

# **Analysis of probable substitution of Summative Assessment methods with Formative Assessments in Higher Education**

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Assessments evaluate students' learning and deliver relevant information institutions use to modify their plans and improve the learning process (Lynch, 2018). According to Basera (2019), Higher Education students are exposed to predominately two strategies of assessment; Formative assessments (FA) and Summative assessments (SA). FA is delivered continually; regularly or spontaneously-formally or informally (Tomlinson, 2014; William 2013) to evaluate students' existing learning gaps; to provide nonjudgmental effective feedback for students to improve (Kibble, 2016;). SA are evaluations administered after a student has completed a unit, semester course, and/or year (Macartney-Clark et al, 2018; Khaled et al,2020) to measure, record, and report a student's overall knowledge (Broadbent et al, 2018; Frey,2018).

Researchers (Iliya, 2014; Ewell & Cumming, 2017; Mubayrik, 2020; & Lahrichi,2019), have examined the purpose and attributes of assessments; both Formative and Summative, drawing comparisons to their structure and effectiveness of use to achieve goals of the education system. Bezanilla et al, (2021) emphasized, critical thinking in the learning process of Higher Education students. An overemphasis and grading system is imposed through SA – evaluations addressing only portions of knowledge and skill specified in a curriculum (Olela et al,2021). Additionally, SA ranks and incentivizes students' learning accomplished (Dixson, Worrell, 2016).

Through conversations, architecture and engineering students of the University of Guyana (UG) have expressed concerns that SA negatively affects their academic performance by failing to achieve the expected standards. These concerns are supported by Ali et al (2015) and Karaman (2017). Examination periods are academically stressful for students (Bedewy & Gabriel, 2015) and schoolmates at UG would constantly lament. Discussions with students revealed anguishing experiences. They are overwhelmed from spending significant time reviewing, and striving to achieve high examination marks. Demotivating thoughts of failure looms as poor marks in high stake examinations affect course grades (Archer,2017); more significant in high credit courses.

## **Purpose of study**

Restructuring of the assessment methods is needed to reduce the stress on students and teachers. A series of structured FA placed strategically through the period can serve the Summative function of measuring and recording learning. Students prefer educative assessments instead of a singular examination. SA in FA nature can help teachers develop informed lesson plans. Through this study, the aim is to answer the research questions:

1. To what extent have SA methods affected students' learning?
2. How can SA take on a formative nature while still fulfilling all its functions of SA?

## **II. Methodology**

### **Population**

The people of this study comprised students and lecturers from the Faculty of Engineering & Technology (FET), University of Guyana. The student population comprises 1,122 students ranging from 18 to 50 years of age. Teaching staff, both Full-time (FT) and Part-time (PT) are 61 lecturers. Participation in the survey was voluntary. The data was obtained from the student in the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> year and lecturers from five departments of FET. Table 1 shows the total student population of FET. The lecturer population is shown in Table 2.

**Table 1**  
*The student population of FET*

Departments		Male	Females	Total
1	Architecture	75	42	117
2	Civil Engineering	365	84	449
3	Electrical Engineering	189	16	205
4	Mechanical Engineering	136	12	148
5	Petroleum & Geological Engineering	107	96	203
<b>FET: Total</b>		872	250	<b>1,122</b>

Note. Students' Population retrieved from Deputy Registrar, Registry records, 2022

**Table 2**  
*Lecturer population of FET*

Departments		Male	Females	Total
1	Architecture	4	5	9
2	Civil Engineering	8	2	10
3	Electrical Engineering	14	3	17
4	Mechanical Engineering	7	3	10
5	Petroleum & Geological Engineering	13	2	15
<b>FET: Total</b>		46	15	<b>61</b>

Note. Lecturer Population retrieved from UG HR records, 2022

### Sampling

A stratified random selection technique was used to identify participants for this research. This method was chosen to ensure a mixture of responses and representation from all departments within the faculty. Approximately 10% of the student population was randomly selected. In each department, the percentage of males and females were equally represented. Table 1A shows the total student sample size selected consisting of 113 students. The total lecturer sample size shown in Table 2A is 25 lecturers.

**Table 1A**  
*Student sample population*

Departments		Male	Sample size	Female	Sample size	Total	Total sample size
1	Architecture	75	7	42	4	117	11
2	Civil Engineering	365	37	84	8	449	45
3	Electrical Engineering	189	19	16	2	205	21
4	Mechanical Engineering	136	14	12	1	148	15
5	Petroleum & Geological Engineering	107	11	96	10	203	21
<b>FET: Total</b>		872	88	250	25	1,122	<b>113</b>

**Table 2A**  
*Lecturer sample population*

Departments		Male	Sample size	Females	Sample size	Total	Total sample size
1	Architecture	4	2	5	2	9	4
2	Civil Engineering	8	3	2	1	10	4
3	Electrical Engineering	14	6	3	1	17	7
4	Mechanical Engineering	7	3	3	1	10	4
5	Petroleum & Geological Engineering	13	5	2	1	15	6
<b>FET: Total</b>		46	19	15	6	61	<b>25</b>

### **Instruments**

The quantitative method of questionnaires and an interview schedule were used as instruments to collect data from the participants. Digital questionnaires were distributed via emails to both students and lecturers who were selected. These instruments were used to determine views on SA, and FA; and feedback on their possible effects on learning. Simple definitions of terms were given to ensure responses were given in context. All questionnaires were confidential as participants were not required to write their names. Also, all questionnaire responses were grouped and returned via email by the department's Head of Department (HOD).

The questionnaire consisted of three sections: Section A provided brief biographical data of the participants (such as department, year of study, and gender). Section B asked participants to rate their responses to ten questions using a Likert scale: strongly agree (5), agree (4), neutral (3), disagree (2), or strongly disagree (1). These responses were analyzed and represented in graphs and charts.

As with the questionnaire, the interview was designed with a similar mindset. The interview was semi-structured; the interviewer (the researcher) prepared a list of initial questions in advance. However, the interviewer allowed the discussion to take a tangent course based on the participant's responses. Virtual interviews were held on the Zoom platform with students and lecturers. This allowed the participants to audibly explain and give more in-depth information on their views of assessments. The interview lasted 1 hour and was audio recorded.

### **Validity**

The questionnaires and interview questions developed for this study were composed through research on the topic. Additionally, discussions were held and feedback was given from the Department Education lectures with experiences in both curriculum and research. The instruments were shared and input was received to reconstruct the instruments for necessary findings.

### **Reliability**

This questionnaire was distributed to 10 students and 4 lecturers from FET. Due to the convenience of technology, clarification was sought and feedback was faster to receive. This helped the questions to be redefined and a comprehensive order established.

### **Data Collection and Analysis**

All data received through questionnaires and interview questions from the sample population were analyzed. Responses were received from a total of 122 persons via both data collection methods.

For the student questionnaires, all item responses were analyzed quantitatively. Responses from the lecturer's questionnaire were also analyzed quantitatively. All quantitative data analyzed were represented using graphs and tables. Interview question responses from both students and lecturers were analyzed qualitatively. The responses of all students were grouped according to common threads. This approach was also used to group lecturer interview responses.

## **III. Results**

### **Responses: Questionnaires**

A total of 98 student respondents completed the questionnaires. Among these were 77 males (79 %) and 21 females (21%); all between the ages of 16-31 years. It was shown several student respondents (70%) were in their 2<sup>nd</sup> and 3<sup>rd</sup> year of studies at the university.

Questionnaire responses were received from a total of 24 lecturers. Findings revealed that many (65%) of lecturer poses at least 8 years of teaching experience.

**Measuring and Encouraging Learning**

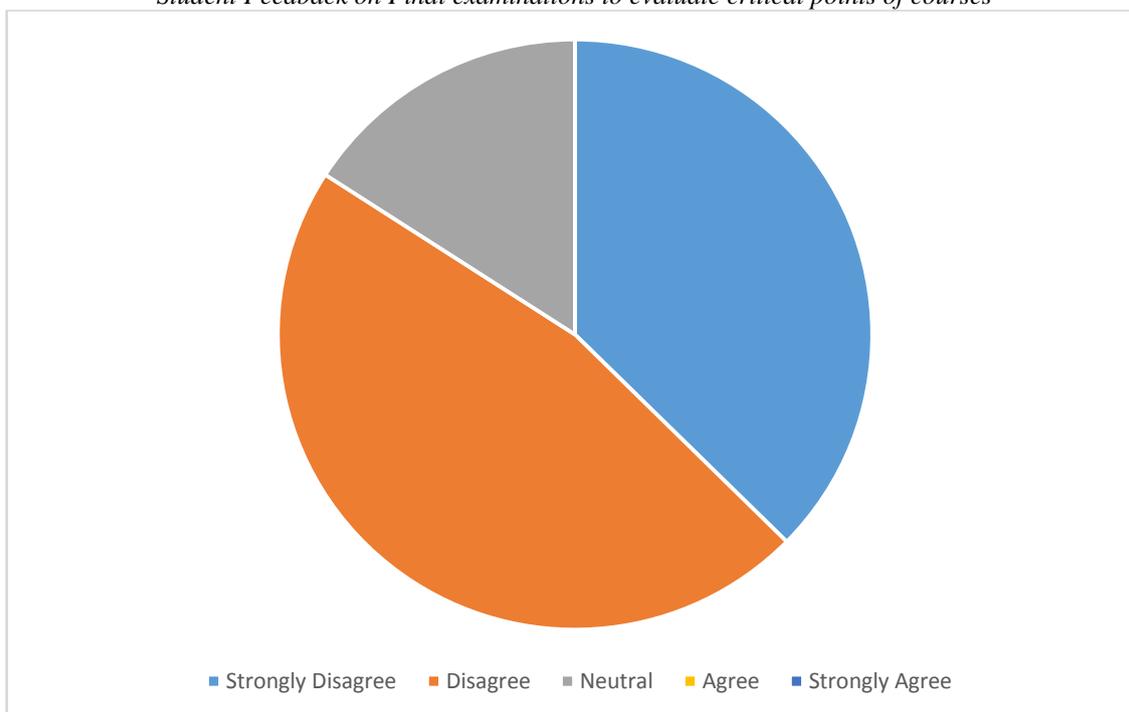
Responses received from students for (items: 1,2 and 5) are represented in Table 3. Findings indicate students are encouraged to learn through the use of FA. The majority (90%) of students strongly agreed with the use of FA to assess learning- measuring competencies and individual skills. However, responses showed students did not believe SA was effective in assessing academic capabilities.

**Table 3**  
*FA encouraging learning/ FA for measuring individual competencies*

	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	FA encourages my learning as a student	0	0	0	38	60
2	SA is effective to assess my academic capabilities	28	50	18	2	0
5	FA is effective in measuring individual skills and competencies	0	0	0	22	76

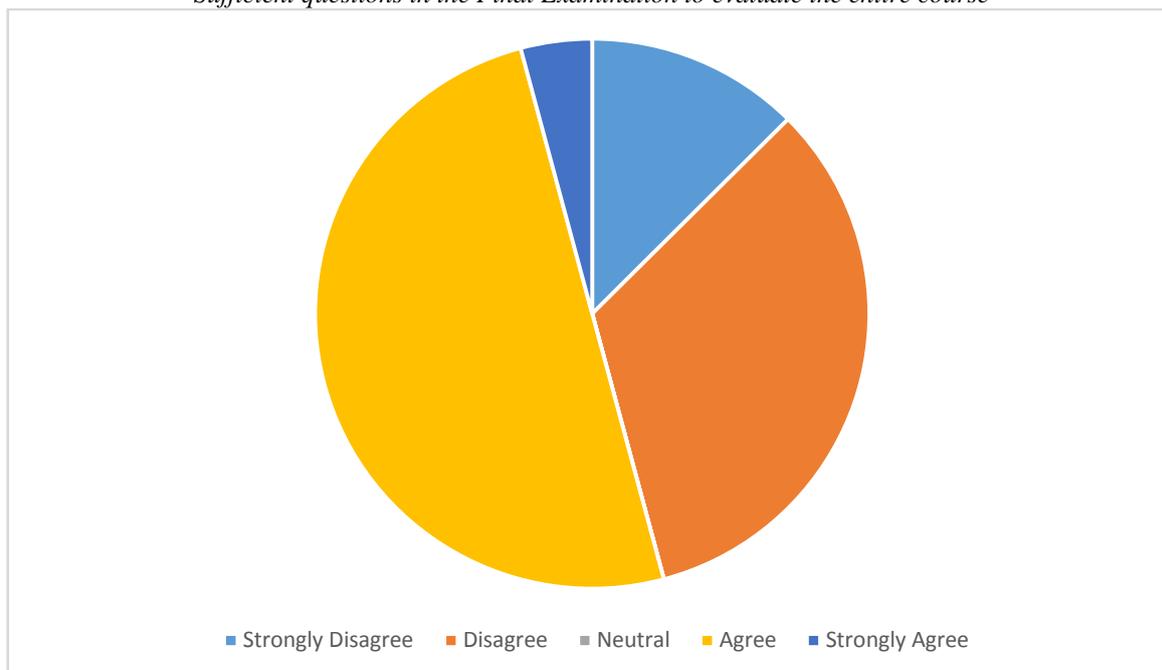
The majority of students (90%) felt final examinations did not have enough questions to thoroughly cover all the critical points of a course. Responses received from students for (item:8) are presented in Figure 1. Corresponding responses from the lecturer’s questionnaire (item:1) showed mixed views on Final examinations to evaluate all critical points of the course. Results are shown in Figure 2. Though varying views, the majority (58%) believe final examinations evaluate all critical points.

**Figure 1**  
*Student Feedback on Final examinations to evaluate critical points of courses*



**Figure 2**

*Sufficient questions in the Final Examination to evaluate the entire course*



Lecturer responses for (items: 2B,3B, and 5B) of the questionnaire indicated views on assessment types and selections. These findings are presented in Table 4. The majority of responses (58%) indicated SA is used to measure ability. Findings also showed that (58%) of respondents believe FA measures skills and competencies. Moreover, there was a significant amount of respondents (75%) who did not view SA as the only method of assessing learning.

**Table 4**

*SA for measuring memory ability/FA used to measure competencies/SA for assessing learning*

	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>2B</b>	SA is used to measure memory and the ability to organize facts	0	7	3	7	7
<b>3B</b>	FA is used to measure skill and competences	10	0	0	9	5
<b>5B</b>	Summative assessments are the only way to assess learning	14	4	0	3	3

**Assessment Selection**

Responses from lecturers for (items:4B,7B, and 9B) are presented in Table 5. Findings indicated assessment strategies are most timeselected based on the time it takes to mark. However, assessment types are chosen based on the needed purpose. Findings revealed that (75%) of lecturer respondents feel SA preparation is time-consuming. All lectures (100%) have noted the assessments chosen reveal students' learning gaps.

**Table 5**

*Assessment is chosen for time/assessment for purpose/assessment to determine gaps/SA preparation*

	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>4B</b>	Assessments are chosen based on the time it takes to mark	2	2	8	8	3
<b>7B</b>	Assessment types are chosen based on the purpose	4	0	0	4	16
<b>8B</b>	SA preparation is time-consuming	3	12	3	6	0
<b>9B</b>	My assessment procedures determine student's learning gaps	0	0	0	15	9

### Assessment Environment

Responses received from students for (items 3,4,6 and 10B) are presented in Table 6. The findings indicated the majority of students appreciate the time to produce and prepare assessments. A significant amount of students (93%) preferred studying internal topics rather than the entire course at a time. When it came to examinations, (90%) of students did not believe exam conditions helped them to perform better at assessments. Student responses (82%) indicated they need time to focus to complete assessments.

Lecturer findings for (item: 10B) responded to the question of class time allotted for FA. The majority (54%) of lecturers indicated class time is not adequate to conduct FA.

**Table 6**  
*Assessment Frequency/ Performance in Examination/Time to complete Assessment*

	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>3</b>	I prefer to study for an entire course of study than studying for interval topics	88	10	0	0	0
<b>4</b>	I perform better in examination conditions	50	40	20	0	0
<b>6</b>	I need time and focus to produce work at my own pace	40	60	0	0	0
<b>10B</b>	Class sessions support time for FA	4	9	1	0	10

### Responses: Interviews

Respondents shared their views on assessment types, selection, and usefulness. The student populations were 60 students and 10 lecturers.

### Assessment selection

This finding from the interviews revealed students were exposed to a range of assessments. When asked ‘what types of assessment they have experienced?’, they said oral presentations, written assignments, in-class discussions, major projects, quizzes, field exercises, and final examinations.

When asked ‘how are assessment methods determined for students?’, the lecturer’s selection depended on criteria like class size and course type. One new lecturer said, she uses the course outline as a guide; often the course outlines provide suggestions on assessment methods and she’s often found them to be useful to develop an assessment type. However, responses indicated, that oftentimes, the selection is based on student numbers. The lecturers of large departments shared, that the department has a large number of students, and we are assigned at least 6 courses to lecture per academic year. Assessment is determined by the learning objectives, class size, and lecture load. In some instances, a lecturer stated, that what is ongoing in the Industry practice plays a role in the assessment types he chooses. For computation-based courses, a lecturer said, methods are chosen to provide live discussions, feedback, and demonstrations which could help the student and students help their classmates.

Lecturers were asked ‘what are the most effective assessment selected that enhances students’ learning?’ Responses from lecturers revealed that feedback-based assessments were best. The lecturer said Formative ensures small targets are met so that students can correct mistakes made and better determine what is expected of them. Research-based assignments and computation-based work are also given. One lecturer shared she has noted when independent research, portfolios, or group work are used, the knowledge is cemented in students’ minds because they were required to find the information themselves. For practical-based courses, lectures indicated major projects were effective-allowing topics of the course outline to be broken down into stages and taught, then replicated to holistically represent the learning outcomes in their projects. Notably, many lecturers stated, that the best assessment to enhance learning is to give the students practical field experience so they could apply the knowledge in practice. A lecturer noted students should be provided practical examples; this experience gives the students hands-on learning and the ability to perform in Industry. The oral assessment was identified by some lecturers. They said instant feedback is given and good class discussions arise from these sessions. In-class work provides engagement and correction for analytic courses as stated by a lecturer. He found students working on the whiteboard or in groups provide classmates with the opportunity to work along and correct each other. However, he noted this is only workable for small classes.

### Assessments for enhancing and assessing learning

When asked which type of assessment they preferred to be assessed with, it was revealed that most (83%) of the students appreciated multi-layered project tasks. Students said projects give more time and flexibility to complete. They can work on manageable bits at a time. An important factor mentioned was the chance to improve. Students said they preferred multiple assessments during the course to help improve and build up their final grades. When asked ‘what type of assessment they would recommend for the curriculum?’, some students said they prefer performance-based assessment- where topics would be taught first after which

practical projects would be given to apply this knowledge. Students said they preferred more coursework assessments over examinations because the final examination is one test for the same percentage as all the coursework they did. They do not mind quizzes and tests but are deterred by the high percentage grading for those assessments.

Lecturers' responses when asked 'what type of assessment do you recommend for enhancing and assessing learning?' ranged from in-class assessments, projects, and final examinations. The common themes were assessments that prepare the students for real-life practice. Lecturers stated assessments that bridge the gap between theory and practical application are significant to enhance learning since it seems to foster more interest in the class. To enhance learning, responses indicated, field and lab exercises assessment and practical demonstrations help students to be directly involved and not be lost in the session throughout the semester. One lecturer stated he recommends monitored group sessions to provide oversight and guidance while helping students learn from peers.

A lecturer mentioned that, assessing students learning with assessments other than final examination, would help students feel less pressured and would not force them to memorize a whole semester's work. Lecturers said quizzes and examinations to assess the students after feedback was provided throughout the course. One lecturer noted it was important to give an examination at the end of the course to give the student another opportunity to improve since some students catch on to topics later in the course. Open book examinations were suggested by some lecturers for the assessment of analytic-type courses. However, lecturers emphasized it was important for virtual examination questions not to be closed-ended but instead be application-based to test the use of knowledge. Lecturers said assessments for assessing learning should have incentives since not all students are motivated to complete the given work. For practical courses, lecturers said continuous and project-based assessment for these courses works just fine for assessing learning. They noted that final close book examinations do not do justice to these types of courses since no one straightforward response is required. Lecturers stated projects are effective; projects are representations of course topics to find a solution for a problem. She further stated that the solution is usually the project- only then she can gauge how much students have learned during the semester.

#### **IV. Findings**

This study discovered:

##### **1. Student's attitudes toward assessments**

Students' disapproval of the final examination stems from the weighting it holds for their overall grade. Students do not mind being graded for assessments, however, they prefer their overall grade to be distributed among many pieces of assessments.

##### **2. Lecturer's assessment selection**

Students are not motivated to complete assessments used for learning unless it affects their grades. Therefore, assessments used must not only provide verbal and written feedback, but also a grade.

#### **V. Discussion**

Assessment is a needed tool to identify problems of students or teaching strategies, use feedback to improve students' learning and measure student understanding (Fisher et al., 2019). The findings indicated students are exposed to a range of assessments. Students' preference is for course grade percentages to be distributed among several assessments. Multi-layered project-based assessments were more encouraging for students than one-time close book examinations. However, teachers find it difficult to provide feedback for assessments when the class numbers are large, hence lecturers set only a limited number of assessments for their courses and group students for assessments other than quizzes and examinations. The use of various assessment types for learning allows the majority of students the chance to be exposed to their preferred learning style; thus improving academic performance (İlçin, N et al., 2018). Although the use of group assignments has positive effects, they are less effective when students' knowledge cannot be assessed for learning and provide individual feedback from the lecturer (Lodge et al., 2018).

One of the main considerations by lecturers when planning assessments, is to ensure the knowledge acquired will provide the students with the practical skill and understanding to perform in the workplace environment. Likewise, students are motivated when completing assessments that are related to real-world experiences. However, lecturers expressed concerns about non-incentivized assessments. Students lack the motivation to complete assessments that will not attract a grade.

The overall findings of this study revealed assessment types affect students' learning and performance when assessed. The type of assessment also affects the lecturers' effectiveness to assess learning. The use of appropriate assessment is vital for enhancing learning and ensuring a deeper understanding of concepts to develop the abilities and attributes for employment (Yerrabati, 2017). According to Kosimov (2022), teachers should design and use assessments relevant to the student's needs. Similarly, Muskin (2017), stated, that when

teachers are selecting instruments and strategies fit to purpose, they must first be aware of all the assessments that exist and which serve best to appraise the many respective aspects of learning. Students favour time to complete tasks, frequent assessments for assessing learning, and more even weight distribution of overall grade with these assessments. Few assessments mean greater weighing for assessments- this contributes to a lack of motivation. Noteworthy, Pascoe (2019) believes academic-related stress can decrease motivation and lead to student dropout. Vaessen (2016) stated, that with frequent graded assessments, students receive grades frequently during the course, and the weighted percentage of these grades may affect students' intrinsic motivation. Findings also revealed a disproportionate lecturer-to-student ratio, affecting the frequency and type of assessments used by lecturers. According to Martin (2015), class size and staff-to-student ratios are indicators of quality at universities. Sapelli (2016) found, that when higher education FT staff do not have a flexible teaching load, administration increases class sizes, leading to student dissatisfaction. Large class sizes negatively impact students' academic achievement and quality (Aoumeur, 2017). Marking is easier when grouping students but it does not provide a true representation of individual learning when assessed. Despite the ratio, students' attitude toward non-graded assessments is an essential factor to ensure learning strategies work. FA in its nature provides feedback that is useful before graded assessments. According to Ozan et al. (2018), teachers use a range of assessment activities and strategies in the classroom to gain a comprehensive insight into how much students learn as part of formative assessment.

## **VI. Recommendation**

The following recommendations are given in response to the findings of this study:

1. Several FA types should be provided to students throughout the semester. However, some FA throughout the semester should be of summative nature- providing a grade along with feedback. In the first instance, FA will provide the students with needed feedback. After this time, subsequent FA, dependent on previous knowledge will be rewarded with a grade and provided feedback for the next task. The sum of these varied FA will constitute the overall course grade for the student- a continuous SA of appropriately even percentage weighing. FA of summative nature should not be given at the end of the semester to replace a final examination. SA as a final examination should be used when a student's cumulative course grade thus far is below the stipulated Faculty standard. This recommendation will provide an environment for in-class interaction and an opportunity for various assessment types to be used. Students' overall attitude to tests and quizzes will be enhanced knowing their weighting is less. These attributes for assessments can change students' perception of the academic environment.
2. A stipulated lecturer-to-student ratio should be enacted by the FET administration. This will allow students to be properly assessed with adequate and timely feedback being provided on an individual basis.
3. This present study was limited to the predominantly practical-based Faculty of Engineering and Technology. Similar studies could be conducted within other faculties at UG.

## **VII. Conclusion**

This study concentrated on the probable substitution of Summative Assessment methods with Formative Assessments in Higher Education, using the sample from students and lecturers of FET. This study revealed many respondents agreed final examinations and their percentage concentration negatively affected the attitude and academic performance of students. The study also disclosed assessments are chosen to provide practical skills for students to perform when in the workforce. These results further indicated the need to provide students with more real-world-based types of assessments throughout the course to distribute the percentage weighing and sufficient time and feedback to complete assessments. Students learned more when they can be provided feedback on taught lessons before executing completed tasks. From the findings, it can be concluded that class time and student and lecturer participation support the restructuring of the traditional nature of SA for courses in Higher Education- to allow multi opportunities for learning to be measured and recorded after feedback was given on the taught lessons. However, the findings showed there is a need to follow an appropriate student-to-lecturer ratio for class sizes for learning and assessing to be effective.

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