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### RESEARCH ARTICLE

#### Effect of Internet Addiction on Physics Practical Work among Secondary School Students

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#### Abstract

Physics education possesses great potential in providing an outstanding opportunity to drive and shape sustainable development for the future world. Perhaps, the subject is among the science subjects that are better learned through laboratory experiments. Practical physics work enables students to do experiments on the fundamental laws and principles and gain experience of using a variety of measuring instruments and other physics-related apparatus. However, insinuation suggests that most students show less commitment to practical work, attributed to various factors. Thus, the purpose of the present study was to examine internet addiction as a factor that could explain the variation in student's participation in physics practical. One hundred and forty-four students who met the inclusion criteria were selected from secondary schools in the Kogi state as the participants. The respondents completed a self-report measure of internet addiction and practical physics participation. The result revealed that compulsive internet usage significantly predicts participation in physics practical. Thus, the study concluded that internet addiction is a positive determinant of student's engagement in physics practical.

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#### Introduction:-

Physics education possesses great potential in providing an outstanding opportunity to drive and shape sustainable development for the future world (Nasri et al., 2020). Physics is an essential subject at the secondary schools level in Nigeria that portends a real panacea towards realizing scientifically informed citizens capable of projecting the nation towards realizing a sustainable economic force (Aderonmu & Obafemi, 2015). Accordingly, scholars have argued that physics as a subject might foster high-end cognitive skills, improve the young learner's scientific literacy and competencies, and create a technically literate, skilled workforce to support the sustainable development of every nation (Bao & Koenig, 2019). Physics is among the science disciplines aimed at exploring the properties of matter and its association with energy. Empirical experiments characterize physics, and the general principles and concepts produced from physics experiments are essential in interpreting natural scientific phenomena. The subject is fundamentally deployed to excite students' interest, curiosity and initiative for learning science and boost students' enrolment in science-related courses (Nasri et al., 2020). Thus, physics learning requires more attention to the teaching and learning process to enhance the students' state of knowledge and understanding to the desired level (Ali, 2020). Researchers have always argued that learning physics develops cognitive patterns that solve broad applicability problems (Grayson, 2020). The relevance of physics is extensively highlighted (Descamps et al., 2020; Hake, 2011; Hidayatullah et al., 2021; Magazù, 2018; Nair, 2018; Nair & Sawtelle, 2019; Zalewski et al., 2019).

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Physics Education is arguably one of the few courses that gain the lowest patronage among science students across Nigeria (Amusa, 2020). Studies in Nigeria have reported students' underachievement in Physics (Achufusi et al., 2019). Researchers in science education in Nigeria have continued to seek ways of improving the situation and maximizing the students' meaningful learning of Physics (Ebong, 2021). Understanding the factors affecting performance in secondary school physics is the first step in solving poor performance in physics (Onah & Ugwu, 2010). Thus, one of the practical approaches deployed by physics instructors in identifying potential individual setbacks in physics is exposing the students to practical laboratory work. Perhaps, experiencing physics laws and observing the phenomenon in the laboratory help students learn effectively (Chang et al., 2015).

Practical work is a significant part of secondary school science (Sharpe & Abrahams, 2020). School curriculums emphasize practical work in the syllabi of chemistry and physics as a primary method (Šorgo & Špernjak, 2012). Practical physics work enables students to do experiments on the fundamental laws and principles and gain experience of using a variety of measuring instruments and other physics-related apparatus. Practical work enhances basic learning skills (Babalola, 2017). Physics practical entails learning conducted with particular contexts to enhance learners' motivation and engagement due to relevant learning episodes drawn from everyday experiences and phenomena (Stanley, 2000).

Research has provided evidence linking physics practical activities to better performance, positive attitude, increased interest and motivation towards the subject (Babajide, 2010; Babalola, 2017; Bandele & Owolabi, 2009; Cheung, 2016; Juuti & Lavonen, 2016; Káčovský & Snětinová, 2021; Lee & Sulaiman, 2018; Naval, 2020; Trivedi & Sharma, 2013; Uba & Mba, 2012; Ukoh & Amuda, 2015). Similarly, empirical studies implicate physics practical on achievement. For example, Omeodu (2018) examined the impact of practical work in teaching physics in secondary schools in Rivers State, Nigeria. The study revealed that the respondents perceived physics practical work as an activity that helps teachers/students master the content through investigations and observations, promoting teachers/students' understanding of the topics. Omeodu (2018) also reported that practical physics makes scientific phenomena more real and has great potential in enhancing social interactions that can positively develop attitudes. Accordingly, Twahirwa and Twizeyimana (2020) investigated the effectiveness of practical work in physics on academic performance among learners of a secondary school in Rwanda. The study employs a quasi-experimental research design, specifically pretest-posttest control group design (control group and experimental group). The study showed that practical physics work was more effective in improving students' performance in physics. Hence, practical work remains an essential approach in teaching and learning physics.

Amadalo et al. (2016) explored practical work as an influencing agent in learning physics by enabling the girls to carry out empirical investigations in the subject. The study involved two groups of girls from three sampled medium-performing schools in Western Kenya. The experimental conditions were exposed to intensive practical work. The control conditions were conventionally taught the same content. The researchers compared the groups in terms of accomplishment on the test, attitude acquired towards physics, and relative choice to further the subject in future class was assessed. The study revealed that the participants in the experimental condition performed better than the control conditions. Thus, signifying the relevance of practical work physics learning.

Lee and Sulaiman (2018) conducted a study to investigate the effectiveness of practical physics work on students' academic performances and compare male and female students' academic performances after implementing practical work in an experimental group. Their study was conducted in a secondary school at Semporna District in Sabah. A total of sixty-six (66) Form Four students (e.g., 16 years old) participated in this research; thirty-two (32) students were assigned to the experimental group and thirty-four (34) students to the control group. The experimental group and control group were taught by using practical work and traditional teaching methods, respectively. A quasi-experimental design was used in this study, and their result showed that practical physics work positively influences physics performance.

A study by Musasia et al. (2012) sought to find out the difference in academic accomplishment in physics between learners engaged in intensive practical work and students taught with the traditional methods. Their study was conducted in Kakamega South Sub-County-Kenya using a quasi-experimental pre-test, post-test non-equivalent group research design. The researchers analyzed their post-test study using the t-test, ANOVA, and Chi-Square. After the analysis, they observed that the experimental condition significantly outperformed the control condition. Despite evidence indicating the relevance of practical work in physics, research in Nigeria argued that measurement phobia, lack of interest, and annoyance during practical work hinder students' participation in practical (Adedayo

&Julius, 2015). Thus, the present study is aimed to examine internet addiction as a possible antecedent that could predict student participation in practical physics work.

Although the internet has provided limitless opportunities to the universe, there is growing concern about the increasingly common phenomenon of excessive internet use by young people, leading to internet addiction (Niedorys et al., 2018). Internet addiction has become a public health issue that cannot be neglected (Malak et al., 2017; Ukoh & Amuda, 2015). An observation into the current activities of students in secondary schools in Nigeria would suggest that most students commit much of their time to internet-enabled devices rather than school-related activities. It could be right to state that most students now spend excessive time engaging in all sorts of internet activities such as online chatting, gambling, and using their smartphones during school periods. This trend could negatively impact their schoolwork engagement and, by extension, academic performance. For this study, internet addiction is the excessive or irresistible compulsion regarding internet use that leads to impaired psychological and social functioning.

Internet addicts may use their smartphones or other devices to access the internet for extended periods, isolating themselves from other forms of social contact and focus almost entirely on their internet device rather than broader life events. In other words, internet addicts are assumed to be unable to do without their internet accessing devices and may find it extremely difficult to function without them. As such, they may not have time to engage in practical activities relating to physics education. To this end, the person may be preoccupied with internet-related activities more than other school activities such as physics-related practice. Also, because physics practical is conducted outside the classroom, the activity may seem unimportant to the internet-addicted person.

More so, evidence suggests that most students show a negative attitude towards physics practical work (Kaya & Boyuk, 2011). Following the relevance of physics practical work to teaching and learning physics at the secondary school level and beyond. It would seem essential to consider the factors that could impact experimental physics works among the youngsters. In that sense, one possible antecedent that is purported, in the current study, to have an impact on secondary school student's physics practical work is internet addiction. Therefore, the main objective of this study is to investigate the role of internet addiction in predicting physics practical work participation among senior secondary school students in Kogi State.

### **Hypothesis**

Based on the objective of the study, the following hypothesis was formulated in the study:

Internet addiction will significantly predict participation in practical physics work among senior secondary school students in Kogi State.

### **Method:-**

For this study, a cross-sectional survey was adopted. The population of the study includes secondary school students in the Kogi State of Nigeria. Participants comprised males and females senior secondary school students. A total of one hundred and eighty-three students who met the inclusion criteria (e.g., having a smartphone and being enrolled in science class) were approached with the aid of school teachers and administrators between July and September 2021. The students were prepared and informed on the study purpose before the start of the study. Out of the 183 students approached, 165 consented to partake in the research and were handed the questionnaires to fill on the spot. On observation of the retrieved questionnaires, one hundred and forty-four (144) were correctly filled while thirteen were wrongly filled and eight were not returned. Thus the 144 correctly filled copies were subjected to statistical analysis.

### **Measure:-**

Internet addiction was measured using the Internet Addiction Test (IAT) by Young (1998). The twenty-item instrument measures online behaviors associated with irrepressible internet use, including distraction, reliance, and compulsivity. The items are randomized and measured based on a 5-point Likert scale ranging from 0 = less extreme behavior to 5 = most extreme behavior (Young, 1998). The IAT can be administered to people in about 5 to 10 minutes. Scores of 0 to 30 specify an average internet use level. Scores of 31 to 49 show a mild internet addiction level, 50 to 79 indicate a moderate internet addiction level, and scores of 80 to 100 designate a severe internet addiction level Young (1998). The instrument has been validated and used previously in Nigeria by Akpunne et al. (2020)

Physics practical work participation was rated on a 10-item Likert form scale scored in 5-point ratings ranged from 1 (not likable at all) to 5 (very likable). The scale was validated following a pilot study, and Cronbach alpha .78 reliability coefficient was obtained. A higher score indicates high participation in practical work.

## Result:-

### Testing the study hypothesis

The primary assumption of the study is that internet addiction would account for the variation in student's participation in physics practical work. A linear regression model was conducted to test the hypothesis. The result of the linear regression established a statistically significant effect of internet addiction on the respondent's participation in physics practical work at  $F(1,142), 134.618 P < .05$  with adjusted  $R^2$  of 483.

**Table 1:-** Table showing the regression analysis of the role of internet addiction on participation in practical physics work.

	B	SEB	$\beta$	t	$R^2$	Sig
Constant	1.85	.047		37.78	.483	.000
Internet Addiction	-.69	.062	-.69	-11.19	.000	

## Discussion:-

The present study was aimed to determine internet addiction as a factor that could influence students' participation in physics practical work in secondary school in Kogi State, Nigeria. The result of the regression analysis revealed that internet addiction statistically significantly predicted practical work engagement among the respondents  $F(1,142), 134.618 P < .05$ . The research finding suggests that the students who are compulsive internet users are more likely to engage less in practical than their unaddicted counterparts. Consequently, the adjusted  $R^2$  indicates that the phenomenon of internet addiction accounts for about 48.3% of the variance in student's participation in physics practical. Similarly (Ganji et al., 2016; Li et al., 2019; Taş, 2017) had reported an association between internet addiction and school participation. The probable explanation for this outcome reflects the effect of compulsive internet use on general wellbeing. Physics practical is essential and also requires commitment and dedication. Thus, over-dependence on the internet is a critical determinant in academic participation and could impair attention in the laboratory. Equally, internet dependence does not necessarily lead to poor performance in physics. However, it can increase burnout and prompt procrastination towards laboratory participation. Perhaps, research has linked internet dependence with academic burnout and procrastination (Imani et al., 2018; Malyshev & Arkhipenko, 2019). From this result, it can be deduced that internet addiction would significantly influence learners' engagement in any science practical, including biology and chemistry. Also, the motivation to engage in physics practical could be improved among the young students if the teachers and parents' moderate internet usage. Perhaps, moderate internet use provides the pathway through which interest in practical could be enhanced.

## Conclusion:-

The study aimed to examine compulsive internet usage as a factor that could influence student's participation in physics practical in secondary school. The result found that the predictor variable accounted for the variance in practical work participation. Hence, it is concluded that internet addiction is a significant predictor of involvement in laboratory practical. Thus, the study recommends effective monitoring of student's exposure to the internet. Despite this current knowledge, the mechanism through which internet dependence affects participation in practical work remains unclear. Thus, the study recommends that future research establish a cause-effect relation to broadening the interaction between internet dependence and student engagement in science laboratory practical.

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