciting the Performance:** The study ensures that each module in the course contains achievement test at the very end of the lesson. The achievement test was given to the students to assess their understanding and their attitude towards learning on the multimedia instructional method.

**Event (7): Providing Feedback: Providing**

Students in this learning environment have access to the instructor in person. The instructor went around the classroom to observe and help learners.

**Event (8): Assessing Performance**

Objects were arranged before the students to confirm/ascertain students understanding of the elements and principles of design by drawing and colouring the objects and concepts learnt.

**Event (9): Enhancing Retention and Transfer**

Throughout the lesson, efforts were made sure to provide different examples in every unit of a module, so that students could relate these examples to their own art or design. The students had to apply the learnt information from the modules in doing a final independent design.

**Pretest - Post-Test Results**

The collected data for pretest - post-test were subjected to statistical analysis and the results obtained are presented below:

**Table 1: Achievement Scores of Students of Experimental and Control Group on Pretest.**

Group	N	Mean	S.D.	t-cal	t-crit	df	p	Remark
Experimental	10	32	13.9	0.018	2.101	18	0.5	NS
Control	10	32.1	10.3					

Table-1: states that mean scores achieved by students of experimental and control groups on pre-test are 32 and 32.1 respectively. The calculated 't' value of 0.018 is less than the t-critical of 2.101 at 0.05 level of significance and 18 degree of freedom. This indicates the students of the experimental group do not differ significantly from the students of the control group in their mean scores at the pre-test level. On the basis of the above findings, it is obvious that at the initial level, previous subject matter knowledge of both groups were about the same.

**Table 2: Achievement Scores of Students of Experimental/Control Groups on Post-Test**

Group	N	Mean	S.D.	t-cal	t-crit	df	p	Remark
Experimental	10	68.1	19.28	3.27	2.101	18	0.5	S
Control	10	45.5	10.29					

From the Table 2, shows statistically significant differences between the control and experimental groups at the significance level of 0.05 in the post test in favor of the experimental group. To emphasize this point, the significance of the difference between mean scores of the two groups, that is, 't' value is calculated with two tailed test of significance. The obtained, t-calculated is 3.27 which is larger than the t-critical value of 2.101 at 0.05 level of significance and 18 degree of freedom. This means that the null hypothesis which states that there is no significant difference between the mean achievement test scores of students who learned with a multimedia that was designed with Gagne's nine events of instruction compared to those that learned using conventional method is rejected.

### Findings

- The results indicate that the use of multimedia programme holds promise for improving teaching and learning of elements and principles of design in Demonstration Secondary, Ahmadu Bello University, Zaria.
- The mean value of achievement gain of students taught through the multimedia programme is higher compared to the other group that studied through conventional method.
- Students who were taught with the multimedia programme agreed that learning with multimedia programme was interesting and engaging; at the same time they found this method of learning useful and favourable.
- The findings also revealed that a multimedia programme that adapts Gagne's nine events of instruction is capable of improving learning by managing cognitive load in working memory and supporting transfer of learning.

### Conclusion

In this study, one hypothesis was formulated and tested. The hypothesis which states that there will be no significant difference between mean achievement test scores of students that learned with multimedia that was designed with Gagne's nine events of instruction, compared to those that learned using conventional method. After administering the pretest and the post-test, the results obtained were subjected to statistical analysis. The 't' test was applied to test the significance of difference between the mean achievement test scores of the experimental group and the control group before experimentation. The 't' value (0.018) was not significant at 0.05 level. Hence, it can be inferred that there was no significant difference between the mean achievement test scores of experimental group and control group before experimentation. The 't' test was applied to test the significance of difference between the mean achievement test scores of the experimental group and the control group after experimentation. The 't' value of 3.27 was significant at 0.05 level. The students of the experimental group and control group differed significantly in their mean achievement test scores after experimentation. As indicated by the mean value, the students of the experimental group fared better in their achievement than the students of the control group. Hence, the use of multimedia increased the achievement of the students.

The findings of this study corroborate the findings of Cotton (1997), Yusuf and Afolabi (2010), Gee and Heng (2008) and Ellis (2001) in different school subjects. The study negates the finding of Adeyemi (2012) who found no significant main effect of treatment (Computer Assisted Instruction and Conventional Methods) on students' achievement in social studies. It is interesting to note that in this study the mean score of the Post-test of the achievement test of the treatment group is significantly higher than that of the control group. The results of this study is in line with the findings of Teoh et al (2007), Ngussa (2014) Zhu et al (2010) and Kutlu et al (2013) studies that give credence to the relevance of multimedia learning environment in promoting the transfer of knowledge and information when incorporated with the Gagne's nine events and instructions as put forth by his instructional theory. .

Furthermore, the responses from the interview conducted shows that the perceptions of students, who learned with multimedia, were very positive. Students agreed that learning with multimedia was more illuminating and preferable to the conventional method. They also confirmed that after the exposure they could mention, identify, and differentiate and even apply the elements of design in their art works as anticipated by the Nigeria Federal Ministry of Education curriculum for cultural and creative arts JSS 1-3 (2007).

The results of this study has proven that the use of the developed multimedia programme holds promise for improving teaching and learning of elements and principles of design. This may well be an indication that the sequential stages of proper instructional designing and presentation provided in Gagne's learning strategies have offered a better understanding of the difficult concepts by the learners.

## Recommendations

The following recommendations appear necessary in view of the conclusions and findings of the study;

- i. If the standard of education has to be raised, the use of multimedia programme should be incorporated into teaching and learning of cultural and creative arts and other school subjects as well. It is therefore recommended that the use of multimedia instruction must be given adequate priority in the Nigerian school system.
- ii. In addition, government and all other stakeholders in education sector should as a matter of urgency supply schools with all the necessary instructional media to enhance effective teaching and learning of cultural and creative arts and other school subjects.
- iii. Government should also refresh and encourage educational resource centres and media production centres to intensify the production of instructional media in a large scale.
- iv. Workshops and seminars should be organized for the teachers primarily for the purpose of training and equipping them on how to select and use appropriate multimedia programme in the classroom.

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