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PERSONALIZATION DESIGN PRINCIPLES AND SENIOR SECONDARY SCHOOL COMPUTER SCIENCE STUDENTS' INTEREST AND ACADEMIC PERFORMANCE

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Abstract

Effective presentations using technology apps always have a positive impact on an audience. Not only does it sustain the interest of the audience but also motivates them to take action on an exhortation. This article examined the impact of integrating personalization design principles into PowerPoint presentations on the interest and performance of senior secondary school one (SS1) computer science students. Quasi-experimental design was adopted for the study with a sample size of four hundred (400) students selected from private secondary schools in Obio-Akpor Local Government Area of Rivers State, Nigeria. Two instruments were designed by the authors to answer the research questions and analyze the hypotheses at 0.05 level of significance using mean, standard deviation and analysis of co-variance. One of the instruments was a 10-item questionnaire for determining the interest of the SS1 computer science students while the other was a 20-item performance test. The latter was subjected to Kuder-Richardson – 21 to test for the reliability and consistency of the responses from the students while cronbach alpha was used to determine the internal consistency of the interest scale. A KR-21 score of ≥0.75 was obtained for the performance test, while a 0.78 was obtained for the interest questionnaire. Findings of the study revealed that personalization principle enhanced students' interest and performance when compared to text-based design. Further analysis revealed that the difference in the mean performance scores of students taught using personalization design principles and those taught using texted based design was statistically significant. Based on the findings, it was recommended amongst others that workshops and conferences to encourage the use of instructional slides when appropriate and adopting Mayer's principles of multimedia design should be inculcated at the secondary school level.

Keywords: Personalization design principles, Text-based design, Computer studies, Academic performance, Interest.

Introduction

Presentation software has been widely used by various sectors of the economy to convey messages. Business owners use these apps to make presentations to clients so as to promote their goods and services. Within the education sector, instructors and students use presentation apps massively for teaching and learning. The effective use of these apps has promoted learning. Some of the technology apps used for effective presentations include but are not limited to Visme, Prezi, Google Slides, Keynote, Microsoft PowerPoint, Ludus, Slides and Slidebean (Easy WebContent, Inc.,(2023).

PowerPoint initially called Presenter, is a visual presentation software created by Robert Gaskins in 1984 for Forethought Inc. This software seems to be the most popular presentation software used by community organizations, business owners, educational instructors and students, though it was developed and designed to facilitate visual demonstrations for group presentations in the business environment (Britannica, The Editors of Encyclopaedia, 2022). SlideLizard (2021) showed that ninety five (95%) of presentations are created with PowerPoint, Thirty (30) Million PowerPoint presentations are given every day, and five hundred (500) million people all over the world are using the software. By 1987, Microsoft acquired the company and ever since then different versions of the software

has been released. PowerPoint Presentations are arranged as a series of individually designed "slides" that contain images, text, or other objects (Britannica, The Editors of Encyclopaedia, 2022).

The effectiveness of PowerPoint slides largely depends on its adherence to multimedia principle. The principle simply states that when creating presentations, there should be a synergy - a mental connection - between written words and graphic representations used within the presentation. Thus, with the combination of words and graphics, learners are able to effectively encode information, that is, move information from the working memory to the long term memory where they are retained longer and can be recalled for application. Mayer (2001) came up with twelve (12) multimedia principles. These include coherence principle, signaling principle, redundancy principle, spatial contiguity principle, temporal contiguity principle, segmenting principle, pre-training principle, modality principle, multimedia principle, personalization principle, voice principle and image principle. The focus of this study is on the personalization principle.

Literature Review

One of the 12 Principles of Multimedia Learning that Mayer developed is called the Personalization Principle. According to this theory, simulating a social discourse is an event that stimulates active cognitive processing. This gives individuals the impression that they are actively participating in a conversation with another person, rather than simply receiving information in a receptive manner (E-learning fundamentals, 2022). According to this theory, it is possible to improve learning outcomes and increase learner engagement by employing a more casual, conversational teaching style and employing virtual coaches. The Personalization Principle says that humans learn best from a more informal, conversational voice than an overly formal voice (Andrew, 2019). This implies that having a more casual voice actually improves the learning experience. and that instructional content should be clear, concise, simple, and casual. Furthermore, personalization principle allows learners to be comfortable, schoolers. (Mayer 2018) and Andrew (2019) explained that when instructional contents are presented in a personalised clear and concise format, meaningful learning can be promoted, students performance and interest can be enhanced.

Interest is a psychological state of engagement, experienced in the moment and also a predisposition to engage repeatedly with particular ideas, events or objects over time. Interest according to Lowman in onlinelibrary.com (2016) refers to a relatively stable psychological characteristics of people which identify the personal evaluation (subjective attributions of goodness or badness, judged degree or personal fit or misfit) attached to particular group of occupational or leisure activity cluster. This simply implies that interest has to do with the learners' emotions which help to guide their assessment.

Interest is a feeling of likening associated with a reaction, either actual or imagined to a specific thing. In a classroom setting, interest is required to meet students' intellectual as well as emotional needs. Interest can never be imposed on an individual by external forces, however it can be aroused Koca (2016). Students' interest in a topic holds so much power, when a topic connects to what students like to do, engagement deepens as they willingly spend time thinking, dialoguing, and creating ideas in meaningful ways. Interest has long been seen to be a necessary component of learning. Few educators would argue that learning would be hindered if teachers did not capitalize on students' pre-existing interest in certain topics or did not provide instructional materials in such a way as to pique students' interest. John Dewey was one of the first educators to clearly establish the importance of interest in education. From his explanation, interest plays a vital role in improving students' academic performance.

Academic performance shows the level at which learning has taken place in a learner. Academic performance could also be viewed as the increase in knowledge of a student resulting from taking part in a learning activity or event. It is commonly measured through examinations or continuous assessments but there is no general agreement on how it is best evaluated, or which aspects are most important.

Mayer and Moreno (2000) conducted five investigations to determine whether the use of conversational and formal language styles while presenting multimedia messages has a good effect on learning. The findings revealed that pupils who received instructional instructions in a conversational format outperformed those who received them in a non-personalized (formal) approach on achievement exams.

Kurt (2011) examined the effect of appropriately designed multimedia software for both conversational and formal styles with respect to various variables. Two groups were used in the study. One group was made up of 22 students who studied with the multimedia material in formal style and the other group was made up of 23 students who studied using the conversational style. The data collection tools used in the study was an achievement test, cognitive load scale and a questionnaire that sampled students' views of the style used in the personalized group. The findings showed a significant difference between the cognitive load scores of the students in the personalized group and those of the students in the non-personalized group. Also, the learners who were in the personalized group stated that the style used in the software motivated them to study and they felt as if they were talking to a human. They preferred similar multimedia software to be used in their other courses. It is quite clear that application of personalization multimedia principle enhances students' interest as compared to text-based PowerPoint presentations.

In many ways, a text-based presentation is analogous to the lecture style of instruction. Many methods exist for graphically presenting data in tabular or bulleted form. The information on the slides will be presented in a list manner, with no connection to actual experience. Whether or whether the information in the bullet point is already known to the students, it will be provided during the presentation as part of the instructions. The presentation is apparently listened to in its entirety without the inclusion of any aural or visual aids beyond the written word to enhance the students' mental processing. Slides are used in the presentation component of teaching to establish a framework for the order and arrangement of information. There are many other kinds of visual aids, but Microsoft PowerPoint is probably the most well-known. It can be a great tool for summarizing large amounts of information while keeping the key ideas intact, if it is used correctly. However, improper application could have the reverse consequence. This suggests that the presentation style used for PowerPoint slides can have a positive or negative effect on students' interest and performance. Further understanding of the topics of personalization principle, interest and students' performance can be facilitated through the lenses of various theoretical frameworks. These frameworks shed light on the bigger picture of interest and performance and are helpful guides in developing practical new approaches to the classroom. one major relevant theory includes but not limited to cognitive theory propounded by Jean Piaget in the 1930's. Understanding the cognitive orientation to learning is essential to providing a quality education and this enhances students' performance. The internal processes that are associated with information and memory are the primary focus of cognitive learning theory. Cognitivism is a learning theory that can be applied in many ways in the classroom. In each of these applications, the central idea is that student experiences, perspectives, and prior knowledge should be incorporated into the learning process. Not only can this strategy help students learn, but it can also help them feel respected and listened to, which is a double win for everyone involved. Moreso has the potential to make students more engaged in class and to inspire a lifelong love of learning, both of which will improve the students' overall level of academic achievement.

Statement of problem

In today's digital world, the foundation for sustainable growth to a large extent depends on Science and technology. This is why most governments have introduced computer science into their school curriculum from primary schools to tertiary institutions. Zakana and Fomsi (2019) posit that the purpose of computer science education is to empower students and help them acquire basic scientific knowledge, so they can be creative, confident and better thinkers. Since the teaching of computer science exposes learners to theoretical knowledge and practical skills, and prepares them for life in a technology-driven society, it is important that computer science teachers use effective PowerPoint presentations to drive home the practical lesson of the subject and help learners develop problem solving skills. Problem-solving skills is the brainchild of computer science because it instills in the learners, the use of all systems applications in execution of solutions to human need as it is inculcated in the learners at the basic level. This is the reason why the authors have decided to investigate if the integration of personalization principle while using PowerPoint presentations would enhance students' interest and thus, their performance in the learning of computer science.

Aim and Objectives

The aim of the study is to examine the impact of personalization design principles on the interest and performance of computer science students in senior secondary schools. Specifically the study sought to;

1. ascertain the effect of personalization design principle in comparison to conventional text-based presentation on the interest of students in Computer Studies.
2. ascertain the effect of personalization design principle in comparison to conventional text-based presentation on the students' mean performance scores in Computer Studies.

Research questions

1. What is the effect of personalization design principle in comparison to the text-based presentation on the interest of students in Computer Studies?
2. What is the effect of personalization design principle in comparison to the text-based presentation on the students' mean performance scores in Computer Studies?

Hypotheses

1. There is no significant difference between the interest of students taught Computer Studies using personalization design principles and those taught using the text based instructional presentation.
2. No significant difference exists between the mean performance scores of students taught Computer Studies using the personalization design principle and those taught using text based instructional presentation.

Methodology

One hundred (100) Senior secondary school one (SSS 1) students from two private schools in Obio-Akpor LGA were used for the study. The variables considered were interest and academic performance. The 2-group pre-test post-test quasi experimental design was adopted for the study. One private secondary school was used as a control group, while the other was used as an experimental group. Two instruments were used for the study. One was a performance test that was administered as a pre-test and reshuffled as a post-test and the other was an interest scale. The performance test covered questions taken from the topic: input and output system, which is contained in the senior secondary school scheme of work for SSS1 students. The instruments were validated by subject matter experts and experts in measurement and evaluation. The reliability of the performance test instrument was determined using Kuder Richardson (21) and a co-efficient KR-21 score of ≥0.75 was obtained while a 0.78 was obtained for the interest questionnaire whose reliability was determined using Cronbach alpha.

Results

Research Question one. What is the effect of personalization design principle in comparison to conventional text-based presentation on the interest of students in Computer Studies?

Table 1a :Assessing interest of students taught with personalization design principles

	Questionnaire Items	1	2	3	4	5	Likert Mean
Q1	the teaching presentation of computer studies classes makes it boring.	5(10.00)	8(16.00)	17(34.00)	11(22.00)	9(18.00)	3.2*
Q2	I always look forward to the next computer studies classes.	9(18.00)	8(16.00)	7(14.00)	15(30.00)	11(22.00)	3.2*
Q3	During teaching presentation, I lost interest	2(4.00)	5(10.00)	19(38.00)	10(20.00)	14(28.00)	3.6*
Q4	If I could change just one subject, I would change computer studies?	16(32.00)	14(28.00)	8(16.00)	8(16.00)	4(8.00)	2.4**
Q5	Computer studies classes always appears too long	14(28.00)	19(38.00)	6(12.00)	3(6.00)	8(16.00)	2.4**
Q6	I would rate computer studies classes high.	20(40.00)	12(24.00)	4(8.00)	7(14.00)	7(14.00)	2.4**
Q7	During computer studies classes, I find myself sleepy	8(16.00)	8(16.00)	12(24.00)	11(22.00)	11(22.00)	3.2*

Q8	I am satisfied with computer studies classes.	10(20.00)	22(44.00)	8(16.00)	8(16.00)	2(4.00)	2.4**
Q9	Missing computer studies classes is like a treasure thrown into an ocean.	3(6.00)	7(14.00)	15(30.00)	10(20.00)	15(30.00)	3.5*
Q10	the teaching presentation of computer studies classes makes it boring.	6(12.00)	13(26.00)	4(8.00)	10(20.00)	17(34.00)	3.4*

**statement is accepted, **statement is not accepted*

Table 1a displayed the distribution and response of interest amongst students using personalization design principles. Items accepted revealed that students taught computer science using personalization design principle as propounded by Mayer had a mean score above the criterion mean score of 2.5. Item number 1 has a mean score of 3.2, item 2 has a mean score of 3.2, item 3 has a mean score of 3.6, item 9 has a mean score of 3.5 and item 10 has a mean score of 3.4. The items 1,2,3,9 and 10 has a mean score higher than the criterion mean value of 2.5 and the questionnaire items affirmed that students find computer science classes interesting. While item number 4 has a mean score of 2.4, item 5 has a mean score of 2.4, item 6 has a mean score of 2.4 and item 8 has a mean score of 2.4 showing a decline in the questionnaire items that explained low level of interest in computer studies classes as the mean scores are lower compared to the criterion mean of 2.5. The grand mean 2.97 revealed that Students taught computer science using the personalized-based design principle had a mean score above the criterion mean score of 2.5, meaning that personalized-based design principle has effect on students' interest when applied.

Table 1b ***Assessing interest of students taught using texted based design.***

S/N	Questionnaire items	1	2	3	4	5	Likert Mean
Q1	the teaching presentation of computer studies classes makes it boring.	17(34.00)	14(28.00)	5(10.00)	8(16.00)	6(12.00)	2.4**
Q2	I always look forward to the next computer studies classes.	20(40.00)	11(22.00)	4(8.00)	8(16.00)	7(14.00)	2.4**
Q3	During teaching presentation, I lost interest	21(42.00)	16(32.00)	2(4.00)	4(8.00)	7(14.00)	2.2**
Q4	If I could change just one subject, I would change computer studies?	12(24.00)	5(10.00)	8(16.00)	17(34.00)	8(16.00)	3.1*
Q5	Computer studies classes always appears too long	10(20.00)	10(20.00)	13(26.00)	3(6.00)	14(28.00)	3.0*
Q6	I would rate computer studies classes high.	8(16.00)	12(24.00)	14(28.00)	6(12.00)	10(20.00)	3.0*
Q7	During computer studies classes, I find myself sleepy	13(26.00)	18(36.00)	8(16.00)	6(12.00)	5(10.00)	2.4**
Q8	I am satisfied with computer studies classes.	10(20.00)	8(16.00)	19(38.00)	11(22.00)	2(4.00)	2.7*
Q9	Missing computer studies classes is like a treasure	20(40.00)	12(24.00)	4(8.00)	5(10.00)	9(18.00)	2.4**

	thrown into an ocean.					
Q10	the teaching presentation of computer studies classes makes it boring.	21(42.00)	10(20.00)	4(8.00)	8(16.00)	7(14.00)	2.4**

**Statement is accepted, **Statement is not accepted*

Table 1b displayed the distribution and response of interest amongst students using text-base design. Items with mean value within and above 2.5 were accepted, and items below the criterion mean of 2.5 were rejected. Item number 1 has a mean score of 2.4, item 2 has a mean score of 2.4, item 3 has a mean score of 2.2, item 9 has a mean score of 3.38 and item 10 has a mean score of .4. The items 1,2,3,9 and 10 has a mean score lower than the criterion mean value of 2.5 and the questionnaire items affirmed that students find computer science classes less interesting. While item number 4 has a mean score of 3.1, item 5 has a mean score of 3.0, item 6 has a mean score of 3.0 and item 8 has a mean score of 2.7 showing a decline in the questionnaire items that explained high level of interest in computer studies classes as the mean scores are higher compared to the criterion mean of 2.5. The grand mean 2.3 revealed that Students taught computer science using the text-based design principle had a mean score below the criterion mean score of 2.5. Thus, text-based design principle has no effect on students' interest when applied.

Research Question Two What is the effect of personalization design principle in comparison to conventional text-based presentation on the students' mean performance scores in Computer Studies?

Table 2: Performance scores of students taught using personalization design principles and text-based design.

Personalization Design principles

Pre-test		**Post-test**	
Mean	7.4	Mean	17.38
SD	1.6	SD	1.69

Text Based Design

Pre-test		**Post-test**	
Mean	7.26	Mean	14.34
SD	1.79	SD	2.87

Table 2 displayed the mean and standard deviation of computer studies students taught using personalization design principles and text-based design. The table revealed that students taught computer studies using personalization design principles has a higher post-test mean score of 17.34 when compared to the mean score of students taught computer studies using text-based design which had a mean score of 14.34. This shows a slight difference in favour of personalization design principles.

Hypothesis One: There is no significant difference between the interest of students taught Computer Studies using personalization design principle and those taught using text based instructional presentation.

Table 3: Test of Hypothesis 1

Tests of Between-Subjects Effects

Dependent Variable: Post Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	0.030	2	0.015	0.002	0.998	0
Intercept	795.347	1	795.347	92.851	0.000	0.32
Principle	0.025	1	0.025	0.003	0.957	0
Interest	***0.01***	***1***	***0.01***	***0.001***	***0.972***	***0***
Error	1687.47	197	8.566			
Total	42872	200				
Corrected Total	1687.5	199				

Accept the null hypothesis

Table 3 displayed the output result of the test of Hypothesis 1 which states that: "There is no significant difference between the interest of students taught Computer Studies using personalization design principle and those taught using text based instructional presentation." Findings revealed that the difference between the interest of students taught computer studies using personalization design principles and text-based design principle is not statistically significant. Hence the null hypothesis of no significant difference was retained

Hypothesis two: There is no significant difference between the mean performance scores of students taught Computer Studies using personalization design principle and those taught using text based instructional presentation.

Table 4: Test of Hypothesis 2

Tests of Between-Subjects Effects

Dependent Variable: Post Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.030	2	0.015	0.002	0.998	0
Intercept	3716.85	1	3716.85	433.916	0	0.688
Performance	0.01	1	0.01	0.001	0.972	0
Principle	***0.025***	***1***	***0.025***	***0.003***	***0.007***	***0***
Error	1687.47	197	8.566			
Total	42872	200				
Corrected Total	1687.5	199				

Reject the null hypothesis

Table 4 displayed the output result of the test of Hypothesis 2 which states that "There is no significant difference between the mean performance scores of students taught Computer Studies using personalization design principle and those taught using text based instructional presentation." findings revealed that there is a statistical difference. Hence, the null hypothesis was rejected.

Discussion of findings

In table 1, items accepted revealed that students taught computer science using personalization design principle as propounded by Mayer had a mean score above the criterion mean score of 2.5. This further revealed that personalization principle has positive impact on students' interest when applied. While in table 2, items rejected revealed that text-based design has no effect on students interest Further analysis also emphasized on the statistical difference between personalized design principles and text-based design. It was found when data obtained was subjected to ANCOVA test that the difference between the interest of students taught computer studies using personalization design principles and text-based design principle is not statistically significant. Hence the null hypothesis was retained.

Table 2 revealed that students taught computer studies using personalization design principles had a higher post-test mean score of 17.34 when compared to the mean score of students taught computer studies using text-based design which had a mean score of 14.34. This shows a slight difference in favour of personalization design principles. When subjected to an analysis of covariance test, findings revealed that there is a statistical difference. Hence, the null hypothesis was rejected. This finding does not support that of Bonnie, Nithi, and Jaqueline (2016) that explained that text-based principle improved students learning.

Conclusion

From the findings of the study, it can be ascertained that personalization design principles as explained by Richard E. Mayer can simplify teaching and learning of computer science and has the ability to enhance performance and interest of students in computer studies.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Richard E. Mayers multimedia principles should be adopted at all stages and levels of education when designing instructional slides.
2. Instructional system designers and curriculum experts should also create awareness on these principles to various educational cadres.
3. Workshops and conferences to encourage the use of instructional slides when appropriate and adopting the principles should be inculcated at the secondary school level by the bodies concerned with retraining of secondary school teachers.

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