Vol.6 No.1 (2023)

Journal of Applied Learning & Teaching

ISSN : 2591-801X

Content Available at : http://journals.sfu.ca/jalt/index.php/jalt/index

Sitting arrangement and malpractice behaviours among higher education test-takers: On educational assessment in Nigeria

Valentine J. Owan[A] [A] *Department of Educational Foundations, University of Calabar, Calabar, Ultimate Research Network (URN), Calabar, Nigeria*

Mercy V. Owan[B] [B] *Department of Educational Management, Department of Educational Foundations, University of Calabar, Calabar, Nigeria*

Joseph O. Ogabor[C] [C] *Department of Human Kinetics and Health Education, University of Calabar, Nigeria*

Keywords

Gender separation;
higher education;
inter-class integration;
malpractice;
sitting pattern.

Correspondence

owanvalentine@gmail.com [A]

Article Info

Received 12 September 2022
Received in revised form 8 January 2023
Accepted 9 January 2023
Available online 10 January 2023

DOI: https://doi.org/10.37074/jalt.2023.6.1.5

Abstract

In this study, a cohort of 170 university students was observed for malpractice behaviour under three forms of sitting arrangement. The aim was to identify the conditions under which test-takers are more likely to engage in different forms of examination malpractice. The study was primarily concerned with providing answers to four research questions and testing four null hypotheses. Data were collected using an observation checklist conceived by the researchers. Data analysis was done using frequency counts, simple percentages and the Chi-square test of independence. It was determined, among other things, that many higher education test-takers participated in various forms of examination misconduct. Giraffing, copying from colleagues, script exchange, discussion with peers, using small papers containing answers, using phones, swaying seats, handwriting on desks, using headphones with recorded audio, and requesting invigilators for help are all manifestations of these behaviours. It was found that test-takers malpractice behaviour varied with the sitting arrangement used. Furthermore, the malpractice behaviours exhibited and the instances of cheating were not significantly dependent on gender, although males exhibited, on average, a higher rate of malpractice behaviours. However, students' malpractice behaviours and the instances of cheating significantly depended on the sitting arrangement implemented. The educational assessment implications were examined considering these findings. Examiners wishing to limit examination fraud and improve efficient performance assessments may utilise one or more combinations of gender separation and inter-class test sitting arrangements.

Highlights of the paper

1. Test-takers exhibited different forms of malpractice behaviours.
2. Using small pieces of paper was the most prevalent form of malpractice behaviour.
3. The exchange of scripts was the least common form of malpractice behaviour by test-takers.
4. Implementing gender separation formation reduced the rate of malpractice behaviours.
5. Inter-class integration formation was the most effective in curtailing malpractice.

Introduction

Educational assessment has received substantial attention among teachers, researchers, and practitioners in African educational research. Consequently, most African studies continue to focus on different strategies to improve the quality of educational assessment (Beets, 2012; Rosenberg et al., 2018; Serpell & Simatende, 2016; Sireci, 2020). In Sub-Saharan Africa, studies on educational assessment continue to grow in the literature (Anyanwu & Reuben, 2016; Ede et al., 2021; Ekuri et al., 2011; Kahembe & Jackson, 2020; Kyaruzi et al., 2019; Sayed & Kanjee, 2013). The development of assessment systems is becoming a priority among stakeholders to improve the quality of education. Different tests are used as assessment tools for decision-making (Bassey et al., 2019; Kawugana & Woyopwa, 2017). Test results are used to ascertain whether there is informed decision-making.

Every test is moderated through proper invigilation to curtail irregularities and obtain reliable trait measures under assessment. In education, teachers are the key players moderating the invigilation of tests (Owan et al., 2019; Paveling et al., 2019; Shraim, 2019). Test invigilation is conceived as a conscious, deliberate, and direct observation of events and how they are done to guide how tests are administered and taken in schools based on rules and regulations. Test invigilation can take any form, depending on (1) the trait measured, (2) the nature of examiners and their rationale, (3) the nature and characteristics of test-takers, and (4) the attributes of the test itself.

Over the years, there have been some complexities surrounding the invigilation of tests globally, especially as online-based testing practices are gradually becoming pervasive. One perceived reason is the concern about addressing the issue of varying and evolving forms of examination malpractice (Fuentes, 2020; Haque et al., 2021; Lefoka, 2020). Malpractice, in this case, is any wrongdoing exhibited before, during or after any test or examination (Kawugana & Woyopwa, 2007; Maciver, 2017). Any practice that counters or alters examination ethics is malpractice (Bibi et al., 2020; Okafor, 2021; Okwu, 2006). Several higher education studies continue to report students' untoward attitudes when writing tests or other performance assessment activities to obtain high grades (Adesina, 2020; Arop et al., 2018; Chirumamilla et al., 2020; Petters & Okon, 2014; Vlaardingerbroek et al., 2011). For example, research conducted by Open Education Database (2010) revealed that 68% of higher education students admitted to cheating, with first-year undergraduate students being the most prone to doing so. Recently, Bender (2021) found that 40% of college students self-reported having cheated at least once in their academic history. In another revelation, more than half of the students admitted to cheating during examinations in their past academic year (Mata, 2021; McCabe et al., 2006). All these studies support the claim that examination malpractice is widespread among students in higher education institutions. In Ethiopia, Dejene's (2021) study indicated a high malpractice prevalence rate, with 80% of the respondents admitting to having cheated.

As popularly discussed in the literature, these acts include neck-straining to copy from others (Arop et al., 2018), writing relevant information on different objects and re-copying the same while writing examination (Akaranga & Ongong, 2013). Smuggling lecture notes, exchange of question papers with written answers (Bassey & Owan, 2020), impersonation (Aishwarya et al., 2020; John-Otumu et al., 2021; Nagal et al., 2017), pointing answer booklets for others to copy, use of written inscription on small pieces of papers (microchips), browsing from the internet, exchange of scripts (Ekpoudo et al., 2021; Forkuor et al., 2019). An observation by the researchers suggests that some students engage in other practices such as whispering answers and sharing ideas with colleagues, swapping scripts, seat switching, playing audio recordings with the support of earphones, asking invigilators for assistance, use of textbooks and regularly obtaining permission to go out of the examination halls. Furthermore, the use of electronic devices (Odongo et al., 2021), submission of multiple scripts, and use of coded sign language or slang (for communicating answers during examinations) have also been reported by previous studies as other forms of malpractice behaviour (Akaranga & Ongong, 2013; Okolie et al., 2019; Robbin, 2020).

These poor practices are unacceptable since they tend to skew evaluation results in high stake examinations (Bassey et al., 2019; Haque et al., 2021) and contribute negatively to the quality of graduates produced in higher education institutions (Arop et al., 2018; Birkeland & Bogh, 2018; Kawugana & Woyopwa, 2017), which in turn, could hinder the economic growth of nations. Different reasons account for students' indulgence in examination malpractice. These include moral decadence, deplorable value system, poor admission and enrolment methods, inadequate teaching and learning, social vices (Okwu, 2006); poor study habits, over-emphasis on paper certification and grades as performance measures (Aderogba, 2011; Arop et al., 2018; Bassey et al., 2019, 2020); students' interest, motivation and graduation policy (Yu & Zhao, 2021), and poor invigilation (Li & Meng, 2016). Many techniques are now being implemented to fight the 'cancer' (examination malpractice), which keeps growing in higher education institutions. For example, different institutions have set up quality assurance committees to regulate assessment activities and address irregularities (Bassey et al., 2019 Uijtdehaage & Schuwirth, 2018). Teachers and students caught promoting examination malpractice are often punished, and the implementation of "conference marking" and 'two weeks maximum' results submission policies (Arop et al., 2018). However, these approaches to curtailing malpractice behaviour appear more institutional than behavioural. That is, they are primarily implemented after examinations are written.

To address the behavioural aspect of malpractice, a study revealed that the Joint Admission and Matriculation Board (JAMB) in Nigeria adopted the test items scrambling approach, as well as the use of different examination paper types, which allows for close-sitting students to answer questions in a separate order (Bassey et al., 2020). The approach used by JAMB is unarguably practical but only succeeds in curtailing just one form of malpractice (copying) among test-takers. Besides, JAMB only regulates entrance examinations into higher institutions, with such efforts not

being applied in semester examinations, rendering their efforts non-inclusive. Since malpractice relating to test-taking usually occurs before, during and after assessments, there is a need for better or more proactive measures to tackle malpractice behaviour along these lines. This will help in curtailing such unwanted occurrences across all physically taken examinations. In line with this thinking, recent studies have implemented other strategies such as adopting online assessment practices (Fuentes, 2020; Owan, 2020; Shraim, 2019), using the Internet of Things model (Haque et al., 2021), the use of higher-ordered test items (Bassey & Owan, 2020) and rational emotive behaviour education intervention (Abiogu et al., 2021). Using the resource-process-value (RPV) framework to tackle online examination malpractices has also been proffered (Hu et al., 2021).

Studies trying to resolve the problem of examination malpractice have also employed diverse independent variables. For example, research indicated that practical techniques, such as computer-based tests and biometric verification, should be adopted during testing (Akintunde & Selzing-Musa, 2016). However, this suggestion seems more applicable to computer-based testing scenarios than physical ones. Bridging this gap, the study of James and Giacaman (2020) recommended that to curb malpractice, it is essential to substitute in-class assessments and practical take-home tests to detect students' plagiarism, student learning, and repeatability. Even so, from experience, these techniques rarely eliminate or mitigate the examination malpractice activities of students. Noticeably, many students persistently indulge in such unacceptable acts even amid invigilators (Situma & Wasike, 2020) and implement other strategies.

Despite the pervasive attempts to curb examination malpractice, little focus has been paid to investigating invigilating strategies. More specifically, none of the cited studies considered the sitting arrangement of students during test-taking as a strategy capable of mitigating examination malpractice. This overlooked aspect is critical because the techniques adopted to monitor students as they take assessments could go a long way to deciding how test-takers behave. The presence of invigilators plays a vital role in curtailing excesses in test-takers' behaviour during the administration of tests (Owan et al., 2019). This explains why test-taking processes are monitored at all educational levels to guide conduct and prevent/reduce malpractice and related offences among test-takers. Popular test invigilation strategies often include attaching strict invigilators to examination halls (Oni & Osuji, 2020), wide spacing of students, and searching students' bags and pockets before entering examination halls (Arop et al., 2018). Others include disallowing mobile and electronic gadgets during examinations (Mulongo et al., 2019) and asking students to drop personal possessions outside examination halls and others.

Furthermore, research by Odongo et al. (2021) reveals that higher education students are very innovative in their approach to cheating during examinations. This implies that more untold cheating systems will likely unfold in the future, especially as online assessment practices are likely to be widely used due to the Covid-19 pandemic. Therefore, a challenge is presented to researchers to rethink new approaches and innovative strategies to invigilate test-taking processes to promote quality assessment. This study experimented with sitting arrangements to determine their effectiveness in tackling malpractice among test-takers in African higher education institutions.

In the context of this study, "sitting arrangement" or simply "sitting formation" are ways of achieving acceptable standards during the test-taking process by altering the sitting pattern of examinees before commencing the test. It refers to the order and organisation of students' sitting structure before receiving an assessment instrument. The present study derives root from the finding of Odongo et al. (2021), which revealed that many students sit in "formation" or according to a unique pattern to enable them to cheat during examinations. According to the cited authors, the formation aims to allow students to draw support from group members. Although the cited study also revealed that the effectiveness of the formation could be reduced through a reshuffling of students, it did not explain how the students should be subsequently rearranged. Also, Odongo and his colleagues did not reveal the extent to which the reshuffling of students can mitigate examination malpractice, being a qualitative study. The present study draws from these limitations and quantitatively assesses how three sitting arrangements can reduce malpractice behaviour among higher education test-takers. This study makes a unique contribution to the existing body of knowledge. It can be a valuable tool for examiners, examination bodies, educational invigilators and assessment experts to determine what approach to use while conducting internal and external examinations. The rationale was to determine the method(s) that are effective or otherwise in mitigating the prevalence of examination malpractice among higher education students.

Research questions

The specific questions addressed in this study are:

1. What are the instances of malpractice behaviour among test-takers in higher education when allowed to sit at random during examinations?

2. What instances of malpractice behaviour are manifested by test-takers in higher education when the gender separation sitting arrangement is applied?

3. What is the frequency of test-takers examination malpractice and the number of cheating instances when the inter-class integration approach is implemented?

4. Which is the most effective sitting arrangement for reducing test-takers malpractice behaviour between the random, gender-separation and inter-class integration approaches?

Hypotheses

The following hypotheses were formulated and tested:

Hypothesis 1

Ho: Test-takers' indulgence in malpractice behaviours does not significantly depend on their gender.

H1: Test-takers' indulgence in malpractice behaviours significantly depends on their gender.

Hypothesis 2

Ho: The observed instances of malpractice behaviours among test-takers do not significantly depend on their gender.

H1: The observed instances of malpractice behaviours among test-takers significantly depends on their gender.

Hypothesis 3

Ho: Test-takers' indulgence in malpractice behaviours is not significantly dependent on the implemented sitting arrangement.

H1: Test-takers' indulgence in malpractice behaviours significantly depends on the implemented sitting arrangement.

Hypothesis 4

Ho: The observed instances of malpractice behaviours among test-takers do not significantly depend on the sitting arrangement implemented.

H1: The observed instances of malpractice behaviours among test-takers significantly depend on the sitting arrangement implemented.

Theoretical framework

This study is grounded in the classical test theory (CTT) (Allen & Yen, 2002; Lord & Novick, 1968; Novick, 1966). The CTT is a quantitative approach to ensuring the validity and reliability of psychological measurement (Cappelleri et al., 2014). The theory holds that every observed score (X) contains a true score (T) plus a random error score (E). The CTT also referred to as true score theory assumes that every individual in a test has a true score that would have been attained if there were no errors. However, due to several factors (observable and non-observable), which can be psychological, social, genetic or environmental, an error score must always be present. Thus, it is impossible to determine the true score since most variables contributing to the error scores cannot be examined. Therefore, instructors and test administrators can only quantify each student's observed score (X) but never their true score (T). This position can be mathematically expressed as:

$$X = T \pm E$$

Where:
X = observed score
T = True score
E = Error (Random or systematic) score

Note that the plus or minus symbol was not the plus sign because random errors could increase or decrease the observed score. The mean of the hypothesised distribution of test results that would result from several independent tests of the same person using the same test is known as the true score for a test. Error is a product of random and illogical departures from the true score in every testing session (Sharkness & DeAngelo, 2011). Since the error is random, it changes throughout all test administrations, and so does the observed score. In contrast, a true score should remain constant, independent of the testing context. This merely means that a person's T is confirmed for that individual taking one exam; it does not imply that a person's actual score is 'true' for every test or measure of the same type.

The CTT is relevant to this study because students' indulgence in examination malpractice is one factor that makes it impossible to attain the T. Studies have shown that the indulgence of students in different forms of examination malpractice raises the error score while lowering or skewing the true score (Ekechukwu & Nwamadi, 2017; Joshua, 2019). Because the error score is not minimised, incorrect conclusions are drawn about the trait being tested (Bassey et al., 2020; Bassey & Owan, 2020; Owan, 2020; Memory & Abosede, 2021). Along these lines, the current study was undertaken to test the efficacy of different sitting arrangements in minimising students' indulgence in examination malpractice to reduce the error score.

Conceptual clarification: Description of sitting arrangement

The three sitting arrangements include random, gender separation, and inter-class integration arrangements. The random sitting arrangement is a system where the students are allowed to sit as they like in an examination hall or where the arrangement of seats follows no order. This sitting arrangement was used to obtain baseline data about students' cheating behaviour in a more realistic situation. The baseline information served as the benchmark for further comparing students' malpractice behaviours after implementing other sitting arrangements. Gender separation formation is a sitting arrangement that demarcates male from female students before a test. In this formation, male and female students occupy some columns in the examination hall (with adequate space demarcating them). It is used to administer the same test to male and female students of the same class. Students of sex A are not seated in the section meant for sex B and vice versa. Inter-class integration accommodates students of different academic classes to take their respective tests in the same venue. Also, students at different levels of the same discipline could be made to take their tests in the same hall. Students of the same class can also use it but across different academic disciplines in the same test venue. This approach entails several tests for

different subgroups of respondents in the same venue. For example, integrating first-year, second-year, third-year and final-year students into the same examination hall to take their separate examinations.

Methods

Research design and participants

The study adopted the prospective cohort study design. The prospective cohort design is a type of observational study within the analytic framework to collect data from a group of people from a given time point into the future (Song & Chung, 2010). This design is planned and implemented for participants who meet eligibility criteria to answer specific research questions in an area (Gad, 2014). Our study involved a cohort of 170 second-year students (Males = 75; Females = 95) at a public university in Nigeria (its name is masked for confidentiality). The population of second-year students in the university was 1,211 (Males, N = 534; Females, N= 677). The 170 participants represented approximately 14% of the population and were chosen across the two strata in the same proportion for fairness.

A priori power analysis proved that a sample size of 101 participants (for 11 degrees of freedom) or 128 participants (for 22 degrees of freedom) was large enough to achieve an effect size of w = 0.50 and a 95% statistical power at the .05 alpha level in rejecting the null hypothesis correctly if it is false or accepting it if it is true (See appendix 1 and 2). The power analysis was conducted for the Chi-square test at 11 and 22 degrees of freedom using G*power software (Cohen, 1988; Faul et al., 2007; Mayr et al., 2007). Since a larger sample was preferred, the target was to recruit at least 128 participants. Nevertheless, an additional 30% increase in the sample size was considered for possible attrition and non-response (Bujang, 2021; Corry et al., 2017; Heo, 2014; In et al., 2020), resulting in a required sample of 164 participants, which was approximated to 170 participants. Thus, the sample of 170 participants was slightly more than the minimum requirements to achieve adequate power after accounting for possible attrition.

The cohort of second-year students was of interest to us because they have had a fair amount of university experience (compared to the first-year) and are still more likely to be academically weaker (compared to third or final-year students). The respondents were randomly selected using the simple random sampling technique, a probability sampling procedure. This approach gave each eligible participant an equal probability of selection, promoting fairness. The cohort was observed under one control condition and two experimental conditions. The control condition was used to obtain baseline information on the malpractice behaviour of the students before any form of manipulation was implemented.

Instrument for data collection

We designed a paper monitor checklist as the tool for data collection. Based on existing literature, the checklist was developed to indicate the number of test-takers engaging in different forms of the listed malpractice behaviour. Provisions were also made to record the number of instances test-takers manifested a particular malpractice behaviour on the checklist. Since test-takers are known to be innovative and evolving in their cheating strategies (Hill et al., 2021; Odongo et al., 2021), we made provisions to include any malpractice behaviour exhibited by students that were not initially listed. Some experts offered the checklist face validity before it was used for data collection.

Data collection procedure

Collecting data for any study dealing with academic integrity has always been challenging (Teymouri et al., 2022) due to the difficulty associated with getting participants, organisms, or objects to act as they would naturally. To promote data integrity and avoid bias in our observations, we partnered with three academic staff at the university under focus. These three academics were purposively chosen because they have been allocated courses for teaching first-year, second, and third-year students and were willing to assist us in pursuing this study. We assume that students will only manifest malpractice behaviour if they know that the written test or examination is part of the build-up for their semester course achievement (GPA). For this reason, the three academic staff were made to provide written informed consent on behalf of their students. The cohort did not participate in this study voluntarily because we did not want them to pretend; we wanted them to act as they would in any other test. Ethical consideration was waived for this study as per national and institutional regulations.

Data collection for this study was done in the second semester of the 2020/2021 academic session. We partnered with an academic staff teaching the cohort of second-year students at a selected department by offering to be part of his invigilation team throughout the term (from July to October 2021). This was done to enable us to collect data at three-time points. During the first phase, the academic staff scheduled a test as part of the build-up to students' cumulative scores for the semester. We visited the test venue as scheduled with five well-trained research assistants. The academic staff offered test questions based on the curriculum contents provided to students at the time. Students came in well-prepared to write their test without knowledge about this research. The students were allowed to sit at random, as they wished. The researchers and research assistants had earlier been pre-assigned to focus on specific columns to avoid repetition in recording observations. Each person was in their duty post, observing students closely as they took their tests. We recorded the number of test-takers who cheated and the malpractice behaviour exhibited using the inventory. We also recorded the instances of cheating (i.e., the number of times different malpractice behaviours were shown regardless of whether it was the same person exhibiting it). At the close of the test, scripts were collected from the students and handed over to the teacher.

After one month and two weeks, the second phase of the data collection commenced. We used the same cohort of students that participated in the first phase and the same teacher for

the exercise. However, unlike in the first phase, students were not allowed to sit randomly. Before administering the test, all the desks in the hall were rearranged into four columns. The gender separation approach was implemented with male test-takers occupying the first two columns while female test-takers sat on the last two. After the seating arrangement had been executed, the teacher administered the test as usual, without the students' knowledge. As in the first phase, we recorded information about the number of unique test-takers that exhibited malpractice behaviour and documented the instances of cheating.

After another month, the school timetable came out for teachers to administer their final continuous assessment (test) for the semester. This time, a date was scheduled between the research team and the three academic staff (including the one that took part in the first two experiments and the other two that are yet to) to administer their tests. This time around, a schedule was made for the three different tests to be taken by three groups of students at the same time, date and venue. The big hall was chosen to accommodate these three groups of students. The other two academic staff participating for the first time in the research were teaching first-year and third-year students. After entering the examination hall, we implemented the inter-class integration formation where three test-takers of different class members were made to sit on a desk. They were all sat in this order: first-year, second-year, and third-year across all the desks. This way, it was easy for each academic staff to locate his students based on the seating arrangement for administering and retrieving test booklets. Even though three groups of students were mixed, keen observation was still paid to the cohort of this study – the year two students occupying the middle position at each desk. We were not interested in monitoring nor recording the malpractice behaviour of first-year and third-year students because they were only brought in to alter the experimental condition. Thus, we took all recordings of the unique test-takers that cheated from the primary cohort and recorded the instances of cheating behaviour.

The method of counting the malpractice behaviours was based on the instances (frequency) of the cheating behaviours and the number of test-takers who cheated. The number of instances refers to the number of times test-takers manifested specific cheating behaviours. Efforts were made to determine the unique number of test-takers who cheated by allowing each research assistant to focus on a region assigned to them for observation. Each observer did not cross their area of focus to avoid multiple recordings of the same behaviour by different observers. Recordings from all observations were collated from all observers, prepared on a spreadsheet package and stored in the personal computer of the lead author with a strong password. The data was only accessible to the team of researchers and utilised only when necessary. Since self-identifying data were not requested, the collected data was obtained with a high level of anonymity. Thereafter, the data were summarised using descriptive statistics such as frequency counts, simple percentages, averages and charts. The summarised frequency-based data were further used to create crosstabs where the Chi-square test of independence was used to test the null hypotheses at the .05 level of significance.

Results

Research question 1

The malpractice behaviour of test-takers in higher education when they were allowed to sit at random during examinations was determined using reports recorded by the researcher through the observation of test-takers behaviour during the test. The results presented in Table 1 generally revealed that, on average, 62 students engaged in cheating during the test, with an observed average of 37 cheating instances. Specifically, the observation revealed that 38.82% (n = 66) unique students were caught giraffing, with 97 giraffing instances. A total of 35.13% (n = 60) were observed copying from their colleagues with 69 cases. The observations also revealed that 3.93% (n =7), 29.97% (n = 51), 21.87 % (n = 37), 8.84% (n = 15), 2.95% (n = 5), 0.49% (n = 1), 28.74% (n = 49), and 22.6% (n = 38) of the test-takers exchanged scripts, discussed with other colleagues, used small pieces of paper (microchips), used their phones, switched seats, wrote on desks, sought help from invigilators and took regular permission to go out respectively. The number of incidents of cheating was recorded: n = 10 (script exchanges), n = 61 (talking with colleagues), n = 47 (microchips used), n = 18 (phone-using), n = 5 (switching seats), n = 8 (scripting on desks), 58 (seeking for invigilators' aid) and 70 (asking permission to leave often). However, no student was observed using earphones or textbooks while they sat at random. The rate of cheating was computed as the total number of cheating instances divided by the number of unique test-takers caught cheating. The analysis revealed that students intending to giraffe, copy from colleagues, exchange scripts, discuss with colleagues, use microchips, use phones, switch seats, write on desks, seek help from invigilators and seek regular permission are likely to do so at approximately one, two, one, one, one, one, eight, one and two times respectively.

Table 1. Instances of cheating and the number of unique test-takers who cheated at the implementation of the random sitting arrangement.

Forms of Malpractice	No. of unique test-takers who cheated (N)	No. of cheaters as a per cent of total test-takers	Instances of cheating (IC)	Rate of cheating (IC/N)
Giraffing	66	38.82%	97	1.47
Copying from colleagues	60	35.13%	69	1.15
Exchange of scripts	7	3.93%	10	1.50
Discussing with colleagues	51	29.97%	61	1.19
Microchips	37	21.87%	47	1.26
Use of phones	15	8.84%	18	1.17
Seats switching	5	2.95%	5	1.00
Writing on desks	1	0.49%	8	8.00
Use of earphones	0	0	0	Nil
Seeking help from invigilators	49	28.74%	58	1.19
Use of textbooks	0	0	0	Nil
Seeking regular permission	38	22.60%	70	1.82
Mean ($\bar{X}$)	**62**		**37**	

Research question 2

The frequency of malpractice behaviour manifested by higher education test-takers at the implementation of the gender separation sitting arrangement was determined using the observation report. The total number of males and females who were caught exhibiting malpractice behaviour and the total number of cheating instances were used. Table 2 indicates, on a general note, that an average number of 11 males cheated, with a recorded average number of

17 cheating instances, while 11 females cheated, with a computed average of 22 cheating instances. Based on mean to sample proportion, the result implies that males (14.7%) are more likely to iterate their malpractice behaviour than females (12.9%), even though the average number of male and female students who cheated was about the same. In total, 22 students cheated during the test regardless of sex, with an average of 39 cheating instances at the implementation of the gender separation sitting arrangement. However, no student was caught exchanging scripts or using textbooks under this approach. The number of males and females who cheated and the number of cheating instances across specific forms of malpractice are presented in Table 2.

Table 2. Distribution of test-takers who cheated and the instances of cheating at the implementation of the gender separation sitting arrangement.

Malpractice (s)	No. of unique test-takers who cheated as a per cent of total test-takers			Instances of cheating (IC)			Rate of cheating (IC/N)		
	M [%]	F [%]	T [%]	M	F	T	M	F	T
Giraffing	14 [8.24]	23 [13.53]	37 [21.76]	38	60	98	2.71	2.61	5.32
Copying from friends	20 [11.76]	27 [15.88]	47 [27.65]	30	51	81	1.50	1.89	3.39
Exchange of scripts	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Discussing with colleagues	20 [11.76]	10 [5.88]	30 [17.65]	34	39	73	1.70	3.90	5.6
Microchips	29 [17.06]	15 [8.82]	44 [25.88]	33	26	59	1.14	1.73	2.87
Use of phones	9 [5.29]	8 [4.71]	17 [10.00]	9	8	17	1.00	1.00	2.00
Seats switching	0 [0.00]	1 [0.59]	1 [0.59]	2	3	5	0.00	3.00	3.00
Writing on desks	2 [1.18]	3 [1.76]	5 [2.94]	6	19	25	3.00	6.33	9.33
Use of earphones	0 [0.00]	1 [0.59]	1 [0.59]	0	1	1	0.00	1.00	1.00
Seeking help from invigilators	19 [11.18]	26 [15.29]	45 [26.47]	23	35	58	1.21	1.35	2.56
Use of textbooks	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Seeking regular permission	24 [14.12]	15 [8.82]	39 [22.94]	27	17	44	1.13	1.13	2.26
Mean ($\bar{X}$)	11/75 [14.7%]	11/95 [11.6%]	22	17	22	39	1.14	2.00	1.87

Key: M = Male; F = Female; T = Total

Research question 3

The frequency of test-takers' examination malpractice and the number of cheating instances when the inter-class integration sitting arrangement was implemented is presented in Table 3. An average of seven students cheated, with an average of nine cheating instances. Specifically, 10.59% (n = 18), 3.53% (n =6), 1.18% (n = 2), 13.53% (n = 23) and 20% (n = 34) of the students were caught using microchips, phones, earphones, seeking help from invigilators, and seeking regular permission to go out of the examination hall respectively. The number of cheating cases for test-takers using microchips, phones, earphones, seeking help from invigilators and seeking regular permission was 27, 10, 2, 28, and 43, respectively. However, malpractice behaviours such as giraffing, copying, script exchange, conversation with peers, seat swapping and the utilisation of textbooks were not noted among the test-takers after the inter-class integration sitting arrangement was implemented.

Research question 4

The most effective sitting arrangement in reducing test-takers malpractice behaviour between the random, gender-separation and inter-class integration approaches was determined by comparing the percentage of total test-takers who cheated and the rate of cheating instances generally

Table 3. Distribution of the number of test-takers who cheated and the number of cheating instances at the implementation of the inter-class integration sitting arrangement.

Malpractice	No. of unique test-takers who cheated (N)	No. of cheaters as a per cent of total test-takers	Instances of cheating (IC)	Rate of cheating (IC/N)
Giraffing	0	0%	0	0
Copying from friends	0	0%	0	0
Exchange of scripts	0	0%	0	0
Discussing with colleagues	0	0%	0	0
Microchips	18	10.59%	27	1.51
Use of phones	6	3.53%	10	1.60
Seats switching	0	0%	0	0
Writing on desks	0	0%	0	0
Use of earphones	2	1.18%	2	0.84
Seeking help from invigilators	23	13.53%	28	1.22
Use of textbooks	0	0%	0	0
Seeking regular permission	34	20.00%	43	1.25
Mean ($\bar{X}$)	**7**		**9**	

and across specific forms of malpractice. Based on the results presented in Table 4, it was discovered generally, through comparison, that, on average, test-takers who engaged in malpractice were 16.11% (random), 13.04% (gender separation) and 4.07% (inter-class integration), respectively, for the three sitting arrangements. Specifically, the following examination misconducts (giraffing, assisting colleagues or copying from friends, script swapping, discussion with other test-takers, seat switching and seeking help from invigilators) were reduced during gender separation, and the inter-class integration approach was applied. Many of these malpractice behaviours were not observed in the inter-class integration formation.

Furthermore, the following malpractice behaviours (use of microchips, use of phones and writing on desks) were minimal at the application of the random formation but increased at the implementation of the gender separation sitting arrangement. The use of earphones was not observed in the random sitting arrangement but was recorded in applying the gender separation and inter-class integration arrangements. Obtaining regular permission to go out of the examination hall was recorded almost at the same rate at the application of both the random and gender-separation sitting arrangements but reduced when the inter-class integration arrangement was implemented. This result is further presented pictorially (see Figures 1 and 2) to understand the malpractice behaviour across the three sitting arrangements quickly.

Table 4. Comparison of the extent of test-takers malpractice behaviours based on the application of the random, gender separation and inter-class integration sitting arrangements.

Forms of malpractice	Per cent of total test-takers who cheated			Rate of cheating instances		
	Random	Gender separation	Inter-class integration	Random	Gender separation	Inter-class integration
Giraffing	38.82%	21.76%	0.00%	1.47	5.32	0.00
Copying from friends	35.13%	27.65%	0.00%	1.15	3.39	0.00
Exchange of scripts	3.93%	0.00%	0.00%	1.50	0.00	0.00
Discussing with colleagues	29.97%	17.65%	0.00%	1.19	5.6	0.00
Microchips	21.87%	25.88%	10.59%	1.26	2.87	1.51
Use of phones	8.84%	10.00%	3.53%	1.17	2.00	1.60
Seats switching	2.95%	0.59%	0.00%	1.00	3.00	0.00
Writing on desks	0.49%	2.94%	0.00%	8.00	9.33	0.00
Use of earphones	0.00%	0.59%	1.18%	0.00	1.00	0.84
Seeking help from invigilators	28.74%	26.47%	13.53%	1.19	2.56	1.22
Use of textbooks	0.00%	0.00%	0.00%	0.00	0.00	0.00
Seeking regular permission	22.60%	22.94%	20.00%	1.82	2.26	1.25
Mean ($\bar{X}$)	**16.11**	**13.04**	**4.07**	1.65	3.11	**0.54**

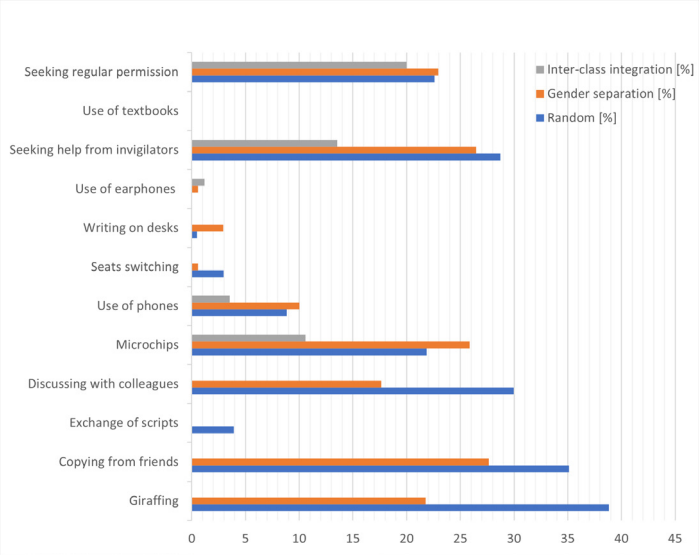


Figure 1. A clustered bar chart showing the number of test-takers who cheated as a per cent of the total cohort of this study across the three sitting arrangements.

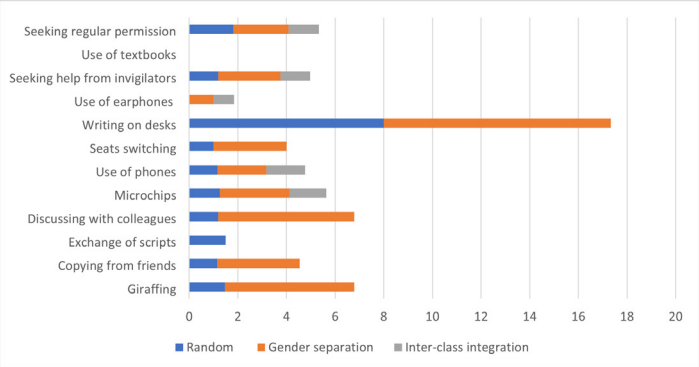


Figure 2: Stacked bar chart showing the rate of malpractice among test-takers across the three sitting arrangements.

Hypothesis 1

A chi-square test was performed to determine whether test-takers indulgence in malpractice behaviours significantly depended on their gender. Table 5 shows that the calculated Chi-Square value of χ2cal = 16.22 is less than the critical value of χ2crit. = 19.68 at the .05 level of significance and 11 degrees of freedom. Based on this result, we failed to reject the null hypothesis, whereas the alternative hypothesis was disregarded. This implies that test-takers indulgence in malpractice behaviours does not significantly depend on their gender. Therefore, the observed difference in the proportion of cheating between male and female test-takers (reported in Table 2) in favour of the latter is attributable to chance.

Hypothesis 2

The second hypothesis was tested to determine whether the observed instances of malpractice behaviours among test-takers significantly depended on their gender using a Chi-square test of independence. The results in Table 6 reveal that the observed instances of malpractice behaviours did

Table 5: Chi-square test results of gender and malpractice behaviours among test-takers.

	Number of male and female unique test-takers who cheated		
Malpractice behaviours	Males	Females	Total
Giraffing	14 (19.06)	23 (17.94)	37
Copying from friends	20 (24.21)	27 (22.79)	47
Exchange of scripts	0 (0.00)	0 (0.00)	0
Discussing with colleagues	20 (15.45)	10 (14.55)	30
Microchips	29 (22.66)	15 (21.34)	44
Use of phones	9 (8.76)	8 (8.24)	17
Seats switching	0 (0.52)	1 (0.48)	1
Writing on desks	2 (2.58)	3 (2.42)	5
Use of earphones	0 (0.52)	1 (0.48)	1
Seeking help from invigilators	19 (23.18)	26 (21.82)	45
Use of textbooks	0 (0.00)	0 (0.00)	0
Seeking regular permission	24 (20.09)	15 (18.91)	39
Total	137	129	266

$\Sigma F_O = 266$; $\Sigma F_E = 266$; $\Sigma(F_O - F_E) = 0$; $\Sigma(F_O - F_E)^2 = 275.64$;
$\chi^2_{Calc.} = 16.23$; $\chi^2_{Crit.} = 19.68$; df = 11; α = .05

Notes: Values in parentheses are expected frequencies; ΣF_O = Sum of all observed frequencies; ΣF_E = Sum of all expected frequencies; $\Sigma(FO - FE)$ = Sum of all observed minus expected frequencies; $\Sigma(FO - FE)^2$ = Sum of all observed minus expected frequencies squared; $\chi^2_{calc.}$ = Calculated Chi-Square value $\left(\frac{F_O - F_E}{E}\right)$; $\chi^2_{crit.}$ = Critical Chi-square value at 22 degrees of freedom, derived from statistical tables; df = Degrees of freedom, given as (R – 1) (C – 1); where C = number of columns and R = Number of rows; α = Alpha level showing the margin of error

not significantly depend on the test-takers' gender since the calculated Chi-square value of 17.55 is less than the critical value of 19.68 at the .05 level of significance and 11 degrees of freedom. Consequently, we fail to reject the null hypothesis, and in its stead, the alternative hypothesis is rejected. Therefore, the observed difference in the cheating instances of male and female test-takers recorded in Table 3 is due to chance.

Table 6: Chi-square test results of malpractice behaviours and cheating instances among male and female test-takers.

	Instances of cheating by male and female participants		
Malpractice behaviours	Male	Female	Total
Giraffing	38 (42.94)	60 (55.06)	98
Copying from colleagues	30 (35.49)	51 (45.51)	81
Exchange of scripts	0 (0.00)	0 (0.00)	0
Discussing with colleagues	34 (31.99)	39 (41.01)	73
Microchips	33 (25.85)	26 (33.15)	59
Use of phones	9 (7.45)	8 (9.55)	17
Seats switching	2 (2.19)	3 (2.81)	5
Writing on desks	6 (10.95)	19 (14.05)	25
Use of earphones	0 (0.44)	1 (0.56)	1
Seeking help from invigilators	23 (25.41)	35 (32.59)	58
Use of textbooks	0 (0.00)	0 (0.00)	0
Seeking regular permission	27 (19.28)	17 (24.72)	44
Total	202	259	461

$\Sigma F_O = 461$; $\Sigma F_E = 461$; $\Sigma(F_O - F_E) = 0$; $\Sigma(F_O - F_E)^2 = 404.67$
$\chi^2_{Calc.} = 17.55$; $\chi^2_{Crit.} = 19.68$; df = 11; α = .05

Notes: Values in parentheses are expected frequencies; ΣF_O = Sum of all observed frequencies; ΣF_E = Sum of all expected frequencies; $\Sigma(FO - FE)$ = Sum of all observed minus expected frequencies; $\Sigma(FO - FE)^2$ = Sum of all observed minus expected frequencies squared; $\chi^2_{calc.}$ = Calculated Chi-Square value $\left(\frac{F_O - F_E}{E}\right)$; $\chi^2_{crit.}$ = Critical Chi-square value at 22 degrees of freedom, derived from statistical tables; df = Degrees of freedom, given as (R – 1) (C – 1); where C = number of columns and R = Number of rows; α = Alpha level showing the margin of error

Hypothesis 3

To test whether test-takers' indulgence in malpractice behaviours significantly depended on the implemented sitting arrangement, a crosstab was created, and a Chi-square test of independence was performed on the data. Table 7 provides evidence that the calculated Chi-square value of 120.17 is greater than the critical Chi-square value of 33.92 at the .05 alpha level and 22 degrees of freedom. Given this result, the null hypothesis was rejected, whereas the alternative hypothesis was upheld. This suggests that test-takers' indulgence in malpractice behaviours significantly depends on the implemented sitting arrangement. Therefore, the results presented in Table 4 and Figure 1 were not due to chance.

Hypothesis 4

In the fourth hypothesis, a crosstab was generated, and a Chi-square test of independence was performed on

the data to determine whether the observed instances of malpractice behaviours among test-takers significantly depended on the sitting arrangement implemented. Table 8 shows that the computed Chi-square value of 177.28 is higher than the critical Chi-square value of 33.92 at the .05 alpha level and 22 degrees of freedom. As a consequence of this outcome, the null hypothesis was rejected, whereas the alternative hypothesis was accepted. This implies that the observed instances of malpractice behaviours among test-takers significantly depend on the sitting arrangement implemented. Thus, the results shown in Table 4 and Figure 2 were not due to chance.

Table 7: Chi-square results showing the dependence of test-takers' indulgence in malpractice behaviours on the implemented sitting arrangement.

	Number of Unique Test-takers who cheated across three sitting arrangements			
Malpractice behaviours	Random	Gender-Separation	Inter-Class Integration	Total
Giraffing	66 (49.98)	37 (40.41)	0 (12.61)	103
Copying from colleagues	60 (51.92)	47 (41.98)	0 (13.10)	107
Exchange of scripts	7 (3.40)	0 (2.75)	0 (0.86)	7
Discussing with colleagues	51 (39.31)	30 (31.78)	0 (9.92)	81
Microchips	37 (48.04)	44 (38.84)	18 (12.12)	99
Use of phones	15 (18.44)	17 (14.91)	6 (4.65)	38
Seats switching	5 (2.91)	1 (2.35)	0 (0.73)	6
Writing on desks	1 (2.91)	5 (2.35)	0 (0.73)	6
Use of earphones	0 (1.46)	1 (1.18)	2 (0.37)	3
Seeking help from invigilators	49 (56.77)	45 (45.90)	23 (14.32)	117
Use of textbooks	0 (0.00)	0 (0.00)	0 (0.00)	0
Seeking regular permission	38 (53.86)	39 (43.55)	34 (13.59)	111
Total	329	266	83	678
$\Sigma F_O = 678$; $\Sigma F_E = 678$;	$\Sigma(FO - FE) = 0$;	$\Sigma(FO - FE)^2 = 1998.13$		
$\chi^2_{calc.} = 120.17$; $\chi^2_{crit.} = 33.92$;	$df = 22$;	$\alpha = .05$		

Notes: Values in parentheses are expected frequencies; ΣF_O = Sum of all observed frequencies; ΣF_E = Sum of all expected frequencies; $\Sigma(FO - FE)$ = Sum of all observed minus expected frequencies; $\Sigma(FO - FE)^2$ = Sum of all observed minus expected frequencies squared; $\chi^2_{calc.}$ = Calculated Chi-Square value $\left(\frac{F_O - F_E}{F_E}\right)$; $\chi^2_{crit.}$ = Critical Chi-square value at 22 degrees of freedom, derived from statistical tables; df = Degrees of freedom, given as (R – 1) (C – 1); where C = number of columns and R = Number of rows; α = Alpha level showing the margin of error

Table 8: Chi-square results showing the dependence of students' instances of cheating on the implemented sitting arrangements.

	Instances of cheating across three sitting arrangements			
Malpractice behaviours	Random	Gender-Separation	Inter-Class Integration	Total
Giraffing	97 (85.19)	98 (88.65)	0 (21.15)	195
Copying from colleagues	69 (65.53)	81 (68.20)	0 (16.27)	150
Exchange of scripts	10 (4.37)	0 (4.55)	0 (1.08)	10
Discussing with colleagues	61 (58.54)	73 (60.92)	0 (14.54)	134
Microchips	47 (58.11)	59 (60.47)	27 (14.43)	133
Use of phones	18 (19.66)	17 (20.46)	10 (4.88)	45
Seats switching	5 (4.37)	5 (4.55)	0 (1.08)	10
Writing on desks	8 (14.42)	25 (15.00)	0 (3.58)	33
Use of earphones	0 (1.31)	1 (1.36)	2 (0.33)	3
Seeking help from invigilators	58 (62.91)	58 (65.47)	28 (15.62)	144
Use of textbooks	0 (0.00)	0 (0.00)	0 (0.00)	0
Seeking regular permission	70 (68.59)	44 (71.38)	43 (17.03)	157
Total	443	461	110	1014
$\Sigma F_O = 1014$; $\Sigma F_E = 1014$;	$\Sigma(FO - FE) = 0$;	$\Sigma(FO - FE)^2 = 3675.66$		
$\chi^2_{calc.} = 177.28$; $\chi^2_{crit.} = 33.92$;	$df = 22$;	$\alpha = .05$		

Notes: Values in parentheses are expected frequencies; ΣF_O = Sum of all observed frequencies; ΣF_E = Sum of all expected frequencies; $\Sigma(FO - FE)$ = Sum of all observed minus expected frequencies; $\Sigma(FO - FE)^2$ = Sum of all observed minus expected frequencies squared; $\chi^2_{calc.}$ = Calculated Chi-Square value $\left(\frac{F_O - F_E}{F_E}\right)$; $\chi^2_{crit.}$ = Critical Chi-square value at 22 degrees of freedom, derived from statistical tables; df = Degrees of freedom, given as (R – 1) (C – 1); where C = number of columns and R = Number of rows; α = Alpha level showing the margin of error

Discussion of findings

This study has found that many second-year students in Nigerian universities engage in examination misconduct. These habits include giraffing, friendly copying, exchange of manuscripts, interaction with colleagues, microchips, telephone use, seat swap, desk writing, earbuds, and requesting help from invigilators. This finding strengthens the report of previous studies (Akaranga & Ongong, 2013; Arop et al., 2018; Okwu, 2006), which enlist some everyday malpractice activities of higher education test-takers, including giraffing, the use of electronic devices, submission of multiple scripts, use of coded sign language among test-takers or between teachers and some test-takers for communicating answers during examinations are other standard practices of examination malpractice.

Interestingly, there is a significant deviation in the malpractice behaviour of test-takers depending on the sitting arrangement applied. This shows that the way students are arranged to take tests or examinations matters in their malpractice behaviours and their cheating instances. For instance, the rate of giraffing, copying, scripts and seat exchange, use of microchips, and invigilator disturbance dropped when the gender separation approach was applied and went utterly extinct when the inter-class integration approach was applied. This suggests that the inter-class integration approach may be the most effective method among the three in curtailing malpractice behaviours and instances of cheating among test-takers. The gender-separation technique follows this. This decline may be attributed to the destabilisation that sitting arrangements bring. For example, giraffing, copying and exchanging seats/scripts may be difficult to achieve when surrounding neighbours in a test hall are members of a different class, writing a different test. It is also impossible for test-takers to discuss when they have been rearranged to the point that test-takers, who usually adopt the teamwork approach to cheat, are made to sit apart from their team members. Cases of test-takers copying from desks are also likely to be reduced or eliminated if they are relocated from the desk where inscriptions were made before the examination.

The gender separation may have also proven effective because most students sit beside intelligent students of the opposite gender to solicit help that may otherwise not be derived from colleagues of the same sex. Some students are more willing to help colleagues of the opposite sex than those of the same sex due to the rewards they can derive after examinations. Consequently, students visit the classroom with a planned sitting formation that will enable the brilliant ones to assist their dull friends of the opposite sex. Although the gender-separation technique has been revealed to be effective in reducing malpractice behaviours and instances of cheating among students, malpractice behaviour is not significantly associated with a particular gender. Therefore, whether a student will cheat and the instances of cheating is not significantly dependent on their being a male or female. This result conforms with several studies indicating that gender is not an index for examination malpractice (Badejo & Gandonu, 2010; Olowodunoye & Titus, 2011). Nevertheless, the present study has provided further evidence corresponding to the result uncovered by previous studies (Ejinwa & Ojiaku, 2020; Mulongo et al., 2020) that males are more likely to indulge in malpractice than females, albeit the difference is not significant. However, the result disagrees with the findings of some studies (Ifeagwazi et al., 2019; Oyeyemi et al., 2019), which showed, on the contrary, a significant gender difference in malpractice behaviours between male and female students, with the former engaging more than the latter. This disparity in the results is attributable to the data collection methods and the subjects used in the cited and current studies. This suggests that further research is necessary to clarify the role of gender in malpractice behaviours among students at different education levels.

The use of microchips, phones, and earphones increased and could not be eliminated even when the most robust sitting arrangement (inter-class integration) was applied. Such an increase may be attributed to the anxiety test-takers might have developed due to the challenging nature of the supervision environment. Therefore, they may resort to using personally-based or dynamic approaches so that a displacement in the seating arrangement makes it possible for them to move with their cheating devices. In the three experiments, test-takers were not observed cheating with their textbooks against the position of studies (Akaranga & Ongong, 2013; Okwu, 2006). However, the researchers attributed the absence of textbook use to the planned nature of the experiment and the instruction given to test-takers to take their books and other luggage outside. Furthermore, books' usual extensive nature could be easily discovered during the test formation rearrangement. Textbooks found during this process are taken out, implying that test-takers were 'disarmed' from possessing such books. Lastly, many test-takers took frequent permission to go out of the test hall in the name of going to ease themselves. However, the researchers suspect that some test-takers will likely read or 're-arm' themselves before returning to continue their examinations.

Limitations and implications for further research

This study faces a few limitations, including the small sample size and scope, which may limit generalisations made to the entire population. However, considering its experimental nature, further studies/experiments should be conducted in different parts of the world to validate the sitting arrangement framework developed in this study. Another limitation is that the test-takers were not observed in an examination condition (such as a semester or degree examination) where we believe there is a higher stake and, therefore, a higher likelihood for students to cheat than in a testing scenario. Perhaps some test-takers did not exhibit specific behaviour because a lower value must have been placed on the test. Therefore, future research should be designed to observe test-takers malpractice behaviour at the end of the semester examination. Prospective researchers should also use complex and more sophisticated data collection methods, such as hidden cameras. This will help reduce the number of invigilators in the test or examination hall, allowing students to exhibit their actual behaviour.

Conclusion

Based on the findings from this study, it was concluded that the examination malpractice behaviour of the examiners varies with the employed seating scheme. Random sitting arrangements (where test-takers are allowed to sit as they wish) promote a higher rate of cheating among higher education test-takers. Although a gender separation sitting arrangement reduces the rate of malpractice, the inter-class integration approach is the most effective in reducing several malpractice behaviours. This study has numerous implications because the adoption of sitting arrangements tends to decrease some kinds of examination malpractices, such as using microchips, phones, earphones and writing on desks. Therefore, higher education teachers and examination invigilators should take note of this evidence and adopt these approaches to mitigate these practices. This study contributes to the literature by offering two new methods of arranging students in an examination or test-taking condition to regulate their malpractice behaviour.

Therefore, the two new sitting arrangements experimented on in this study are recommended for national or standardised examinations where paper-pencil tests are used. These formations may also be used to some extent in computer-based assessment practices. Examiners who aim to lower the exam misconduct rate of test-takers and improve practical performance assessment should either employ gender separation, inter-class integration or a mix of both sitting arrangements. This would reduce test-takers' malpractice behaviour and provide results that reflect test-takers actual cognitive ability in higher education. Test-takers should be compelled to take out all items in their possession before the beginning of any test, examination or evaluation. They should be checked, ensuring that things such as phones, earpieces, textbooks and notebooks of different types, forms and sizes are not with test-takers. No student should be allowed to leave an assessment venue more than once. All test-takers returning to the examination hall after obtaining permission to go out should be assessed before they take their seats. Close attention should also be paid to such test-takers throughout the exercise. Disciplinary approaches should also be instituted in higher learning institutions, prescribing the penalties for particular academic offences.

References

Abiogu, G. C., Ede, M. O., Mezieobi, D. I., Nwosu, N., Ogheneakoke, C. E., Ujah, P., ... & Agbigwe, I. B. (2021). Reducing negative value system in students: The impacts of rational emotive behavioural education. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 2020*(2), 243-271. https://doi.org/10.1007/s10942-021-00387-2

Aderogba, K. A. (2011). Examination malpractice in schools and colleges of Ifo educational zone: Implications for sustainable educational development. *Academic Research International, 1*(3), 130 – 148. https://bit.ly/3eZxOIr

Adesina, A. O. (2020). Facial capture as a measure to solving CBT examination malpractices. *African Journal of Science and Nature, 7*, 12-18. https://doi.org/10.46881/ajsn.v7i0.152

Aishwarya, S., Ramya, S., Subhiksha, S., & Samundeswari, S. (2020). Detection of impersonation in online examinations using blockchain. In *2020 International Conference on Power, Energy, Control and Transmission Systems (ICPECTS)* (pp. 1-5). IEEE. https://doi.org/10.1109/ICPECTS49113.2020.9337001

Akaranga, S. I., & Ongong, J. J. (2013). The phenomenon of examination malpractice: An example of Nairobi and Kenyatta Universities. *Journal of Education and Practice, 4*(18), 87 – 96. https://bit.ly/3dJvMMv

Akintunde, O. O., & Selzing-musa, G. (2010). Pragmatic techniques of curbing examination malpractices in secondary schools in Nigeria. *Asia Pacific Journal of Education, Arts and Sciences, 3*(1), 110-115. https://bit.ly/30kTlaG

Allen, M., & Yen, W. (2002). *Introduction to measurement theory*. Waveland Press. (Original work published 1979).

Anyanwu, F. C., & Reuben, O. S. (2016). Retooling assessment procedures for skill-based health education for young people in Nigeria: Implications for 21st-century educational assessment. *Universal Journal of Educational Research, 4*(1), 58-64. https://doi.org/10.13189/ujer.2016.040107

Arop, F. O., Ekpang, M. A., Nwannunu, B. I., & Owan, V. J. (2018). Personnel management and corrupt academic practices in universities in Cross River State, Nigeria. *International Journal of Economics, Commerce and Management, 6*(9), 405–419. https://doi.org/10.2139/ssrn.3250019

Badejo, A. O., & Gandonu, M. B. (2010). Predisposing factors towards examination malpractice among students in Lagos universities: Implications for counselling. *Edo Journal of Counselling, 3*(2), 197-210. https://doi.org/10.4314/ejc.v3i2.63601

Bassey, B. A., & Owan, V. J. (2020). Higher-ordered test items as assessment practice in higher education during Pandemics: Implications for effective e-learning and safety. In V. C. Emeribe, L. U. Akah, O. A. Dada, D. A. Alawa, & B. A. Akuegwu (Eds.), *Multidisciplinary issues in health, human kinetics and general education practices* (pp. 395–409). University of Calabar Press. https://bit.ly/31J4Zil

Bassey, B. A., Owan, V. J., & Agunwa, J. N. (2019). Quality assurance practices and students' performance evaluation in universities of South-South Nigeria: A structural equation modelling approach. *British Journal of Psychology Research, 7*(3), 1–13. https://doi.org/10.5281/zenodo.4458641

Bassey, B. A., Ubi, I. O., Anagbougu, G. E., & Owan, V. J. (2020). Permutation of UTME multiple-choice test items on performance in use of English and mathematics among prospective higher education students. *The Journal of Social Sciences Research, 6*(4), 483–493. https://doi.org/10.32861/jssr.64.483.493

Beets, P. A. (2012). Strengthening morality and ethics in educational assessment through ubuntu in South Africa. *Educational Philosophy and Theory, 44*(2), 68-83. https://doi.org/10.1111/j.1469-5812.2011.00796.x

Bender, B. (2021). *Related research. In platform coring on digital software platforms* (pp. 7-29). Springer Gabler, Wiesbaden. https://doi.org/10.1007/978-3-658-34799-4

Bibi, M., Muhammad, D. K., & Dahiru, U. (2020). Types and levels of involvement in examination malpractice as perceived by undergraduates in Gombe State University. *International Journal of Educational Research, 8*(1), 8-15. https://www.ajol.info/index.php/ijer/article/view/205019

Birkeland, S., & Bogh, S. B. (2018). Education trajectories and malpractice complaints-A study among Danish general practitioners. *Cogent Education, 5*(1), Article 1473747. https://doi.org/10.1080/2331186X.2018.1473747

Bujang M. A. (2021). A step-by-step process on sample size determination for medical research. *The Malaysian Journal of Medical Sciences, 28*(2), 15–27. https://doi.org/10.21315/mjms2021.28.2.2

Cappelleri, J. C., Jason Lundy, J., & Hays, R. D. (2014). Overview of classical test theory and item response theory for the quantitative assessment of items in developing patient-reported outcomes measures. *Clinical therapeutics, 36*(5), 648–662. https://doi.org/10.1016/j.clinthera.2014.04.006

Chirumamilla, A., Sindre, G., & Nguyen-Duc, A. (2020). Cheating in e-exams and paper exams: The perceptions of engineering students and teachers in Norway. *Assessment & Evaluation in Higher Education, 45*(7), 940-957. https://doi.org/10.1080/02602938.2020.1719975

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Lawrence Erlbaum Associates, Publishers.

Corry, N. H., Williams, C. S., Battaglia, M., McMaster, H. S., & Stander, V. A. (2017). Assessing and adjusting for non-response in the millennium cohort family study. *BMC Medical Research Methodology, 17*(1), 1-17. https://doi.org/10.1186/s12874-017-0294-8

Dejene, W. (2021). Academic cheating in Ethiopian secondary schools: Prevalence, perceived severity, and justifications. *Cogent Education, 8*(1), Article 1866803. https://doi.org/10.1080/2331186X.2020.1866803

Ede, M. O., Agah, J. J., Okeke, C. I., Chuks, Z. O., Oguguo, B., Agu, P. U., ..., & Manafa, I. F. (2021). Effect of cognitive behavioural active engagement training on test item construction skills among primary school teachers in Nigeria: Implication for educational policymakers. *Medicine, 100*(36), Article e26876. https://doi.org/10.1097/MD.0000000000026876

Ejinwa, E., & Ojiaku, F. C, O. (2020). Gender disparity in the use of ICT in committing examination malpractice in senior secondary school examination in Nigerian. *Interdisciplinary Journal of Gender and Women Development Studies, 3*(2), 233-245.

Ekechukwu, R., & Nwamadi, L. (2017). Predictive determinants of teachers' psychological variables on students examination malpractice tendency in public junior secondary schools in Rivers State, Nigeria. *European Journal of Research and Reflection in Educational Sciences, 5*(1), 50-57. https://bit.ly/39ZWq6X

Ekpoudo, E. M., Simon, A. K., & Emmanuel, B. A. (2021). Civic education as a tool for curbing examination malpractices in senior secondary school. *Nigerian Journal of Curriculum Studies, 27*(1), 63-72. https://bit.ly/3qggRT8

Ekuri, E. E., Egbai, J. M., & Ita, C. I. (2011). Teacher factors and perceived assessment practices need of social studies teachers in Cross River State, Nigeria. *Educational Assessment,*

Evaluation and Accountability, 23(4), 307-319. https://doi.org/10.1007/s11092-011-9129-z

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Forkuor, J. B., Amarteifio, J., Attoh, D. O., & Buari, M. A. (2019). Students' perception of cheating and the best time to cheat during examinations. *The Urban Review, 51*(3), 424-443. https://doi.org/10.1007/s11256-018-0491-8

Fuentes, S. P. (2020). Moving multiple-choice tests online: Challenges and considerations. *Economics Network*. https://doi.org/10.53593/n3343a

Gad, S. C. (2014). Epidemiology. In P. Wexler (Ed.), *Encyclopedia of toxicology* (3rd ed., pp. 433–437). Academic Press. https://doi.org/https://doi.org/10.1016/B978-0-12-386454-3.00841-1

Haque, S., Zeba, S., Haque, M. A., Kumar, K., & Basha, M. P. A. (2021). An IoT model for securing examinations from malpractices. *Materials Today: Proceedings*. https://doi.org/10.1016/j.matpr.2021.03.413

Heo M. (2014). Impact of subject attrition on sample size determinations for longitudinal cluster randomised clinical trials. *Journal of Biopharmaceutical Statistics, 24*(3), 507–522. https://doi.org/10.1080/10543406.2014.888442

Hill, G., Mason, J., & Dunn, A. (2021). Contract cheating: An increasing challenge for global academic community arising from COVID-19. *Research and Practice in Technology Enhanced Learning, 16*(1), 1-20. https://doi.org/10.1186/s41039-021-00166-8

Ifeagwazi, C. M., Chukwuorji, J. C., Egbodo, S. O., & Nwoke, M. B. (2019). Peer pressure, fear of failure and examination cheating behavior in the university: Does gender make the difference? *Cognition, Brain, Behavior, 23*(1), 43-62. https://doi.org/10.24193/cbb.2019.23.03

In, J., Kang, H., Kim, J. H., Kim, T. K., Ahn, E. J., Lee, D. K., Lee, S., & Park, J. H. (2020). Tips for troublesome sample-size calculation. *Korean Journal of Anesthesiology, 73*(2), 114–120. https://doi.org/10.4097/kja.19497

Hu, X-H., Xin, N. Z., & Jiang, A-P. (2021). The exploration and practice of university online assessment based on RPV framework. *Revista Argentina de Clínica Psicológica (Argentine Journal of Psychological Clinic), 30*(2), 145-155. https://doi.org/10.24205/03276716.2020.4014

James, J., & Giacaman, N. (2020). Replacing in-class tests with take-home practical tests: Focussing on student learning, plagiarism and reproducibility. In *31st Annual Conference of the Australasian Association for Engineering Education (AAEE 2020): Disrupting business as usual in engineering education* (pp. 120-127). Barton, ACT: Engineers Australia.https://www.aaee2020.com.au/wpcontent/uploads/2020/11/AAEE2020_paper_26.pdf

John-Otumu, A. M., Nwokonkwo, O. C., Izu-Okpara, I. U., Dokun, O. O., Susan, K., & Oshoiribhor, E. O. (2021). A novel smart CBT model for detecting impersonators using machine learning technique. In *2020 IEEE 2nd International Conference on cyberspace (CYBER NIGERIA)* (pp. 21-30). IEEE. https://doi.org/10.1109/CYBERNIGERIA51635.2021.9428814

Joshua, M. T. (2019). *Battles in the classroom: Evaluation of teaching and learning to the rescue*. University of Calabar Press.

Kahembe, J., & Jackson, L. (2020). Educational assessment in Tanzania: A sociocultural perspective. *Springer Nature*. https://doi.org/10.1007/978-981-15-9992-7

Kawugana, A., & Woyopwa, A. K (2017). Impact of exam malpractice on the quality of graduates in Nigeria. *International Journal of Education and Evaluation, 3*(6), 45-51. https://bit.ly/3cGTQhM

Kyaruzi, F., Strijbos, J. W., Ufer, S., & Brown, G. T. (2019). Students' formative assessment perceptions, feedback use and mathematics performance in secondary schools in Tanzania. *Assessment in Education: Principles, Policy & Practice, 26*(3), 278-302. https://doi.org/10.1080/0969594X.2019.1593103

Lefoka, P. J. (2020). The prevalence of and factors contributing to assessment malpractice at the National University of Lesotho. *Humanities and Social Science Research, 3*(3), 10-20. https://doi.org/10.30560/hssr.v3n3p10

Li, X., & Meng, Y. (2016). How to prevent college students from cheating in exams? Based on game theory. *International Journal of Research Studies in Science, Engineering and Technology, 3*(9), 39-42. https://bit.ly/3CVz9fl

Lord, F. M., & Novick, M. R. (1968). *Statistical theories of mental test scores*. Addison-Wesley.

Maciver, J. E. (2017). Examination malpractices and teacher's involvement in Delta State secondary schools: Implication for counselling. *Nigerian Academic Forum, 25*(1), 1–6. https://bit.ly/2MFQpNM

Mata, J. R. (2021). How to teach online? Recommendations for the assessment of online exams with University students in the USA in times of pandemic. *IJERI: International Journal of Educational Research and Innovation, 15*, 188-202. https://doi.org/10.46661/ijeri.5003

Mayr, S., Erdfelder, E., Buchner, A., & Faul, F. (2007). A short tutorial of Gpower. *Tutorials in Quantitative Methods for Psychology, 3*(2), 51–59. https://doi.org/10.20982/tqmp.03.2.p051

McCabe, D. L., Butterfield, K. D., & Trevino, L. K. (2006). Academic dishonesty in graduate business programs: Prevalence, causes, and proposed action. *Academy of Management Learning & Education, 5*(3), 294-305. https://doi.org/10.5465/amle.2006.22697018

Memory, Q., & Abosede, A. O. (2021). Assessment of the predictive validity of entrance examination questions (EEQ) of Nigerian Baptist theological seminary, Ogbomoso. *IJER-International Journal of Educational Research, 4*(9), 10-20. https://bit.ly/3xXsMHE

Mulongo, M. A., Kimosop, M. K., & Njoka, J. N. (2019). Assessment of mitigation strategies used in the management of examination malpractices by Universities in Mount Kenya Region. *International Journal of Social Sciences & Educational Studies, 6*(2), 1-13. https://doi.org/10.23918/ijsses.v6i2p1

Mulongo, M. A., Kimosop, M., & Njoka, J. (2020). Assessment of prevalence of examination malpractices among universities students: a comparative study of male and female students in universities in mount Kenya region. *International Journal of Educational Best Practices, 4*(1), 29-42. https://doi.org/10.32581/ijebp.v4n1.p29-42

Nagal, R., Nemkul, P., Kumar, D., Kumar, N., & Joseph, A. (2017). Android-based secure exam management system to prevent impersonation. *International Journal of Latest Technology in Engineering, Management & Applied Science, 6*(5), 46-49. https://bit.ly/3mRCcQq

Novick, M. R. (1966). The axioms and principal results of classical test theory. *Journal of Mathematical Psychology, 3*(1), 1-18. https://doi.org/10.1016/0022-2496(66)90002-2

Odongo, D. A., Agyemang, E., & Forkuor, J. B. (2021). Innovative approaches to cheating: An exploration of examination cheating techniques among tertiary students. *Education Research International, 2021*, Article 6639429. https://doi.org/10.1155/2021/6639429

Okafor, I. P. (2021). Causes and consequences of examination malpractice among senior secondary school students in Eti-Osa LGA of Lagos State, Nigeria. *Canadian Journal of Family and Youth, 13*(1), 84-98. https://doi.org/10.29173/cjfy29603

Okolie, U. C., Nwosu, H. E., Eneje, B. C., & Oluka, B. N. (2019). Reclaiming education: Rising above examination malpractices, and its contextual factors on study progress in Nigeria. *International Journal of Educational Development, 65,* 44-56. https://doi.org/10.1016/j.ijedudev.2019.01.001

Okwu, O. J. (2006). A critique of students' vices and the effect on the quality of graduates of Nigerian tertiary institutions. *Journal of Social Sciences, 12*(3), 193 – 198. https://doi.org/10.1080/09718923.2006.11978391

Olowodunoye, S. A., & Titus, O. A. (2011). Parenting styles, gender, religiosity and examination malpractices. *Gender and Behaviour, 9*(2), 3941-3960. https://doi.org/10.4314/gab.v9i2.72168

Oni, A. A., & Osuji, C. (2020). Administrative strategies and control of examination malpractices among secondary schools students in Lagos, Nigeria. *SMCC Higher Education Research Journal (Teacher Education Journal), 2*(1), 106-114. https://doi.org/10.18868/cte.02.060120.08

Open Education Database (2010). *Eight astonishing stats on academic cheating*. OEDB. http://oedb.org/ilibrarian/8-astonishing-statson-academic-cheating/

Owan, V. J. (2020). Computer-administered testing practice in higher education in era of severe acute respiratory syndrome-related diseases outbreaks. In V. C. Emeribe, L. U. Akah, O. A. Dada, D. A. Alawa, & B. A. Akuegwu (Eds.), *Multidisciplinary issues in health, human kinetics and general education practices* (pp. 429–442). University of Calabar Press. https://bit.ly/3xtSfGo

Owan, V. J., Duruamaku-dim, J. U., & Eneje, S. (2019). Mode of test administration, birth variables, and students' academic achievement in Mathematics in Obubra Local Government Area of Cross River State, Nigeria. *Prestige Journal of Counselling Psychology, 2*(2), 60–77. https://bit.ly/2Xfux0D

Oyeyemi, S. O., Akinola, V., Mafikuyomi, J., & Yakubu, M. (2019). Sociological perceptions of e-cheating online runs sites and students study habit: Focus on public examination quality in Nigeria. *SSRG International Journal of Humanities and Social Science, 6*(1), 16-22. https://doi.org/10.14445/23942703/IJHSS-V6I1P104

Paveling, B., Vidovich, L., & Oakley, G. (2019). Global to local tensions in the production and enactment of Physical education curriculum policy reforms. *Curriculum studies in health and physical education, 10*(2), 141-155. https://doi.org/10.1080/25742981.2019.1583066

Petters, J. S., & Okon, M. O. (2014). Students' perception of causes and effects of examination malpractice in the Nigerian educational system: The way forward for quality education. *Procedia-Social and Behavioral Sciences, 114,* 125-129. https://doi.org/10.1016/j.sbspro.2013.12.671

Robbin, A. (2020). Slangs as registers: A study of academic slang register use by undergraduates. *International Journal of Linguistics, Literature and Translation, 3*(6), 186-194. https://doi.org/10.32996/ijllt.2020.3.6.19

Rosenberg, E., Lotz-Sisitka, H. B., & Ramsarup, P. (2018). The green economy learning assessment South Africa: Lessons for higher education, skills and work-based learning. *Higher Education, Skills and Work-Based Learning, 8*(3), 243-258. https://doi.org/10.1108/HESWBL-03-2018-0041

Sayed, Y., & Kanjee, A. (2013). Assessment in Sub-Saharan Africa: Challenges and prospects. *Assessment in Education: Principles, Policy & Practice, 20*(4), 373-384. https://doi.org/10.1080/0969594X.2013.849056

Serpell, R., & Simatende, B. (2016). Contextual responsiveness: An enduring challenge for educational assessment in Africa. *Journal of Intelligence, 4*(1), Article 3. https://doi.org/10.3390/jintelligence4010003

Sharkness, J., & DeAngelo, L. (2011). Measuring student involvement: A comparison of classical test theory and item response theory in the construction of scales from student surveys. *Research in Higher Education, 52*(5), 480–507. https://doi.org/10.1007/s11162-010-9202-3

Shraim, K. (2019). Online examination practices in higher education institutions: Learners' perspectives. *Turkish Online Journal of Distance Education, 20*(4), 185-196. https://doi.org/10.17718/tojde.640588

Sireci, S. G. (2020). Standardisation and understandardization in educational assessment. *Educational Measurement: Issues and Practice, 39*(3), 100-105. https://doi.org/10.1111/emip.12377

Situma, J., & Wasike, M. (2020). The challenge of examination malpractices in institutions of higher learning in Kenya. *International Journal of Academic Research in Business and Social Sciences, 10*(9), 699-710. https://doi.org/10.6007/IJARBSS/v10-i9/7859

Song, J. W., & Chung, K. C. (2010). Observational studies: cohort and case-control studies. *Plastic and Reconstructive Surgery, 126*(6), 2234–2242. https://doi.org/10.1097/PRS.0b013e3181f44abc

Teymouri, N., Boisvert, S., & John-West, K. (2022). Promotion of academic integrity through a marketing lens for Canadian post-secondary institutions. In S.E. Eaton, H. J. Christensen (Eds), *Academic integrity in Canada: Ethics and integrity in educational contexts, vol 1* (pp. 505-517). Springer, Cham. https://doi.org/10.1007/978-3-030-83255-1_26

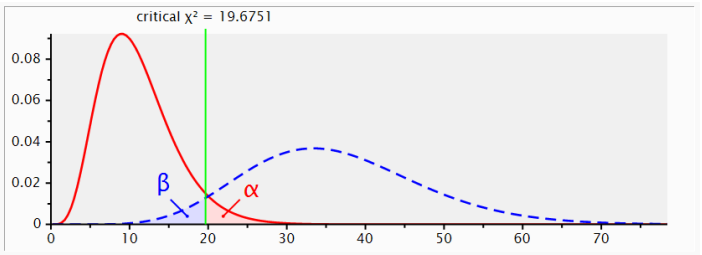
Uijtdehaage, S., & Schuwirth, L. W. (2018). Assuring the quality of programmatic assessment: Moving beyond psychometrics. *Perspectives on Medical Education, 7*(6), 350-351. https://doi.org/10.1007/s40037-018-0485-y

Vlaardingerbroek, B., Shehab, S. S., & Alameh, S. K. (2011). The problem of open cheating and invigilator compliance in the Lebanese Brevet and Baccalauréat examinations. *International Journal of Educational Development, 31*(3), 297-302. https://doi.org/10.1016/j.ijedudev.2010.03.002

Yu, C., & Zhao, C. G. (2021). "I won't try my best": A narrative inquiry of a student's graduation policy appropriation. *Asia Pacific Education Review,* 1-13. https://doi.org/10.1007/s12564-021-09714-9

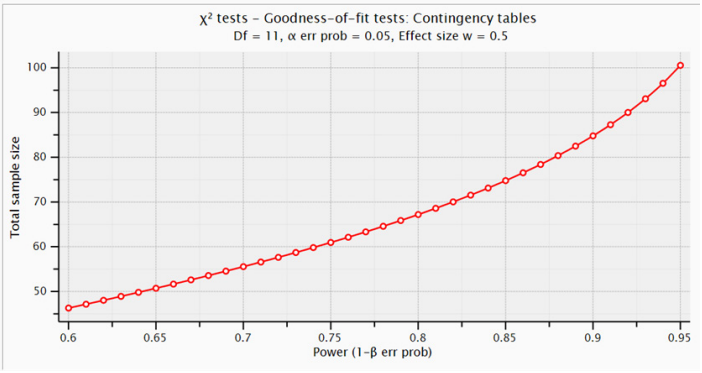
Appendices

Appendix A: A priori power analysis result from G*Power for Chi-square test of independence at 11 degrees of freedom.

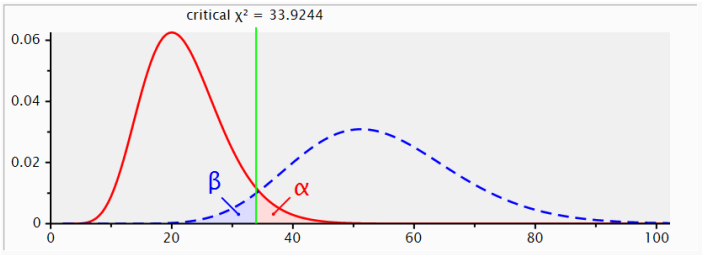


Test family: χ² tests
Statistical test: Goodness-of-fit tests: Contingency tables
Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters		Output Parameters	
Determine =>		Noncentrality parameter λ	25.2500000
Effect size w	0.5	Critical χ²	19.6751376
α err prob	0.05	Total sample size	101
Power (1–β err prob)	0.95	Actual power	0.9510030
Df	11		



Appendix B: A priori power analysis result from G*Power for Chi-square test of independence at 22 degrees of freedom.



Test family: χ² tests
Statistical test: Goodness-of-fit tests: Contingency tables
Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters		Output Parameters	
Determine =>		Noncentrality parameter λ	32.0000000
Effect size w	0.50	Critical χ²	33.9244385
α err prob	0.05	Total sample size	128
Power (1–β err prob)	0.95	Actual power	0.9517741
Df	22