# ANALYSIS OF ITEM DIFFICULTY INDEX OF EDUCATIONAL PSYCHOLOGY ITEMS IN SCHOOL BASED EXAMINATION IN ADENIRAN OGUNSANYA COLLEGE OF EDUCATION, LAGOS STATE, NIGERIA

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## Abstract

*The study investigated determination of item difficulty index in Educational Psychology items in School Based Examination. With a population of 1352 trainees, multi-stage sampling process was employed to select sample. Participants were stratified into 5 natural groupings of Schools (Sciences, Arts and Social Sciences, Languages, Early Childhood and Primary Education, Vocational and Technical Studies respectively). Purposive sampling technique was then introduced to select two departments each from the schools based on number of students. Simple random sampling technique was then introduced to select 40 students each from the 10 departments used in this work. With a sample size of 400 students, two instruments; self-structured Questionnaire on Determination of Item Difficulty Index in Educational Psychology Items in School Based Examination (QDIDEPISBE)" containing 15-items on 4-Likert scale and achievement test containing 60 items on 4-options was used to generate data. Both instruments were validated and met both content and face validity. Using Split-half and Cronbach alpha reliability form, the r-coefficients of .849 and .890 was obtained meaning internal consistency achieved. BILOG-MG and SPSS version 24 software were used to analyse item difficulty and regression analysis. Finding shows that achievement instrument is very reliable as only 7 items was seen to be difficult by test-takers. The study concluded that 2023 Educational Psychology Items Achievement Test remain a true measure for assessment of undergraduates because its items are relatively good measure of academic performance.*

**Keywords:** Item difficulty, Psychology of Learning, School Based Examination, Quality Education, Scores

## Introduction

In any given educational system where students' scores remain a cardinal unit for selection, prediction, motivation, research and development then functional components like test, measurement, assessment and evaluation would always have an important role to play in such a system. Scores generated from students remain an important element used in identification of educational success. According to Retnawati, Kartowagiran, Arlinwibowo and Sulistyaningsih, (2017), results from educational assessment plays a major function useful in further educational progression. Under examination condition, assessment is seen as a process of gathering data, analysing, transforming and interpreting the sourced data in a bid to taking an informed decision by stakeholders. These stakeholders could be responsible for the determination of items in the curriculum, recruitment of psychologists capable of reading learning dispositions to tests, recruitment of teaching professionals, identifiers of lapses in students' performance in school examinations, examiners among others.

Students' performance both in National and School Based Examinations is interpreted in terms of

difficulty, discrimination and guessing ability of students especially when the items are designed using

Multiple Choice Objective Test Format (MCOTF). This format allows test takers to respond to their choice of correct items by picking the right key that best explain their ability. Their ability level is express through the nature of key identified as the right option. School Based Examination (SBE) is not standardised examination where only psychometric items are administered rather it is an examination type where teacher made test is characterised. These are test items developed and validated by certain crop of teachers to determine the validity and reliability of such a test. Items in School Based Examination may necessarily not undergo the various psychometric processes due to the rigour and stringent procedure to adhere to in order to determine the quality of items constructed (Udofia & Topohozin, 2017; Udofia, 2008). Convincingly, Retnawati, Kartowagiran, Arlinwibowo & Sulistyaningsih, (2017) maintained that under school based examination, test items are constructed by the teacher with the aid of curriculum and classroom objectives guiding the choice of questions to develop.

In Nigeria, School Based Examinations includes semester and session examinations carried out in Colleges of Education, Universities, Polytechnics, while Secondary and Primary schools often sit for them in terms (Onuka, 2018). In this examination, due to the large number of test takers, items are designed using multiple option formats with the aim of assessing many students at the same time. Under this format, a greater proportion of the course or subject content is covered and students are expected to respond to them as soon as possible perhaps due to the time allocated for such a test (Aditya, Heri & Eri, 2021).

In Colleges of Education, Psychology of Education is a compulsory course for teacher trainee exposure. Educational Psychology provides important information for educators in order to help them create educational experiences, measure learning and also improve students' learning pattern. In a study carried out by Melekeowei (2015), the study of psychology affords every teacher trainees an opportunity to understand the psychological component of his/her learners, developmental phase of learners, exposure to factors that may hamper effective learning and enlightenment to various human development theories. Meanwhile, Chiwendu (2021) claimed that students' performance is a function of emotional issues, attitudes, motivation, self regulation, behaviour and self esteem among others as they have a higher likelihood of affecting students' outcome and choice of items especially in School Based Examination (SBE).

In school based examination, examiners sometimes raise argument in students' performance in educational psychology based on the quality of items constructed by teachers. Like every other course, students' performance in educational psychology in tertiary institutions may be attributed to many factors associated to students, teachers, nature of test development, difficulty of test items, guessing parameters, ill preparation by learners, lack of content mastery, complex use of terms, marking scheme, scoring error, phobia of failure, time allocated to items, readiness and willingness to learn, level of concentration, age dimension, environmental factors like noise, heat among others (Okon, Mabel & Mfon, 2019).

Okon, et al. (2019) also noted that educational psychology is one course designed to explain the inherent components of students especially as it relates to their learning abilities. These students are often confronted with challenges which can best be explained by seasoned psychologists. As a result exposing students to the study of educational psychology will provide an avenue for them to discover other dimensions of human personality.

In determination of difficulty index of items in School Based Examination (SBE), the Classical Test

Theory (CTT) rather than Item Response Theory (IRT) was used. Although Jour, Ufondu and Ify (2023) stated that both theories, CTT and IRT established that performance of students is determined through estimation of item difficulty, discrimination and guessing ability.

Unlike IRT that seeks to identify quality of test items, CTT is concerned with observed scores consisting of the actual scores and measurement errors. The researchers in this work are more concerned with the use of CTT as it tries to identify difficult items generally not using any form of specifics. Item difficulty is seen as an estimate that seeks to identify the total no of items gotten wrongly. These items are seen to be difficult to those in upper class or intelligent students and lower class or least intelligent. This difficulty could be brought about by faulty setting pattern, objective not well captured, ambiguity of language among others (Jour, Ufondu & Ify, 2023).

Teacher made questions unlike standardised questions are faulted most times because they do not factor the inputs of other specialists in that cognate area thereby bringing about limitation on the quality of items developed. Sometimes they are also restraints owing to the fact that these test developers lack adequate knowledge on test development (Adegoke & Yemisi, 2019).

In other to promote teacher made test of school based examinations, it becomes imperative to analyse each item to find out its quality, so that in the measurement of test items in School Examination test instrument becomes capable of giving the needed information in assessment. This research applied Classical Theory Test approach only to describe the characteristics of items in school based examination of psychology of education using test items analysis to estimate difficulty level only while also stating prevalent factors that contributes to making those items difficult for students.

## Statement of the Problem

Teachers design school based examinations not considering the psychometric properties of those items. And when these students are confronted with standardised examinations comprising of external items even in their cognate areas they most times perform below expectations thereby raising dust on the credibility of school based examinations. In a study carried out by Bankole and Akeem (2019), they claimed that items in school based examination are too weak and easy for test takers as teachers also influence their performance thereby not giving credibility to such examination. Failure to curtail such would lead to rote learning, increase in guessing parameter, non-generalizability and acceptance of test results which will naturally lead to non-credibility of test scores. In a bid to restore confidence in school based examination that is characterised by teacher made items, the researchers were out to determine the item difficulty in Educational Psychology one of the compulsory courses taken at School Based Examination in Colleges of Education, Lagos State.

## Objectives of the Study

The main objective of this study is to determine item difficulty index in educational psychology course items in school based examination. Specifically the study sought:

1. Determination of item difficulty index of 2023 Educational Psychology items in School Based Examination in Adeniran Ogunsanya College of Education, Lagos State, Nigeria.
2. Identify how lack of content mastery, complex terms and ill preparation contributes towards item difficulty in Educational Psychology items in School Based Examination.

## Research Question

1. What is the item difficulty index of 2023 Educational Psychology items in School Based Examination in Adeniran Ogunsanya College of Education, Lagos, Nigeria.

## Research Hypothesis

**H0₁:** There is no significant influence of time allocation, lack of content mastery, complex use of terminologies and ill preparation contribution to item difficulty of Educational Psychology items a School Based Examination.

**Methodology**

The researchers adopted the descriptive survey type of research design. This design type allows the researchers to study a large sample of participants and draw up conclusion from carefully selected samples. The population for 2022/2023 200 level students used in this study was 1352 teacher trainees in Adeniran Ogunsanya College of Education, Ijanikin, Lagos. Multi-stage sampling process was used to select samples for this study. The researchers stratified the participants into 5 natural groupings of Schools (School of Sciences, School of Arts and Social Sciences, School of Languages, School of Early Childhood and Primary Education, School of Vocational and Technical Studies respectively). Purposive sampling technique was then introduced to select two departments from each of the schools based on the number of students. Thereafter, simple random sampling technique was then introduced by the researchers to select forty (40) students each from the ten (10) departments selected for this study. A total of four hundred (400) students formed the sample size for this study.

Two instruments were used in data collection. First was a self structured instrument titled, "Questionnaire on Determination of Item Difficulty in Psychology of Education School Based Examination in Lagos State (QDIDPESBE)". The instrument contains 15 items on 4-Likert Scale type of Very True (VT), True (T), Not True (NT) and Not Very True (NVT) respectively. The Questionnaire was validated by two academics in the Department of Counselling Psychology Education, LASUED. Secondly, with the use of table of specification, an achievement test containing 60 items on 4-options response format was carefully drawn from the course outline by two psychology experts. Both instruments were validated and acclaimed to meet both content and face validity. With the use of Split-half and Cronbach alpha reliability form, the r-coefficients of 0.849 and 0.890 was obtained respectively meaning that internal consistency is achieved hence both instruments suitable for study. Items generated from the Questionnaires were transformed to suit the dichotomous scoring pattern of the Achievement Test. The data was subjected to T-Score and Z-score in order to ensure normality of data. Using BILOG-MG and SPSS version 24 software item difficulties and regression analysis was used to analyse the data and tested at 0.05 significant level.

**Results**
1. **What is the item difficulty index of 2023 Educational Psychology items in School Based Examination in Adeniran Ogunsanya College of Education, Lagos, Nigeria?**

**Table 1: Results of difficulty level ($p$)**

| No of items | (P) | Category Item |
|---|---|---|
| 1 | 0.654 | moderate |
| 2 | 0.564 | moderate |
| 3 | 0.672 | moderate |
| 4 | 0.456 | moderate |
| 5 | 0.435 | moderate |
| 6. | 0.742 | moderate |
| 7. | 0.492 | moderate |
| 8. | 0.742 | moderate |
| 9. | 0.369 | moderate |
| 10. | 0.476 | moderate |
| 11. | 0.392 | moderate |
| 12. | 0.665 | moderate |

| | | |
|---|---|---|
| 13. | 0.813 | moderate |
| 14. | 0.645 | moderate |
| 15. | 0.437 | moderate |
| 16. | 0.446 | moderate |
| 17. | 0.524 | moderate |
| 18. | 0.362 | moderate |
| 19. | 0.832 | too easy |
| 20. | 0.361 | moderate |
| 21. | 0.451 | moderate |
| 22. | 0.537 | moderate |
| 23. | 0.152 | difficult |
| 24. | 0.261 | difficult |
| 25. | 0.563 | moderate |
| 26. | 0.724 | moderate |
| 27. | 0.531 | moderate |
| 28. | 0.563 | moderate |
| 29. | 0.341 | moderate |
| 30. | 0.143 | difficult |
| 31. | 0.214 | difficult |
| 32. | 0.341 | moderate |
| 33. | 0.134 | difficult |
| 34. | 0.141 | difficult |
| 35. | 0.342 | moderate |
| 36. | 0.519 | moderate |
| 37. | 0.341 | moderate |
| 38. | 0.472 | moderate |
| 39. | 0.461 | moderate |
| 40. | 0.363 | moderate |
| 41. | 0.417 | moderate |
| 42. | 0.581 | moderate |
| 43. | 0.461 | moderate |
| 44. | 0.471 | moderate |
| 45. | 0.513 | moderate |
| 46. | 0.483 | moderate |
| 47. | 0.562 | moderate |
| 48. | 0.519 | moderate |
| 49. | 0.445 | moderate |
| 50. | 0.362 | moderate |
| 51. | 0.253 | difficult |
| 52. | 0.673 | moderate |
| 53. | 0.642 | moderate |

| 54. | 0.527 | moderate |
| 55. | 0.717 | moderate |
| 56. | 0.371 | moderate |
| 57. | 0.614 | moderate |
| 58. | 0.483 | moderate |
| 59. | 0.870 | too easy |
| 60. | 0.674 | moderate |

**Source: Research work, (2024)**

From the table above it shows that 60 multiple choice objective test format was used for this data. The responses of the students was dichotomised into 0,1 (0 represent wrong option & 1 represent correct option). From the 400 respondents who participated in Educational Psychology of Learning a school based examination, identified that items 19, 23, 24, 30, 31, 33, 34, 51 and 59 were seen as bad items and needed to be modified or removed totally from the pool of items. However, items 19 and 59 exceeded the difficulty index coefficient of 0.3 to 0.7 as they recorded 0.832 and 0.870 which makes the items too easy and weak for test takers as it is drifting towards 1; while items 23, 24, 30, 31, 33, 34 and 51 all fell below the difficulty estimates as a result seen as very difficult for test takers.

**Hypothesis Testing**
$H0_1$: There is no significant influence of lack of adequate knowledge, time allocation, complex terminologies and ill preparation contribution to item difficulty of Educational Psychology items a School Based Examination.

**Table 2: Regression analysis showing lack of adequate knowledge, timing, complex terms and ill preparation contribution to item difficulty of Educational Psychology items in School Base Examination**

| | | | | ANOVA | | | |
| Model | Sum of Squares | Mean Square | P | F | Sig | Decision |
| --- | --- | --- | --- | --- | --- | --- |
| Regression | 3.452 | 4.21 | | | | |
| Residual | 143.638 | .472 | 0.05 | 9.242 | .0009[b] | Significant |
| Total | 147.096 | 4.682 | | | | |

$\alpha = 0.05$, r = .989    $r^2$ = .867

**Source: Research Work (2024)**

a. Dependent Variable: Performance in Psychology of Education

b.Predictors: (Constant), lack of adequate knowledge, timing, complex terms, ill preparations

Table 2 shows that F-value of 9.242 is significant at 0.05 alpha-level (p-value of 0.009 is less than 0.05) hence there is a significant contribution of adequate knowledge, complex terms and ill preparations to item difficulty of Educational Psychology items in School Base Examination. This indicates that the null hypothesis is rejected.

**Table 3: Regression Analysis showing Contribution from lack of adequate knowledge, timing, use of specialised terms and ill preparations on Item difficulty in Educational Psychology items**

**in College of Education, Lagos State**

**Regression Analysis**

| Model | Unstandardised Co-efficient | | | Standardised coefficients | |
| --- | --- | --- | --- | --- | --- |
| | **B** | **Std. Error** | **Beta** | **T** | **Sig** |
| (Constant) | -2.234 | | .175 | 9.6770 | .000 |
| Inadequate time | .763 | .016 | .866 | 6.050 | .001 |
| Knowledge | .890 | .027 | .834 | 12.255 | .009 |
| Complex terms | .149 | .019 | .313 | 4.869 | .014 |
| ill preparations | .691 | .019 | .616 | 17.177 | .000 |

**Source: Research work, (2024)**

For table 3 it shows that inadequate time allocation contributed 0865 and significant at 0.001; inadequate knowledge contributed .834 and significant at 0.009; ill preparations by students contributed by .616 and significant at 0.005; complex terms contributed by .313 and significant at 0.14 respectively. The data further reveals that inadequate time and lack of knowledge contributed the most while the use of complex terms contributed the least respectively.

**Discussion of Findings**
From the interpretation of the research question above, its shows that only two items 19 and 59 exceeded the difficulty index coefficient of 0.3 to 0.7 as they recorded 0.832 and 0.870 which shows that those items are too easy and weak for test takers as it is also drifting towards 1; while for items 23, 24, 30, 31, 33, 34 and 51, they all fell below the difficulty estimates hence seen as very difficult for test takers. This was corroborated with that of Rosidin, et al. (2019) who claimed that such test items are developed and validated by certain crop of teachers to determine the validity and reliability of such a test. Items that have been validated locally using similar learners' component is most likely to produce better performance (Moderate & good) as these items are constructed by teachers with the aid of curriculum and behavioural objectives. Such instruments would have weeded out unwanted test items in the course of validation exercise or item development using statement objectives Rosidin, et al. (2019). Moreso, variables like racial discrimination, religious bias and cultural variation was never a factor considered in the course of item development as the teacher was well informed on importance of teaching objectives in test development.

From the findings in the hypothesis, it also revealed that there is a significant lack of content mastery, timing, complex terms and ill preparation contributes to item difficulty of Educational Psychology a School Based Examination. However irrespective of the degree of contribution it upholds that inadequate time and lack of knowledge contributed the most while the use of complex terms contributed the least. This study corroborates the study of Okon, Mabel & Mfon, (2019) who noted that students performance either positive or negative in Educational Psychology may be attributed to many factors associated to students, teachers, nature of test development, guessing parameters, ill preparation by learners, content mastery, complex terms, marking scheme, scoring error, phobia of failure, time allocated to items, readiness and willingness to learn, level of concentration, age dimension, environmental factors like noise, heat among others (Okon, Mabel & Mfon, 2019). Students will naturally find examination items good or moderate if their level of preparation is high and they have mastered the course well.

**Conclusion**
From this work, it can be concluded that 2023 Educational Psychology items Achievement Test remains a true measure for assessment of undergraduates because its items are relatively good and not seen to be difficult. It can also be concluded that for good performance of students to be achieved,

teachers should simplify technical psychological terminologies to the lowest level for easy assimilation of students in the course of teaching and learning exercise.

## Recommendations

Psychology of education remains one compulsory course for undergraduates of teacher training college in Lagos State. Adequate time must be allocated to examination and good knowledge of the subject matter by the students will aid in good performance. Promptly, students should be educated on the need to prepare well for test as it goes a long way to either contribute positively or negatively to difficulty level if items.

At the end of this work, the researchers among others recommended the following:

1. Item analysis should be determined on every school based examination in the institutions.

2. Undergraduates should be encouraged to prepare well for examinations.

3. Teachers should simplify complex course concepts to the barest level so that students can easily assimilate the course.

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