



Effect of Infographics and E-Book Instructional Packages on Junior Secondary School Students' Learning Outcomes in Business Studies in Ibadan, Nigeria

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Abstract

This research developed instructional packages in the form of infographics and e-books and evaluated their effectiveness on junior secondary school students' learning outcomes (achievement, attitude, and entrepreneurial intention) in Business Studies in Ibadan, Nigeria. Three hypotheses were formulated and tested. A quasi-experimental pretest-posttest control group design was used for the study. Three public junior secondary schools with operational computer labs and backup generators were purposefully selected in Ibadan. Three intact Junior School II classes were randomly assigned to the infographic (n=50), e-book (n=42), and control (n=90) groups. The tools utilised included the Students' Achievement Test ($r=0.80$), Attitude to Business Studies ($r=0.75$), and Entrepreneurial Intention ($r=0.70$) scales. Data were analysed using Analysis of Covariance (ANCOVA) and Bonferroni posthoc tests at a 0.05 significance level. Results from the analysis revealed that there were significant main effects of infographics and e-book instructional packages on students' achievement ($F_{(2, 181)} = 358.68; p < 0.05$, partial $\eta^2 = 0.64$); Students' attitude towards business studies ($F_{(2, 181)} = 104.19; p < 0.05$, partial $\eta^2 = 0.54$) and entrepreneurial intention ($F_{(2, 181)} = 66.93; p < 0.05$, partial $\eta^2 = 0.43$). Students in the E-book had the highest adjusted post-achievement mean score (38.88) followed by the Infographics group (38.73) and the Control group (25.10). Students in the Infographics group had the highest adjusted post-attitude mean score (70.14) followed by the e-book group (69.90) and Control group (60.64). While students in E-book had the highest adjusted post-entrepreneurial intention mean score (68.44) followed by the Infographics group (66.63) and Control group (61.60) respectively. This study recommends the adoption of infographics and e-book instructional packages in teaching Business Studies to enhance learning outcomes.

Keywords: Infographics, E-book instructional package, Achievement, Attitudes, Entrepreneurial intention

Introduction

Business studies is a key component of the pre-vocational subjects included in the Junior Secondary School curriculum in Oyo State. It's a compulsory subject at this level of education to provide students with business knowledge and skills through its different components including bookkeeping, commerce, office practice, shorthand, and typewriting. The subject has different trade areas which are capable of motivating students' entrepreneurial intention and equipping the graduates with the required job skills to secure paid employment or personal job creation for those who may not have the opportunity to further their education beyond junior secondary school (Akpojotor, 2022). Despite the fact that students have been exposed to business studies from Junior Secondary School one to three and beyond, findings have revealed that many graduates still find it challenging to be self-employed or secure jobs several years after graduation (Ogonu, 2019). Nigeria, a highly populous country in Africa with around 200 million inhabitants, is the 7th most populous nation globally. Its unemployment rate has risen significantly, increasing from 3.50 million to 12.16 million between 2009 and 2020 (Figure 1) unlike in the previous years when people were employed upon graduation (Trading Economics, 2021).

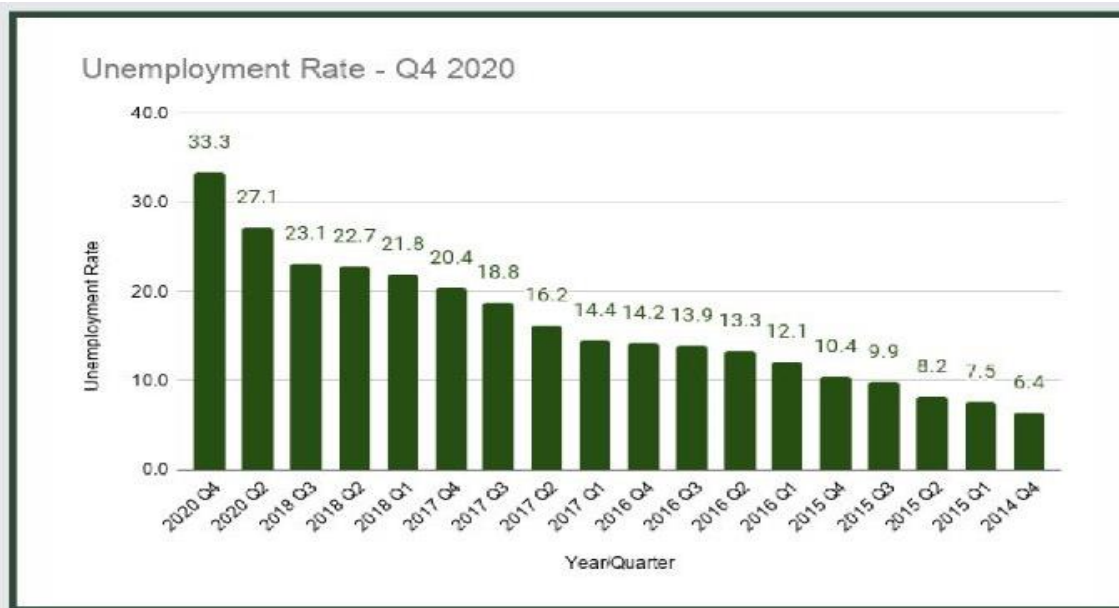


Figure 1: Statistic of Unemployment in Nigeria. **Source:** Trading Economics, 2021. (National Bureau of Statistics)

Moreover, there are several reasons for the persistent increase in the unemployment rate in Nigeria. One of the most prominent reasons is that students seem not to have the requisite knowledge to start their own business. This has been a major factor affecting students' entrepreneurial intention thus they depend on getting white-collar jobs from public and private companies which are not readily available in both sectors (Global Business School Network, 2013; Adeye, 2017; Amesi & Giami, 2018). In support of this assertion, Ibrahim et al. (2015), posited that the entrepreneurial dreams of many students are hindered by the teachers' inability to engage learners in business studies activities through effective instructional methods and this could have been one of the factors affecting learners' attitude towards business studies. This emphasises the efficacy of instructional strategies in promoting students' entrepreneurial intentions and attitude towards Business studies. Attitude in this context is the junior secondary school students' predisposition towards concepts in business studies. Attitude can be positive, negative or neutral and there cannot be intention without an appropriate entrepreneurial attitude. The attitude of students towards business studies will influence their attitude toward business studies and their decision to be either entrepreneurs or employees. According to Ogonu (2019), students develop negative attitudes towards business studies as a result of teachers' adoption of the conventional teaching method which gives more emphasis on verbal narration while students are just passive listeners. This technique is said to be related to deficient stimulation of students' innovation limits, intellectual reasoning, remembrance, cramming and high reliance among learners (Futterman, 2020; Ekoh, 2016). This suggests that educational strategies that support memorisation and reproduction are short of understanding and can be utilised to take care of issues/problems in new circumstances. Thus, more effective pedagogical approaches would be needed to ameliorate the problem.

The effect of relevant and adequate methodologies in propelling a common vision and opportunity identification by Business studies learners cannot be over-emphasized because the nature or quality of knowledge an individual acquires decides the degree of self-realisation and influence on the society at large. This suggests that the instructional contents need to be incorporated with motivating components like (technology) to stimulate students' entrepreneurial intention and engage them with the content of the subject. This might strengthen students' capabilities to effectively apply the knowledge and competence gained in the classroom to solve personal and societal challenges and to lay a solid foundation to pursue the subject at a higher level of education. Therefore, there is a need for instructional packages that will not only improve academic performance but will enhance students' entrepreneurial intention and attitude towards business studies. In an attempt to tackle these challenges, scholars like Amesi and Giami 2018), Oribhabor (2020) and Olalude (2023) have consistently advocated the essence for Business studies educators to integrate technology such as animation, simulation and digital puzzles among others into their collection of teaching and learning toolkits to enhance learners' performance in business studies most especially at junior school level. However, there is more to the teaching of business studies than learners scoring good grades. This instructional content needs to

be incorporated with elements that could motivate students, arouse their entrepreneurial intention and at the same time improve their attitude and academic achievement. These are instructional challenges that could be surmounted with the integration of appropriate integration of technologies, particularly infographics and e-book instructional packages, into classroom activities (Antonova, 2016; Odawn, 2018; Olalude, 2023).

The word "infographics" is information arranged visually. It is a visual portrayal of information that incorporates different modes and communicative functions to illuminate, by depicting or making sense of something or portraying a verifiable story to assist the students grasp essential ideas and content (Ismael & Al Mulhim, 2021). Several studies have indicated obvious improvement in students' learning outcomes as a result of reliance on graphics and text as effective tools for learning. The study carried out by Olalude (2023), established that students remember and retain information when a text is being combined with an image or graphic. Additionally, other research indicates that students can preserve information for a longer time when using textual material enhanced with graphics (Alotiabi, 2016; Al-Hosni, 2016). Based on the principles of Cognitive Load Theory (CLT) of Sweller (1988), such occurrences take place because combining graphics with text lowers the cognitive load, which refers to the mental effort a learner invests in the learning process. This allows learners to concentrate more on the material itself rather than on deciphering how it is presented (Sweller, 2017). This captivating information visualisation can direct and concentrate students' attention, making it a useful learning tool with the potential to enhance knowledge acquisition. In addition, an e-book instructional package is another learning resource that can help overcome the difficulties encountered in teaching and learning business studies. In this digital age, the use of e-books in the classroom is becoming increasingly popular. E-books are digital books that include educational content and features, making them suitable for use in educational settings. (Leong et al., 2019). Numerous studies have investigated the utilisation of e-books as a teaching medium in the classroom. These studies have examined how e-books can improve the learning experience (Shelburne, 2019; Odawn, 2018). According to Odawn (2018), e-books improve learning comprehension, aid in the development of learning strategies, and enhance academic achievement. Chau (2018) also noted that e-books can provide students with varied learning scenarios that, compared to traditional teaching methods, can better support self-directed learning and reading motivation. E-books offer interactive experiences between learners and media, boost learners' logical thinking and integrative skills, and engage multiple senses (sight, hearing, and touch) during learning (Olalude, 2023). Therefore, this study is not meant to criticise the traditional teaching method but to enrich it through interactive instructional packages, particularly infographics and e-books by reducing the degree of abstraction in the way instruction is delivered and stimulating students' entrepreneurial intention, improving their attitude towards business studies as well as their achievement in business studies. In the foregoing, this study developed and examined the effects of infographics and e-book instructional packages on junior school students' learning outcomes in Business studies in Ibadan, Nigeria.

Statement of the Problem

Business Studies is a mandatory discipline that has been established to provide students with the required business knowledge and skills to be self-reliant. The subject has different trade areas which are capable of motivating students' entrepreneurial intention and equipping them with requisite job skills for personal job creation. Despite the fact that students have been exposed to business studies from junior secondary school one to three (JSS 1 – JSS 3) and beyond, findings have revealed that many graduates still find it challenging to be self-employed several years after graduation. Studies have revealed that the entrepreneurial intentions of many students and attitudes towards business studies are being hindered by teachers' inability to engage students in business studies activities through suitable and effective teaching methods. Therefore, students depend on cramming concepts and obtaining high scores rather than understanding business studies concepts to reason out business opportunities for self-employment. In an attempt to tackle these challenges, Researchers have consistently emphasized the importance of using technology-driven teaching methods that can actively engage students and encourage their interaction with technology. Past research has primarily focused on employing technologies such as simulations, interactive videos, and mobile instruction to enhance academic performance in business studies, particularly at the university level. However, the scope of teaching and learning business studies extends beyond merely achieving high grades. The instructional contents need to be incorporated with motivating components (technology) to stimulate students' entrepreneurial intention and engage them with the content of the subject. This would strengthen students' capabilities to effectively apply the expertise and competencies developed through classroom instruction to solve personal and societal problems and also lay a solid foundation to pursue the subject at a higher level of education. Hence, this research developed infographics and e-book instructional packages to evaluate their impact on students' learning outcomes (achievement, attitude, and entrepreneurial intention) in Business Studies in Ibadan, Nigeria.

Aim and Objectives of the Study

The main objective of this study was to assess how effective infographics and e-book packages enhance students' achievement, their attitudes towards business studies, and their entrepreneurial intention. The specific objectives are to:

1. Examine the effect of the intervention on students' achievement in Business Studies.
2. Assess the impact of the intervention on students' attitudes toward Business Studies.
3. Evaluate the effect of the intervention on students' entrepreneurial intentions.

Hypotheses

H01: No significant main effect of the intervention on students' achievement in Business Studies.

H02: No significant main effect of the intervention on students' attitudes toward Business Studies.

H03: No significant main effect of the intervention on students' entrepreneurial intentions.

Methodology

Pretest-posttest control group quasi-experimental design was utilised. In Ibadan, 3 public junior schools equipped with operational computer labs and backup power generators were purposely chosen. Junior School II students from three intact classes were randomly assigned to receive instruction using infographics (n=50), e-books (n=42), and control (n=90) groups. The development of the instructional packages was hinged on the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework and underwent a trial testing phase with students located outside the Ibadan metropolis before their actual implementation. The instrumentation employed included the Business Studies Achievement Test (r=0.80), the Students' Attitude to Business Studies Questionnaire (r=0.75), and the Students' Entrepreneurial Intention Questionnaire (r=0.70). The reliability coefficients of these instruments were determined using Kuder-Richardson (K-R 20) and Cronbach alpha. As a result, the instruments demonstrated high reliability. Data analysis was conducted using Analysis of Covariance (ANCOVA) and the Bonferroni post-hoc test, with a significance level set at 0.05.

Results

Ho1: No significant effect of treatment on learners' achievement in business studies

Table 1: Analysis of Covariance (ANCOVA) of post-achievement by treatment

Source	Type III Sum of Square	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	31138.814	3	10379.605	673.838	0.000	0.919
Intercept	2864.543	1	2864.543	185.965	0.000	0.510
Pre-Achievement	5524.967	1	5524.967	358.678	0.000	0.667
Treatment	4841.003	2	2420.501	157.138	0.000*	0.637
Error	2757.262	179	15.404			
Total	222121.000	183				
Corrected Total	33896.077	182				

*Significant p<0.05

Table 1 indicates there was a significant main effect of treatment on learners' achievement in business studies ($F_{(2, 181)} = 358.68; p < 0.05$, partial $\eta^2 = 0.64$). Table 1 further indicates that 64.0% of the total 92.0% (Adjusted $R^2 = 0.92$) variation in learners' post-achievement scores in business studies is attributed to the significant main effect of the treatment. Consequently, hypothesis 1 was not accepted. To assess the extent of this significant main effect across different treatment groups, the estimated marginal means were calculated, with the results shown in Table 2

Table 2: Estimated Marginal Means (EEM) for post-achievement across treatment and control groups

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Infographics Package (IP)	38.88	0.64	37.63	40.15
E-book Package (EBP)	38.73	0.63	37.49	39.97
Control Group (CG)	25.10	0.49	24.13	26.07

Table 2 reveals that students in the E-book Package (EBP) treatment group achieved the highest adjusted mean score of 38.88 in the post-achievement assessment for business studies, followed by students in the Infographics Package (IP) treatment group (38.73), and Control group (CG) (25.10). The sequence is denoted as EBP > IP > CP. To identify which group accounts for the substantial main effect of the treatment on students' performance in business studies, a Bonferroni post-hoc test was conducted among the groups. The findings are shown in Table 3

Table 3: Bonferroni posthoc analysis of post-achievement by treatment and control group

Treatment	Mean	IP	EBP	CG
Infographics Package (IP)	69.19			*
E-book Package (EBP)	70.33			*
Control Group (CG)	60.61	*	*	

Table 3 indicates that the average post-achievement scores of students in the E-book Package (EBP) group are similar to those of students in the Infographics Package (IP) group. However, there is a noticeable difference between the mean scores of the E-book Package (EBP) group and the Control Group (CG). Additionally, Table 3 highlights a significant disparity in the post-achievement scores between students who used the Infographics Package and those taught with the conventional method. This suggests that the notable difference found in the ANCOVA results is due to the contrast between the treatment groups and the control group, rather than between the treatment groups themselves, in terms of students' post-achievement scores in business studies.

H02: No significant main effect of treatment on learners' attitude to business Studies

Table 4: ANCOVA of post-attitude by treatment

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10069.767	3	3356.589	197.479	0.000	0.768
Intercept	1567.989	1	1567.989	92.250	0.000	0.340
Pre_Attitude	2989.746	1	2989.746	175.897	0.000	0.496
Treatment	3541.719	2	1770.859	104.185	0.000	0.538
Error	3042.495	179	16.997			
Total	796068.000	183				
Corrected Total	13112.262	182				

* Significant. $p < 0.05$

Table 4 reveals a notable main effect of infographics and e-books on learners' attitudes to business study, with statistical results showing $F(2, 181) = 104.19$; $p < 0.05$ and a partial η^2 of 0.54. This partial η^2 value indicates that 54.0% of the observed variation in learners' post-treatment attitudes towards business studies is due to the effects of the treatment. Given that this substantial effect accounts for a significant portion of the total variation (76.0% with an Adjusted R^2 of 0.77), hypothesis 2 was not accepted. To further analyse the impact of the treatment across different groups, Estimated Marginal Means (EMMs) for each treatment group were computed, with the findings detailed in Table 5

Table 5: EEMs for post-attitude by treatment and control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Infographics Package (IP)	70.14	0.58	68.98	71.29
E-book Package (EBP)	69.90	0.65	68.62	71.19
Control Group (CG)	60.64	0.45	59.75	61.52

Table 5 shows that learners in the Infographics Package (IP) treatment group achieved the highest adjusted mean score for their post-attitude towards business studies at 70.14, followed by those in the E-book Package (EbP) treatment group with a score of 69.90, and the Control Group (CG) with a score of 60.64. The ranking is IP > EbP > CG. To determine which group is responsible for the significant main effect of treatment on learners' attitudes towards business studies, the Bonferroni post-hoc test was conducted across the groups, with the results presented in Table 6.

Table 6 Bonferroni post hoc analysis of post-attitude by treatment and control group

Treatment	Mean	IP	EBP	CG
Infographics Package (IP)	70.14			*
E-book Package (EBP)	69.90			*
Control Group (CG)	60.64	*	*	

Table 6 indicates that the mean post-attitude scores of students in the Infographic Package (IP) group toward business studies are comparable to those of students using the E-book Package (EBP). In contrast, there is a notable difference between the mean scores of students in the Infographic Package (IP) group and those in the Control Group (CG). Furthermore, Table 6 highlights a significant difference in the post-attitude mean scores between students who used the E-book Package and those in the Control Group. This suggests that the observed significant difference in the ANCOVA results is primarily due to the disparity between the treatment groups and the control group, rather than among the treatment groups themselves.

H03: No significant main effect of treatment on learners' entrepreneurial intention

Table 7: ANCOVA of post-entrepreneurial intention by treatment

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10457.047	3	3485.682	362.786	0.000	0.859
Intercept	599.379	1	599.379	62.383	0.000	0.258
Pre-Achievement	4310.368	1	4310.368	448.618	0.000	0.715
Treatment	1286.042	2	643.021	66.925	0.000*	0.428
Error	1719.849	179	9.608			
Total	775116.000	183				
Corrected Total	12176.896	182				

*Significant. $p < 0.05$

Table 7 reveals a substantial main effect of treatment on learners' entrepreneurial intentions ($F(2, 181) = 66.93$; $p < 0.05$, partial $\eta^2 = 0.43$). The effect size is shown to be 43.0% in Table 7. This indicates that 43.0% of the total 86.0% (Adjusted $R^2 = 0.86$) variation in learners' post-entrepreneurial intention scores can be attributed to the significant main effect of the treatment. As a result, hypothesis 3 was rejected. To assess the extent of the significant main effect across the treatment groups, the EMMs were calculated, with the findings displayed in Table 8.

Table 8: EMMs for post-entrepreneurial intention by treatment and control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Infographics Package (IP)	66.63	0.47	65.70	67.55
E-book Package (EBP)	68.44	0.49	67.48	69.40
Control Group (CG)	61.60	0.36	60.90	62.30

Table 8 indicates that learners in the E-book (EB) treatment group achieved the highest adjusted mean score in their post-entrepreneurial intention (68.44), followed by those in the Infographics (I) treatment group (66.63), and lastly, the Control Group (CG) (61.60). This ranking is represented as EBP > IP > CG. To identify which group contributed most significantly to the main treatment effect on learners' achievement in business studies, a Bonferroni posthoc test was conducted across the groups. The findings are shown in Table 9.

Table 9: Bonferroni posthoc analysis of post-achievement by treatment and control group

Treatment	Mean	IP	EBP	CG
Infographics Package (IP)	66.63		*	*
E-book Package (EBP)	68.44	*		*
Control Group (CG)	61.60	*	*	

Table 9 reveals that the mean post-entrepreneurial intention score of learners who used the E-book (EB) differed significantly from those taught with the Infographics (I) and from the Control Group (CG). Additionally, Table 9 highlights a significant difference in post-entrepreneurial intention scores between learners who engaged with the Infographics Package and those in the Control Group. The results indicate that the notable disparity found in the ANCOVA analysis is due to differences among the treatment groups and between the treatment groups and the control group regarding learners' post-entrepreneurial intention scores.

Discussion

Effects of Treatment on Students' Achievement in Business Studies

The study's results revealed a notable difference in business studies achievement scores between learners in the experimental and control groups. This suggests that both infographic and e-book instructional methods significantly impacted learners' achievement. Specifically, learners who used the e-book package achieved the highest post-test scores, followed by those who used the infographic method, while those taught through the control group scored the lowest. This outcome may be attributed to the fact that these instructional methods allowed learners to actively participate in learning, enhancing their cognitive performance and retention, something they had not experienced in traditional classroom settings. These findings align with Ogonu (2019), who found that active learners' engagement in learning activities fosters creativity and facilitates the transfer of knowledge to new situations.

Main Effect of Treatment on Learner's Attitude towards Business Studies

Results of this study indicate a notable main effect of the treatment on learners' attitudes towards business studies. Specifically, both infographic and e-book instructional packages had a substantial impact on learners' attitudes towards the subject. The data indicates that learners who utilised the infographic package achieved the highest adjusted mean score for post-attitude, with those using the e-book coming next, and the control group recording the lowest score. This suggests that both infographic and e-book instructional packages positively influenced learners' attitudes towards business studies. This outcome may be related to the increased interest and engagement in business studies due to the interactive elements present in the instructional packages. Including class activities within these packages likely encouraged learners to focus on the content and improve their attitudes towards business studies. These findings support Oribhabor's (2020) argument that integrating computer-assisted instruction in business studies can enhance learners' attitudes and achievement. In essence, infographic and e-book packages facilitate critical thinking, engagement, interaction, and reflection, fostering curiosity and bridging the gap between existing knowledge and desired knowledge, which motivates deeper reflection and action on the subject matter.

Effect of Treatment on Learners' Entrepreneurial Intention

The findings of the study indicated a significant impact of the treatment on the entrepreneurial intentions of participants in both the experimental and control groups. These suggest that the use of infographics and e-books significantly influenced students' entrepreneurial intentions. Specifically, learners who utilised these materials exhibited higher post-treatment entrepreneurial intentions compared to those in the control group. Among the groups, those using e-books had the highest adjusted post-treatment entrepreneurial intention scores, followed by the infographic group, while the control group had the lowest scores. These findings support Asunka (2016); Olalude (2023) studies, which demonstrated the effectiveness of e-books in enhancing learners' entrepreneurial intentions. E-books appear to engage learners in a more compelling and interactive way, fostering their entrepreneurial aspirations. Additionally, other studies by Kim-Sun et al. (2016); and Amesi and Giami (2018) have shown that involvement in business studies positively impacts learners' entrepreneurial intentions. The study also indicates an increase in learners'

entrepreneurial intentions following the experiment, likely due to the engaging nature of the infographic and e-book packages. This aligns with Akpojtor's (2022) research, which found that computer-assisted instruction with scenario elements can create an environment that stimulates learners' entrepreneurial intentions for business creation. Moreover, the study supports Ibrahim et al. (2015) findings, which suggest that infographics capture learners' curiosity, engage them in practical entrepreneurial activities, and motivate further study

Conclusion

The research investigated the efficacy of two different instructional packages on junior secondary school learners in Ibadan. It was found that both the Infographic and E-book packages were effective for teaching Business Studies. Nonetheless, the E-book package proved to be more effective. This outcome may be attributed to the fact that the E-book provided learners the opportunity to actively engage in learning activities which increased their motivation, entrepreneurial intention, attention, retention and interest which they had not been experiencing in their conventional classes. It is advisable, among other recommendations, that Business Studies educators integrate infographics and e-books in their teaching.

Recommendations

- i. Business studies educators should incorporate infographics and e-books into their classrooms, as these tools have been shown to effectively decrease the level of abstractness in teaching business studies concepts.
- ii. The Federal Ministry of Education should ensure that business studies teachers receive thorough training through workshops, seminars, and conferences on the application of computer-assisted instructional tools (infographics and e-books) for teaching.

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