Effectiveness of Bellon and Handler and Kirkpatrick Models in Assessing Entrepreneurial Skills among Polytechnic Students in Ilorin, Nigeria

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Abstract

This study determines the effectiveness of the use of Bellon and Handler and Kirkpatrick as assessment models in measuring the self-efficacy, instructional practices and skills acquisition of polytechnic students in Ilorin, Nigeria. The study employed the quantitative research of the survey type. The participants consisted of 354 National Diploma II (ND II) students (male=183 and female=171) in the academic year 2023/2024 enrolled in science-based programmes at the Kwara State Polytechnics in Ilorin, Nigeria. The samples of this study were necessary because of their exposure to entrepreneurship education. . Two instruments was employed in data collection in the study. A Bellon and Handlers' Assessment Model on Entrepreneurial Skills Acquisition Questionnaire (BHEMESAQ) at the four levels was used to collect opinion from group A (n=204). At the same time, A Kirkpatrick Assessment Model on Entrepreneurial Skills Acquisition Questionnaire (KEMESAQ) was also used to seek opinion of group B (n=150) to determine knowledge on entrepreneurial skills. Data collected were analyzed using Analysis of Covariance (ANCOVA) to compare effectiveness of the two assessment models on self-efficacy, instructional practice and skills acquisition. The results show that both models are effective in assessing skills acquisition, with the Kirkpatrick model shown to be more comprehensive and provides a more detailed understanding of learning science concepts. The study concluded that Entrepreneurial education improve ND II students' self-efficacy. The study recommends that polytechnics education programmes should adopt the combination use of both Bellon and Handler and Kirkpatrick models to assess learners' skills acquisition.

Keywords: Assessment, Bellon and Handler Model, Kirkpatrick Model, Entrepreneurial Skills Acquisition

Introduction

The use of the multiple assessment models is justified by the fact that assessment measures learners learning progress and achievement individually or in group while offering feedback to enhance skills acquisition. The use of assessment as tool to determine leaners progress is geared towards specific performance while it use as evaluation model on the other hand is to render conclusions regarding the overall impact and quality of the educational system or programme (Nieminen, 2024). Therefore, the application of various assessment models on effective practical-oriented education learning is to justify improvement or otherwise learners' learning outcome.

Assessment is a crucial aspect of education as it determines the effectiveness of the training and programme (Abubakar, 2015). Investigating course development using models that are not frequently discussed in literatures but might be useful for a variety of subject areas and goals is therefore a worthy endeavour (Onyeaghala & Goodluck, 2018). The use of Bellon and Handler and Kirkpatrick models as assessment models in education training employed in the present study is to determine effectiveness of entrepreneurial education training among ND students in Kwara State Polytechnics, Ilorin, Nigeria. This study compared the effectiveness of these two models in

assessing the skills acquisition of polytechnic students in Ilorin, Nigeria, when exposed to entrepreneurial education.

Literature Review

Skills acquisition is an imperative part of entrepreneurship training or programme in tertiary institution of learning to embrace diverse approaches towards inspiring prospective learners to acquire requisite skills (Abdulkadir, et al. 2023).. According to Akhmetshin et al. (2019), higher education's focus on skills acquisition is aimed to give students a solid foundation in knowledge as well as to encourage them to think meaningfully. More importantly, it ought to foster the learners' broad cognitive abilities, hands on capabilities and individual traits (Abubakar et al., 2019). Previous studies have used these two and many models separately, but there is a need to compare their effectiveness in evaluating skills acquisition (Onyeaghala & Goodluck, 2018). The Bellon and Handler model (1976) focuses on the assessment of instructional skills at four level (Mutlu, & Şimşek, n.d) while the Kirkpatrick model (1994) also evaluates the learning process at four levels (Kirkpatrick, 1994).

Among all educational institutions, polytechnic institutes are concentrating on the topic of entrepreneurship (Othman & Hisam, 2020). A study conducted by Othman and Hisam (2020) determined the levels of entrepreneurial self-efficacy and entrepreneurial intention among polytechnic students who have participated actively in entrepreneurship education programmes, in contrast to those who have never engaged in any comparable activities. 317 polytechnic students in Malaysia were given survey questionnaires at random for this study. Descriptive statistical techniques were used to examine the responses. The findings when compared to students who have never taken an entrepreneurship course, indicated that students who have participated in entrepreneurship courses have a higher level of entrepreneurial self-efficacy. Ojewumi and Fagbenro (2019) investigated the influence of social networks and self-efficacy on entrepreneurial intention in polytechnic students in Ile-Ife, Osun state, Nigeria. A survey design was adopted for the study. In order to gather the data for this study, 240 students (81 females) and (159 males) with ages ranging from 21 to 35 (M = 23.61, SD = 2.63) were chosen from one polytechnic in 2018. The study's hypotheses were tested using inferential statistics (the t-test for independent measure). The findings indicated a substantial difference between the entrepreneurial intentions of high and low self-efficacious polytechnic students.

The Bellon and Handler Model is designed by Bellon and Handler in 1982 (Mutlu & Şimşek, n.d). The purpose of the model is to improve educational programmes. The originator of the model argued that the model can make a unique contribution to those who are interested in developing and improving educational programmes. This model consists of four major elements (Bellon & Handler, 1976). The four elements include goals, organization, operations and outcomes. Goals addresses the programme's expected results and planned outcomes, organization focus is to examine and evaluate a range of elements that affect the efficacy of curricular effectiveness, operations, is concerned with choices made in relation to learning experiences and how programmes are run on a daily basis and outcome identify the effects of a programme on participants and on the educational setting in which the programme is established (Uçkaya, Z. (2022).

On the other hand, Kirkpatrick Model have been established as the most common and well-liked usage of the paradigm shift in the assessment of training and development initiatives. It focuses on quantifying responses, learning, behaviour, and outcomes that occur from a highly successful training programme at four different levels (Kirkpatrick, 1994). The distinguished four hierarchically stages of training outcomes include reaction, learning, behaviour and result (Azmy & Setiarini, 2023). The first-level (reaction) shows perception or response to programme. In the second level, learning, the goal is to distinguish between what participants truly learned throughout the training programme and what they knew before. The third level, behaviour, measures how the training programme affects a student's behaviour or performance in their line of work, while the fourth level, results, modify the financial results or adjustments to the variables that should dependably have a direct impact on the financial results and support an organization's smooth operation (Azmy & Setiarini, 2023; Kirkpatrick, 1994).

Statement of the Problem

The study considered the application on the effective use of Bellon and Handler and Kirkpatrick models on the acquisition of entrepreneurial skills by polytechnic students in the sciences domain learning in Ilorin, Nigeria. The issue lies in the fact that it is uncertain on how well the polytechnics students learn scientific concepts to translate those learnt concepts into meaningful learning instructional practices by showcasing requisite skills in practical activities and competency in self-sustenance. The two models was employed in the study to enquire self-efficacy, impact of instructional techniques and skills abilities among polytechnics students in

learning of entrepreneurial education in Kwara State Polytechnic in Ilorin, Nigeria. The study's intents are to determine whether these models could assess science students in the polytechnics candid valuation result of the entrepreneurship education programme, enquire if the entrepreneurial education could have developed their skills and to pinpoint the opportunities and problems that come with the programme towards skills acquisition.

Research Purposes

The main purpose of the study is to determine polytechnic students' entrepreneurial skills acquisition in sciences concepts using Bellon and Handler and Kirkpatrick models as assessment models among ND II students in Kwara State Polytechnics in Ilorin, Nigeria. The study specifically investigates:

1. The effectiveness of entrepreneurial education programmes in enhancing polytechnics students' self-efficacy in science concepts using Bellon and Handler and Kirkpatrick model.

2. The effectiveness of entrepreneurial education programmes in enhancing polytechnics students' instructional practice in science concepts using Bellon and Handler and Kirkpatrick model.

3. The effectiveness of entrepreneurial education in enhancing polytechnic students' skills acquisition in science concepts using Bellon and Handler and Kirkpatrick model.

Research Questions

The following research questions were raised and answered to guide the study;

1. What is the effectiveness of entrepreneurial education programmes on polytechnics students' self-efficacy in science concepts when assessed using Bellon and Handler and Kirkpatrick model?

2. What is the effectiveness of entrepreneurial education programmes on polytechnics students' instructional practice in science concepts when assessed using Bellon and Handler and Kirkpatrick model?

3. Doe entrepreneurial education effectively enhance polytechnic students' skills acquisition in science concepts when assessed using Bellon and Handler and Kirkpatrick model?

Research Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance.

H0$_1$: There is no significant difference between entrepreneurial education and polytechnics students' self-efficacy when assessed using Bellon and Handler and Kirkpatrick models

H0$_2$: There is no significant difference between entrepreneurial education and polytechnic students' instructional practices when assessed using Bellon and Handler and Kirkpatrick models.

H0$_3$: There is no significant difference between entrepreneurial education and polytechnic students' skills acquisition in science concepts when assessed using Bellon and Handler and Kirkpatrick models.

Methodology

The study employed the quantitative research of the survey type. The participants consisted of National Diploma II (ND II) students in the academic year 2023/2024 enrolled in science-based programmes at the Kwara State Polytechnics in Ilorin, Nigeria. A census sample of 354 ND II students were purposively selected because the entire students offering the course have been exposed to entrepreneurial education. Two instruments were employed in the study. Bellon and Handlers' Assessment Model on Entrepreneurial Skills Acquisition Questionnaire (BHAMESAQ) that measured the students' skills after the course programme to group A (n=204) at the four levels in order to assess entrepreneurial education programmed. At the same time, Kirkpatrick Assessment Model on Entrepreneurial Skills Acquisition Questionnaire (KAMESAQ) measured the students' skills acquisition after the course programme to group B (n=150). The two questionnaires BHAMESAQ and KAMESAQ were administered to both groups at the same time. All research questions were translated into research hypotheses for data analyses. Data were analyzed using Analysis of Covariance (ANCOVA) to determine entrepreneurial education on self-efficacy, instructional practice and skills acquisition of polytechnics students in science base learning programme. The Statistical Products and Service Solutions (SPSS) version 25.0 was used to analyze the data.

Results

Research Question 1

What is the effectiveness of entrepreneurial education programmes on polytechnics students' self-efficacy in science concepts when assessed using Bellon and Handler and Kirkpatrick model? Hypothesis one was employed to answer research question one.

H0$_1$: There is no significant difference between entrepreneurial education and polytechnic students' self-efficacy when assessed using Bellon and Handler and Kirkpatrick models.

Table 1; Analysis of Entrepreneurial Education on Polytechnic Students' Self-efficacy when assessed using Bellon and Handler and Kirkpatrick Assessment Models

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	34673.375[a]	150	231.156	1.111	.242	.452
Intercept	241262.070	1	241262.07	1159.79	.000	.852
BandH	2243.789	13	172.599	.830	.628	.051
KirkPat	3680.765	25	147.231	.708	.846	.081
BandH * KirkPat	28256.311	112	252.288	1.213	.119	.402
Error	42020.183	202	208.021			
Total	1115459.00	353				
Corrected Total	76693.558	352				

a. R Squared = .452 (Adjusted R Squared = .045)

In order to show the stronger overall efficacy with greater variability in Polytechnics students' judgments on entrepreneurship education, table 1 revealed that the F-value for the main effect of BandH (Bellon and Handler Model) is 0.830, with a non-significant p-value (p > 0.05). This suggests that there is no statistically significant difference in self-efficacy scores between groups assessed using the Bellon and Handler Model. Similarly, the F-value for the main effect of KirkPat (Kirkpatrick Model) is 0.708, with a non-significant p-value (p > 0.05). This indicates that there is no statistically significant difference in self-efficacy scores between groups assessed using the Kirkpatrick Model.

The interaction effect of entrepreneurial education between BandH and KirkPat has an F-value of 1.213 and a non-significant p-value (p > 0.05). This suggests that there is no statistically significant interaction between the two assessment models in predicting self-efficacy scores when ND students were exposed to entrepreneurial education. The Corrected Model overall has a non-significant F-value of 1.111 (p > 0.05), indicating that the combined effect of all predictor variables (including the intercept, BandH, KirkPat, and their interaction) does not significantly predict self-efficacy scores. The Partial Eta Squared values provide an estimate of the proportion of variance in the entrepreneurial education accounted for by each independent variable or combination of

variables. In this case, the highest partial eta squared value is associated with the intercept, indicating its substantial contribution to explaining the variance in self-efficacy scores.

Based on these results, the findings fail to reject the null hypothesis that there is no significant difference between entrepreneurial education and polytechnic students' self-efficacy when assessed using Bellon and Handler and Kirkpatrick models.

Research Question 2

What is the effectiveness of entrepreneurial education programmes on polytechnics students' instructional practice in science concepts when assessed using Bellon and Handler and Kirkpatrick model?

Hypothesis two was employed to answer research question two

$H0_2$: There is no significant difference between entrepreneurial education and polytechnic students' instructional practices when assessed using Bellon and Handler and Kirkpatrick models.

Table 2: Analysis of Entrepreneurial education on Polytechnic Students' Instructional Practices when assessed using Bellon and Handler and Kirkpatrick Models

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	31826.825[a]	150	212.179	1.115	.235	.452
Intercept	303539.274	1	303539.27	1595.0	.000	.887
BandH	3060.310	13	235.408	1.237	.255	.073
KirkPat	4879.037	25	195.161	1.026	.436	.112
BandH * KirkPat	23072.164	112	206.001	1.083	.311	.374
Error	38630.782	203	190.299			
Total	1271893.00	354				
Corrected Total	70457.607	353				

a. R Squared = .452 (Adjusted R Squared = .047)

The Intercept has a very low p-value ($p < 0.05$), indicating that it is statistically significant. Both "BandH" and "KirkPat" have p-values above 0.05, suggesting that neither of them individually significantly affects the instructional practices. The interaction term "BandH * KirkPat" also has a p-value above 0.05, indicating that the combined effect of both assessment models is not statistically significant. Moreover, the Partial Eta Squared values provide

information about the effect size of each variable. A higher value indicates a larger effect. In this case, the Intercept has the highest effect size.

Based on this analysis, the study findings fail to reject the null hypothesis that there is no significant difference between polytechnic students' entrepreneurial education and instructional practices when assessed using Bellon and Handler and Kirkpatrick models. In other words, the study revealed that there is no significant difference between the use of Bellon and Handler (BandH) and Kirkpatrick (KirkPat) assessment models on both groups of polytechnic students' instructional practices when exposed to entrepreneurial education, as neither assessment model nor their interaction with entrepreneurial education significantly influences instructional practices, based on the provided data.

Research Question 3

Doe entrepreneurial education effectively enhance polytechnic students' skills acquisition in science concepts when assessed using Bellon and Handler and Kirkpatrick model?

Hypothesis three was employed to answer research question three

$H0_3$: There is no significant difference between entrepreneurial education and polytechnic students' skills acquisition in science concepts when assessed using Bellon and Handler and Kirkpatrick models.

Table 3: Analysis of Entrepreneurial education in Enhancing Polytechnic Students' Skills Acquisition when assessed using Bellon and Handler and Kirkpatrick Models

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	24299.563[a]	150	161.997	1.174	.144	.465
Intercept	351354.726	1	351354.73	2546.21	.000	.926
BandH	2264.254	13	174.173	1.262	.238	.075
KirkPat	3593.587	25	143.743	1.042	.415	.114
BandH * KirkPat	17971.382	112	160.459	1.163	.177	.391
Error	28012.223	203	137.991			
Total	1475794.00	354				
Corrected Total	52311.785	353				

a. R Squared = .465 (Adjusted R Squared = .069)

The Intercept has a very low p-value ($p < 0.05$), indicating that it is statistically significant. Both "BandH" and "KirkPat" have p-values above 0.05, suggesting that neither of them individually significantly affects entrepreneurial skills acquisition. The interaction term "BandH * KirkPat" also has a p-value above 0.05, indicating that the effect of entrepreneurial education is not statistically significant. Furthermore, the Partial Eta Squared values provide information about the effect size of entrepreneurial education and skills acquisition. A higher value indicates a larger effect. In this case, the Intercept has the highest effect size.

Based on this analysis, findings fail to reject the null hypothesis that there is no significant difference between entrepreneurial education and polytechnic students' skills acquisition in science concepts when assessed using Bellon and Handler and Kirkpatrick models. The study revealed that there is no significant difference in the effectiveness of Bellon and Handler (BandH) and Kirkpatrick (KirkPat) assessment models in enhancing polytechnic students' entrepreneurial skills acquisition in Ilorin, Nigeria. Neither assessment model nor their interaction significantly influences entrepreneurial skills acquisition, based on the provided data.

Summary of Findings

The following are summary of major findings of the study

1. The study revealed that the entrepreneurial education programme exhibit a reasonably high level of efficacy and instructional practices, as indicated by the Bellon and Handler and Kirkpatrick Models.

2. In comparison to the Bellon and Handler approach, the Kirkpatrick model produced a higher mean score, indicating stronger overall efficacy and instructional practices due to entrepreneurial education.

3. Findings from the study revealed that there is no significant difference in the effectiveness of Bellon and Handler (BandH) and Kirkpatrick (KirkPat) assessment models in enhancing polytechnic students' entrepreneurial skills acquisition in Ilorin, Nigeria.

Discussion of Findings

The findings of this study suggest that both Bellon and Handler and Kirkpatrick models are effective assessment tool for polytechnic students' skills acquisition in entrepreneurial education. This is in line with the study of Othman and Hisam (2020) that determined the levels of entrepreneurial self-efficacy and entrepreneurial intention among polytechnic students in

Malaysia and contrast to the study of Ojewumi and Fagbenro (2019) that investigated the influence of social networks and self-efficacy on entrepreneurial intention in polytechnic students in Ile-Ife, Osun state, Nigeria. The study of Komolafe et al. (2020) used the psychomotor domain aspect of revised Bloom's taxonomy to explore microteaching practice as it relates to physics instructions. In contrast, the present study employed the of assessment models at four levels of assessment to provide a more comprehensive understanding of the learning process, allowing for a more detailed assessment of skills acquisition. The implications of these findings are that entrepreneurial education programmes should adopt assessment techniques at multiple levels to ensure necessary skills acquisition for effective learning.

Conclusion and Recommendations

In conclusion, this study identified the effectiveness of the Bellon and Handler and Kirkpatrick models in assessing self-efficacy, instructional practices and skills acquisition among polytechnic students in Ilorin, Nigeria. The study also concluded that Kirkpatrick model is a more comprehensive and effective assessment tool to foster self-efficacy, improve instructional practices and encourage entrepreneurial skills acquisition among polytechnics student in science based field. The study recommends that polytechnics education programmes should adopt the combination use of both Bellon and Handler and Kirkpatrick models to ensure improvement in learners' self-efficacy, proper use of instructional practices to enhance learning outcome and acquisition skills towards self-reliance and sustainability.

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