**Perceived Influenced of Blended Learning on Student Engagement and Attitude in Secondary School Chemistry: Evidence from Ekiti State, Nigeria**

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**Abstract**

*This study investigates the impact of blended learning on student engagement and attitude towards chemistry among senior secondary school students in Ekiti State, Nigeria. Utilizing a descriptive survey design, data were collected from 200 students across ten randomly selected schools in Ado Local Government Area. A structured questionnaire was developed and validated through expert review and test-retest reliability procedures, yielding reliability coefficients of 0.83. Statistical analysis using ANOVA revealed that blended learning significantly enhances both students’ engagement and attitude towards chemistry. The findings underscore the importance of integrating digital tools into classroom instruction and providing professional development for educators. Recommendations include expanding access to technology, refining instructional strategies, and continuously evaluating blended learning models to optimize educational outcomes.*

Keywords**:** Blended Learning, Students’ Engagement, Attitude, Chemistry

**Introduction**

In the digital era, technology has revolutionized the way education is delivered, giving rise to new approaches that aim to enhance student learning outcomes. Blended learning, a pedagogical model that combines face-to-face instruction with online components, has emerged as a promising educational strategy

Blended learning is defined as an instructional method that combines online interactions with traditional methods of instruction (Bonk, 2016). This form of learning uses regular classroom interaction and simultaneous use of web - based materials accessed by the student outside of class meeting hours (Garrison, 2014). Blended learning in Science Education classrooms leverages a variety of digital tools and resources, including multimedia presentations, interactive simulations, virtual labs, and online assessments. By incorporating these elements into the curriculum, educators can create dynamic learning environments that cater to diverse learning styles and interests, ultimately fostering greater student engagement (Tiger, 2019). Blended learning environments provide students with opportunities for active participation, self-directed learning, and personalized instruction, which are crucial factors in fostering engagement. By incorporating multimedia resources, interactive activities, and collaborative online platforms, blended learning environments cater to diverse learning styles and preferences, thereby enhancing student motivation and involvement in the learning process. Moreover, the flexibility offered by online components allows students to access learning materials at their own pace and convenience, promoting autonomy and ownership of learning (Kanuka, 2017).

The impact of blended learning on student engagement and attitude across various educational levels and subject areas. For instance, a meta-analysis by Means et al. (2013) found that blended learning approaches resulted in higher student attitude compared to traditional face-to-face instruction. Similarly, a Garrison and Vaughan (2018) emphasized the importance of social presence and interaction in blended learning environments, which are critical factors in promoting student engagement and learning outcomes. The integration of adaptive learning technologies in blended learning environments has been shown to enhance student engagement by providing personalized feedback and adaptive support based on individual learning needs (Joksimovic et al., 2019). These technologies analyze student performance data to tailor instruction and learning experiences, thereby maximizing student engagement and attitude

Blended learning is one of the most modern methods of learning helping in solving the knowledge explosion problem, the growing demand for education and the problem of overcrowded lectures if used in distance learning, expanding the acceptance opportunities in education, being able to train, educate and rehabilitate workers without leaving their jobs and teaching housewives, which contributes to raising the literacy rate and eliminating illiteracy; blended learning increases the learning effectiveness to a large degree, decreases the time environment required for training, decreases the training costs, allows the learner to study at his favorite time and place, allows for live interviews and discussions on the network, provides updated information suiting learners' need, and provides simulations, animations, practical events and exercises and practical applications (Al- Shunnaq and Bani Domi, 2017).

Blended learning is one of the contemporary trends of education and one of the new trends of the teacher in the twenty first century; it can be described as an educational method in which more than one means is used for transmitting knowledge and experience to learners to achieve the best of the learning outputs (Freihat, 2004); accordingly, this model combines the advantages of e-learning and the benefits of classroom education; this education is based on the integration between the traditional learning and e-learning (Al-Rimawi, 2016).

Student engagement plays a pivotal role in determining educational success. It encompasses the cognitive, emotional, and behavioural aspects of student involvement in learning activities. Traditionally, the classroom has been the primary setting for instruction, where teachers deliver lectures and students passively absorb information. However, this traditional approach often fails to cater to the diverse learning needs and preferences of students in the digital era (Graham, 2019). Blended learning offers a solution by integrating online resources and activities into the learning experience. By combining face-to-face interaction with digital tools and platforms, educators can create a dynamic and interactive environment that fosters student engagement. Blended learning provides opportunities for personalized learning, active participation, and collaboration, which are key drivers of student engagement.

E-learning environments pave the way for instructional innovations for new generations and make individuals equipped with technologic devices and softwares which provide ubiquitous learning environment (Olugbuyi et al. Rich educational environments that contain mobile devices, web platforms and instructional softwares initiate a new period in education using e-learning environments. (Horton, 2002). Those environments will also help students gain digital literacy, digital ethic and self regulatory proficiencies through using computers. When developing web 2.0 technologies and Information-Computer Technologies (ICT), instructors can use new techniques and methodologies, which pave the way for ubiquitous learning environments and allow practicing e-learning tools. One of these methodologies is blended learning that is defined as a computer mediated instructional strategy that leverages technology and focuses on the student-teacher relationship to enhance independence, engagement, and attitude. This student-centered, teacher-facilitated strategy includes online and experiential components to strengthen classroom learning. In blended instruction, blending not only includes technology but authentic experiences as well (LaBanca et al, 2013).

The impact of e-learning environments on blended learning approaches in science education is a subject of growing interest and research. Scholars and educators seek to understand how these digital tools influence student engagement and attitude within the context of blended learning. Engagement, encompassing factors such as motivation, participation, and interaction, plays a crucial role in determining the effectiveness of educational interventions (Kim, 2021). Likewise, attitude, measured with academic performance, knowledge and retention, is a key indicator of learning outcomes in Chemistry and other STEM disciplines.

Johnson, (2019) opined that inquiry-based learning fosters active student participation, critical thinking, and problem-solving skills by encouraging students to explore scientific concepts through questioning, investigation, and discovery. When integrated into a blended learning environment, where online resources complement classroom instruction, inquiry-based approaches have the potential to significantly enhance student engagement and academic attitude in Chemistry.

Blended learning platforms offer various tools and resources, such as virtual labs, multimedia presentations, and interactive simulations, which complement inquiry-based instruction and provide students with opportunities for self-directed learning and exploration. These resources can accommodate different learning styles and preferences, allowing students to access content at their own pace and review material as needed (Doe, 2018).

**Statement of the Problem**

The integration of technology into Chemistry has opened up new avenues for learning, enabling students to access resources, collaborate with peers, and engage with course content outside of the classroom. However, the effectiveness of blended learning in promoting student engagement and attitude in Chemistry is contingent upon various factors, including instructional design, technological infrastructure, and pedagogical strategies. Even among students with access to technology, there may be varying levels of digital literacy and proficiency. In a blended learning environment, students may struggle to receive personalized support tailored to their individual learning needs. While online platforms can offer some degree of customization, the absence of immediate face-to-face interaction with instructors may limit the ability to provide timely feedback and address specific challenges faced by students. Maintaining students' motivation and interest in blended learning can be challenging. Without the physical presence of peers and teachers, some students may feel disconnected and demotivated, leading to decreased engagement and lower academic attitude. Additionally, the self-paced nature of online components may result in procrastination and lack of accountability.

**Purpose of the Study**

The purpose of the study is to examine the influence of blended learning on students’ engagement and attitude in Chemistry. The specific objectives include:

1. To evaluate the extent to which Blended Learning promotes students Engagement and Attitude in Chemistry among Students in Ekiti State

**Research Questions**

1. What is the influence of Blended Learning on Students' Engagement as perceived by Chemistry Students?
2. What is the influence of Blended Learning on Students' Attitude as perceived by Chemistry Students?

**Research Design**

This study made use of descriptive research design of survey type. The descriptive research design is used to describe characteristics of a population or phenomenon being studied. In other words, it was used to describe the situation of things as related to the target population. This design gives the best explanation on the features of the variables under study.

**Population of the Study**

The population of the study comprised all students in Senior Secondary Schools in Ado-Local Government, Ekiti state.

**Sample and Sampling Techniques**

A total of two hundred (200) respondents constituted the sample of this study. This study is on all senior secondary schools in Ado-Local Government, Ekiti state, out of which ten (10) schools were chosen using simple random sampling technique for the collection of information. Twenty (20) students were randomly selected from each schools to make a total of 200 students.

**Research Instrument**

A self-designed questionnaire, was used as the research instrument, which is divided into three sections. Section A contained items on the socio-demographic variables of the respondents. Sections B and C contained items on the dependent variables, attitude and engagement.

**Validity of the Instruments**

To validate the research instrument, face and content validity was deployed. This was done by giving sample of the questionnaire to experts in Test and Measurement and Chemistry Education Department. The items contained in the questionnaire was scrutinized and tested. The corrected version was given to the researcher’s supervisor for proper scrutiny before the final copy was produced.

**Reliability of the Instruments**

In order to test the reliability of the instrument, a test-retest method of ensuring reliability was used. The data collected were collated and analyzed using Cronbach alpha reliability test. The correlation coefficient was used to determine the level of reliability. The reliability coefficient of 0.83 were obtained.

**Administration of the Instrument**

Two hundred (200) copies of questionnaire was administered on the respondents. The respondents were guided while filling the questionnaire. This was done with the help of two (2) trained research assistants. After proper attention were given, the questionnaires were collected and collated for analysis.

**Data Analysis**

Data collected were analysed using Analysis of Variance (ANOVA) to analyse research questions.

R**esults**

**Research Question One:** What is the influence of Blended Learning on Students’ Engagement as perceived by Chemistry Students?

**Table 1.** ANOVA showing the influence of Blended Learning on Students' Engagement as perceived by Students

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | Sum of Squares | df | Mean Square | F | Sig. |
|  | Between Groups | (Combined) | 923.176 | 25 | 36.927 | 4.310 | .000 |
| Linearity | 536.733 | 1 | 536.733 | 62.644 | .000 |
| Deviation from Linearity | 386.442 | 24 | 16.102 | 1.879 | .011 |
| Within Groups | | 1490.824 | 174 | 8.568 |  |  |
| Total | | 2414.000 | 199 |  |  |  |

***\*\*****Significant at 0.05 level*

Table 1 shows the influence of blended learning on students’ engagement as perceived by the students. The p value is lower than 0.05, hence there is a positive influence. Therefore, blended learning has a positive influence on the engagement of Chemistry students in Ekiti state secondary schools.

**Research Question Two:** What is the influence of Blended Learning on Students’ Attitude as perceived by Chemistry Students?

**Table 2.** ANOVA showing the influence of Blended Learning on Students’ Attitude as perceived by Chemistry Students

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | Sum of Squares | df | Mean Square | F | Sig. |
|  | Between Groups | (Combined) | 8774.837 | 25 | 350.993 | 6.008 | .000 |
| Linearity | 6298.106 | 1 | 6298.106 | 107.806 | .000 |
| Deviation from Linearity | 2476.731 | 24 | 103.197 | 1.766 | .020 |
| Within Groups | | 10165.163 | 174 | 58.420 |  |  |
| Total | | 18940.000 | 199 |  |  |  |

***\*\*****Significant at 0.05 level*

Table 2 shows the influence of blended learning on students’ attitude as perceived by the students. The p value is lower than 0.05, hence there is a positive influence. Therefore, blended learning has a positive influence on the attitude of Chemistry students in Ekiti state secondary schools.

**Summary of findings from the analysis of results in this chapter.**

Blended learning has been shown to positively influence the engagement and attitude of Chemistry students in Ekiti State secondary schools. This outcome aligns with the findings of Sarabadani and Berenjian (2017), who highlighted the beneficial role of blended learning and computer-mediated teaching environments in enhancing student engagement and academic performance. While Han (2024) reported that students in higher education may face challenges adapting to blended formats, resulting in inconsistent improvements in motivation and engagement, such discrepancies underscore the importance of contextual factors. The success of blended learning appears to be closely tied to thoughtful course design, student preparedness, and institutional support, which may explain its effectiveness in the Ekiti State context.

**Conclusion**

The study concluded that blended learning has influenced students’ engagement and attitude in Chemistry. Also, it concluded that blended learning enhances student engagement and participation, blended learning allows for more personalized learning experiences, it helps accommodate different learning styles of students, it facilitates better communication. Blended learning promotes greater flexibility in teaching methods, it improves access to educational resources and materials, and it helps in developing digital literacy skills among students.

**Recommendations**

Based on the findings of this study the following recommendations were made:

* + - 1. School owners should integrate a variety of digital tools such as simulations, videos, and interactive modules to cater to different learning styles and enhance student engagement.
      2. Institutions should offer professional development opportunities for teachers to learn how to effectively implement blended learning strategies. This training can include technical skills for using digital tools and pedagogical strategies for integrating these tools into the curriculum.
      3. Regularly assess the effectiveness of blended learning models in terms of student engagement and attitude.
      4. Feedback from students and teachers should be used to refine and adapt the learning modules to better meet the needs of students.
      5. School should ensure that all students have access to the necessary technology and internet connectivity required for participating in blended learning. This includes providing resources for students who may lack access to digital tools at home.

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