The Efficacy of Using Performance-Based Assessments in a Vocational Institution in Singapore.

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CHAPTER 1
INTRODUCTION

1. Introduction

Assessment has been an important aspect of educational practice for a long time and it is integral to teaching. Handley & William (2011) claims that assessment is used primarily as a tool embedded in the processes of evaluating the effectiveness of sequences of instructional activities. Furthermore assessment should be seen as an intrinsic part of the learning process. Assessment is also used to collect data on a student's ability learning achievement.

The aim of Singapore's vocational and technical education system is to provide education to support the need for a skilled and competent workforce. The Institute of Technical Education (ITE) in which this proposed study is located, is a government-funded institution that provides the relevant courses to equip students with the skills and competencies needed for entry into and success in the workforce. The ITE has adopted an assessment methodology that measures the specific trade competencies and skills acquired by the students so that they will be work-ready.

The need to ascertain that the students have acquired the relevant skills to perform a myriad of tasks has resulted in ITE selecting and conducted performance-based assessments. Literature has shown that limited research has been done on the efficacy of using performance-based assessments in a vocational institute in Singapore.

This introduction presents details for the intended research project-titled *The Efficacy of Using Performance-Based Assessments in a Vocational Institution in Singapore.*

The first part of the proposal presents a background to the research by defining the topic and its context. The rationale to undertake this research will be supported through the identification of the expected outcomes and contribution to knowledge. The research aims, questions and objectives are identified whilst the literature review,

methodologies, research design and data collection will be clarified to address these aims. The later parts of the proposal present the ethical considerations, scope and limitations of the research. Finally, the proposed chapters, resources and requirements are presented along with a timeline for research completion.

2. Background and Topic Identification

2.1 Background

The *Institute of Technical Education (ITE)* was established by the Singapore Ministry of Education (MOE) as a post-secondary institution on 1 April 1992. It assumed the functions previously fulfilled by the former Vocational and Industrial Training Board (VITB). As a statutory board under the MOE, the ITE is a key provider of vocational and technical education in Singapore. With one in four secondary school leavers enrolling in the ITE, the institute forms a key component of Singapore's education and training system. Under its "One ITE System, Three Colleges" Model of Education and Governance introduced in 2005, the ITE has three colleges that offer these full-time technical qualifications; National ITE Certificate (NITEC), Higher NITEC, Master NITEC and Diploma programs (Tiew Ming, 2006).

These programs require the students to complete a 2-year full time course at each level of the qualification. Each qualification has an exit point at its own level. Each level consists of formative and summative assessments. The formative assessments consist of theory assessments, which are in the form of written test that consist of multiple-choice and short-answer questions. It also consists of the multiple practical assessments, which are in the form of performance-based assessments. The summative assessments are made up of a practical assessment and theory assessment.

The ITE was established as a post-secondary institution to provide education and training for students seeking careers in vocational areas and in enhancing the employability of vocational trainees. The government decided that every student in

Singapore had to have at least 10 years of general education, with technically inclined students filtered to the Normal (Technical) stream in secondary schools as preparation. These students would be able to attend the ITE after they completed secondary school.

Vocational Education

Vocational education refers to teaching and learning that focuses on practical skills and knowledge; and being able to perform tasks related to working on a particular industry. Waite (2005) reported that vocational education is training for a specific vocation in a trade. Vocational training is a form of learning that can be more practical than academic education and often focuses on skills and abilities required in employment. At ITE, much of this training has often been aimed at preparing students for a specific occupation. ITE provides vocational training in the areas of Business Services and Hospitality, Electronics and Info-Comm Technology, Engineering and Media & Design.

Winer (2000) stated that vocational education is designed to develop skills, abilities, understanding, attitudes, work habits and appreciation encompassing knowledge and skills needed by people to enter and make progress in employment. Craft vocations are usually based on manual or practical activities, traditionally non-academic, related to a specific trade, occupation, or vocation. This is sometimes referred to as technical education as the trainee directly develops expertise in a particular group of techniques. Vocational education can be at the secondary, post-secondary level, and even further education level and often interact with the apprenticeship system.

2.2 Rationale of Study

In Singapore, the Institute of Technical Education (ITE) is the only government-funded educational institution focusing on vocational and technical education (VTE) and using performance-based assessment as an instrument to measure the competence of its students. At the ITE, performance-based learning and assessment represent a set of strategies for the acquisition and application of knowledge, skills, and work habits

through the performance of tasks that are meaningful and engaging to students. Wiggins (2006) reported that performance-assessment is about performing with knowledge in a context faithful to more realistic adult performance situations, as opposed to out of context, as in a school exercise.

In the Singapore context, there is an absence of research on the efficacy of using performance-based assessment in vocational and technical education. However, in order for performance-based assessment to be used effectively, it is imperative that lecturers know and are aware of the efficacy so that they would be able to carry out the performance-based assessment to achieve its objectives.

Generally 2 types of assessments are used – formative and summative assessment. Weurlander, Soderberg, Scheja, Hult and Wennerson (2012) outlined that formative assessments are generally continual assessments conducted during the course of the study program. Also known as assessment for learning, formative assessments measures skills and competencies at a point in time

Wren (2009) suggested that performance assessment is used to evaluate higher-order thinking and the acquisition of knowledge, concepts and skills required for students to succeed in the 21st century workplace. The teacher observes a student performing a task or reviews a student-produced product, and then evaluates the quality of the task or product. This is also aligned to Beck's (2000) view of performance-based assessment as a process where the emphasis is between observed performance and actual workplace situation. Performance-based assessment focused on tasks, where students demonstrate their acquisition of the needed skills and competencies from learning and improving on the practical tasks. Palm (2008) maintained that performance assessment is viewed as having better possibilities to measure complex skills, which are important competencies and disciplinary knowledge needed for work in today's society. Skill is the ability to carry out a specific task or activity whereas competency is a broader term that includes knowledge, behavior and adaptability to perform a job function in multiple situations.

Havnes, Smith, Dysthe and Ludvigsen (2012) argued that feedback is an aspect of the quality of assessment; what feedback is provided, how it is presented to the students, how it is accepted by the students, and the extent to which it is integrated in future learning. Gibbs and Simpson (2004) also suggested that feedback is most likely effective if feedback is frequent, timely, sufficient, detailed, can be linked to purpose of assessment task and criteria and focus on learning. As stated earlier, there is very limited research on the use of performance-based assessment in the Singapore context. In this respect, the vocational institute needs to address the efficacy of using performance-based assessment and its impact on students learning.

3. Significance of Study

Lecturers at the vocational institute in Singapore are mainly recruited from the industry. On the whole, the lecturers were formerly engineers, consultants, executives and technical experts who have been working in their specialised employment fields for an average of five years.

The formative assessments conducted at the vocational institute in Singapore require the students to complete several performance-tasks. These tasks are co-related to each other to form a whole competency defined in the curriculum. Performance assessment at the formative stage conducted at the Institute is a technique or method of assessment that seeks to assess wide-range of skills and competencies which is the criterion activity, which is performance of a task at the workplace. Therefore practical feedback for the completion of each and every task by the lecturer is important so that the students can act upon it and prepare for the next assessment.

The rationale for the research arises from the lack of research conducted on the efficacy of using performance-based assessment in a vocational institute in Singapore. The use of the research findings is important to provide insights to guide lecturers on the practical use performance-based assessment. This will drive the lecturers to steer more to achieve the desired outcome of using performance-based assessment to assess skills and competencies.

4. Research Questions

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

5. Objectives of the Research

The results will contribute to knowledge in the following ways;

- It will address a knowledge gap on the efficacy of using performance-based assessments in vocational institution in Singapore.
- This research will fill in the gap on the study of how performance-based assessment is used to measure acquired skills and competencies in a vocational institute in Singapore.

6. Structure of the Dissertation

Chapter Number	Description
1 – Introduction	This foregoing chapter introduces the topic by providing a contextual background to establish the purpose for the study being conducted.
2 – Literature Review	This chapter analyzes the literatures that relates to performance-based assessment and feedback.
3 – Research Design and Methodology	The chapter presents details of the research design and methodology that is used in the research.

4 – Results	This chapter discussed the results of data collected
5 – Findings and Data Analysis	In this chapter, we discuss the findings and data analysis from the results of the survey, group focus and interviews.
6 - Discussion	This chapter will discuss the results, limitations and future research and recommendations for this thesis.
7 - Conclusion	This is the final chapter of the study that would conclude the critical points of the study.

CHAPTER TWO
LITERATURE REVIEW

Educational assessment plays a vital role in evaluating students' knowledge, skills, and competencies. In traditional academic settings, assessments often rely on tests and exams, which may not fully capture practical skills, especially in vocational education. Vocational programs aim to equip learners with hands-on skills, which demands assessment methods that go beyond theoretical knowledge. This literature review explores the landscape of educational assessment, with a focus on performance-based assessment (PBA) as it applies to vocational education.

Rust (2002) defined assessment as evaluation or appraisal; it is about making a judgment, identifying the strengths and weaknesses, the good and the bad, and the right and the wrong in some cases. It is also defined as the process of documenting, usually in measurable terms, students’ knowledge, skills, attitudes, and beliefs.

Assessment is the systematic collection, review and use of information about educational programs to improve student learning. Assessment focuses on what students know, what they are able to do, and what values they have when they graduate. Assessment is concerned with the collective impact of a program on student learning.

Generally, student assessment is a process of collecting information to enhance and accredit students’ academic performance. It is focused on students' learning and development outcomes. Assessment is critically important for education as it serves to support students' learning and is a form of student’s accreditation of their acquired knowledge. Harlen (2005) stated that the main purpose of assessment is to aid students learning and for summarizing learning.

2.1 PURPOSE OF ASSESSMENT

Literatures have stated different perspectives of the purposes of assessment. These perspectives are commonly categorised as in Trotter (2006) who mentioned that the key concepts of purposes of assessment fall into three main categories: feedback, motivation and student learning. In addition, Eisner (2001) added on to the purpose of assessment; being educational health and effectiveness of a program.

Newton (2007) added in a more simplistic way that the purposes of assessment includes to help learning and to summarize learning. He also stated that the purpose of assessment falls under three main categories; support of learning, which is identical to Trotter (2006); to aid learning, certification; progress and transfer and accountability to the public.

Feedback

The role of assessment is to provide feedback to lecturers, parents, students and the community about the student's work and progress. Parents and the greater community want to know how their children and the youth of our society are performing at school. Celebrating student achievement is a key to further success of students at school. By providing feedback and celebrating student achievement, we encourage, and build the self-esteem of our students.

Motivation

Assessments serve as motivation for the students. Students who performed well in a formative assessment will seek to perform as well, if not better for the next formative assessment. Cauley & McMillan (2010) stated that formative assessments have been recognized as one of the most powerful ways to enhance students' motivation and achievement.

Stiggins (2005) stated that students' use information from the assessments when determining the strength of their engagement with the process of learning, or indeed whether to continue trying at all.

Student Learning

The purpose of assessment is to direct students along certain pathways, i.e. preparing them for specific jobs. This purpose can be implied, as business and industry supported. The owners of business and industry are interested in what graduating students can contribute directly to their economic activities. Brady & Kennedy (2009) stated that students are concerned with knowledge and skills that can be applied immediately to specific work requirements. This requires assessments to identify students with strengths in certain skills, as well as providing opportunities to be ranked or streamed. This leads to identification of students' potential for further education and recommendations to the appropriate facilities (i.e. technical schools, universities or specialist colleges).

Educational Health

The first being, to describe the 'Educational Health' of the country. This purpose can be seen as the governments' main aim in assessments. As the expenditure of education represents a significant proportion of the government's budget, they wish to monitor this closely (Brady & Kennedy: 2009). This requires testing and examining the students nationally, collating the national information and determining how well Australian students are performing compared with the rest of the world.

Effectiveness of Program

The last major purpose is to indicate how effective a program has been. This purpose is teacher orientated, it looks at teacher evaluation and whether the unit/ program was satisfactory or whether it needs modifying to better suit students' needs. A teacher should always be constantly assessing and adapting teaching strategies and content, to information obtained through; students' results, observations of students and feedback from unit lessons.

2.2 Theoretical Frameworks in Educational Assessment

Assessment is a cornerstone of educational practice, providing essential information on student progress, informing instructional decisions, and guiding curriculum

development. Understanding the theoretical frameworks underpinning educational assessment can shed light on why different methods are applied and how they influence student learning outcomes. Two prominent theoretical perspectives – behaviorism and constructivism – have historically shaped assessment practices. This chapter examines each framework, exploring its core principles, applications, and relevance to vocational education, where practical skills and real-world application are critical.

Behaviorist Approach to Assessment

The behaviorist approach, rooted in the work emphasizes observable changes in behavior as indicators of learning. Behaviorism posits that learning is a result of stimulus-response associations, where behaviors can be shaped through reinforcement (Skinner, 1953). From an assessment perspective, behaviorism supports methods that measure clear, measurable outcomes, such as standardized tests and quizzes, which focus on factual recall and procedural knowledge. Ahmad, S. et al. (2020) also stated that learning can be defined as the mechanical process of relating stimulus with response, which further give rise to novel behavior. This new behavior is supported by reinforcement.

According to Eun-Sook (2001), behaviorists believed to assign a role of transferring and transmitting of knowledge to the learners. Behaviorist theory of learning strengthens the use of traditional ways of teaching like lectures, skill worksheets and standardized assessment techniques in achieving isolated facts.

Key Characteristics of Behaviorist Assessment:

- **Focus on Objective Measurement**: Behaviorist assessments prioritize quantifiable results. Standardized tests, often used in large-scale assessments, are designed to measure specific, observable knowledge or skills. Multiple-choice and true/false questions, for instance, provide an objective means of scoring, aligning with behaviorist principles of measurement.
- **Reinforcement and Motivation**: Behaviorist assessments often incorporate reinforcement principles to motivate students. For example, rewards, such as grades or badges, reinforce desirable behaviors (in this case, correct answers), reinforcing learning in a structured way.

In vocational education, however, the behaviorist approach has limitations. While factual recall is important, vocational training also requires the development of complex, practical skills that standardized tests may not fully capture. For instance, a multiple-choice exam may assess a nursing student's knowledge of medical procedures but cannot assess their hands-on skills in a clinical setting. Vocational education requires assessments that go beyond observing isolated skills and instead evaluate students' abilities to perform tasks in realistic settings.

Constructivist Approach to Assessment

Constructivism, championed by theorists such as Jean Piaget and Lev Vygotsky, suggests that knowledge is constructed through active engagement with content and interactions with others. Constructivist theory emphasizes the importance of learners building their understanding through experience, experimentation, and social interaction (Piaget, 1970; Vygotsky, 1978). In this framework, assessment is not solely about obtaining correct answers but about understanding students' thought processes, problem-solving abilities, and application of knowledge.

Key Characteristics of Constructivist Assessment:

- **Authentic and Performance-Based Assessments**: Constructivist assessments, such as performance-based assessments (PBA), project-based learning, and portfolios, provide opportunities for students to demonstrate knowledge in realistic contexts. These methods are particularly relevant to vocational education, where hands-on practice is integral to skill development.
- **Process-Oriented Evaluation**: Unlike behaviorist assessments, which focus primarily on results, constructivist assessments emphasize the learning process. Lecturers using this approach value the steps students take to solve problems or complete tasks, offering insights into their understanding and development of practical skills.
- **Self-Reflection and Peer Assessment**: Constructivist assessment encourages students to engage in self-reflection and peer evaluation, promoting self-awareness and critical thinking. For instance, students in vocational courses might evaluate each other's projects, reflecting on strengths and areas for improvement. This approach not only builds skills but also fosters collaboration and accountability.

Constructivist approaches are highly relevant to vocational education, where competency in real-world tasks is paramount. By focusing on skills in practical

contexts, constructivist assessments align with the experiential nature of vocational training. For example, a culinary arts student might be assessed on their ability to prepare a complex dish, demonstrating skills in real-time rather than solely relying on theoretical knowledge about cooking techniques. Constructivist assessment allows vocational lecturers to capture a broader range of student competencies, including creativity, critical thinking, and adaptability.

2.3 Implications for Vocational Education

Both behaviorist and constructivist frameworks offer valuable insights into assessment practices, but their applicability varies significantly in vocational contexts. Vocational education often emphasizes "learning by doing," which aligns well with constructivist principles of hands-on learning and real-world application. While behaviorist methods can assess foundational knowledge efficiently, vocational education requires assessment methods that can evaluate practical skills and competencies. Performance-based assessments, simulations, and portfolio assessments allow vocational students to demonstrate competencies in controlled, yet realistic, settings.

For example, automotive training programs might use simulations to test students' diagnostic skills, where students identify and repair faults in a virtual car engine. Such assessments go beyond recall of mechanical knowledge, testing the student's ability to apply diagnostic skills in a context mirroring actual industry demands. By incorporating constructivist methods, vocational education aligns assessment with industry expectations, helping students build competencies that are directly transferable to their chosen fields.

This section explored two foundational theories – behaviorism and constructivism – and their impact on educational assessment. While behaviorist approaches contribute to the standardization and objectivity of assessments, constructivist approaches allow for richer, more holistic evaluations of student competencies. For vocational education, which prioritizes real-world skills, constructivist methods provide a framework for assessing practical abilities through performance-based assessments and other experiential forms. These frameworks guide lecturers in designing assessments that align with both educational objectives and industry standards, ensuring that vocational graduates are prepared for the demands of their professions.

Performance-Based Assessment

Beck (2000) stated that performance-based assessment is a process in which pre-established performance criteria and continuous feedback are used by both the student and instructor to improve learning while the students demonstrate their achievement of learning by performing realistic practice tasks. Palm (2008) stated that performance-based assessments are product and behaviour based measurements based on settings designed to emulate real-life contexts or conditions in which specific knowledge or skills are actually applied. It refers to assessments that directly assess the students' understanding and proficiency. These assessments allow students to construct a response, create a product or perform a demonstration to show what they understand and can do. It is to showcase that the student can apply knowledge and skills rather than simply to recall and recognise. Performance-based assessments are likely to reveal students' understanding.

Palm (2008) mentioned that performance and performance-based assessment or authentic assessments are related to performance situated learning, problem-based and competence focused. These are the various interpretations of authentic assessments which have been used by many people. In fact authentic assessments encompass all of these elements. Miller and Linn (2012) mentioned that performance is the execution of some tasks or process which has to be assessed through actual demonstration, which is a productive activity. The construction of authenticity assumes that assessment of performance involves only direct observation of the performance. It is then necessary to assess the student within the relevant learning context. Neal (2009) pointed to an increase in the use of performance-based assessments. Performance-based assessments are believed to be more consistent with a re-conceptualization of teaching and learning as a richer, context-bound experience that does not rely solely on rote skills.

Almeida (2005) stated that performance-based assessments are designed with the understanding that students must apply their knowledge and therefore makes the assessment more rigorous and meaningful to the students. This is also linked to Palm (2008) who mentioned that performance assessment is related to performance-based learning, problem-based and competence focused.

- Wilson & Myers (2000) commented that *performance-based* learning is positioned to bring the individual and transform the individual who is moving towards

full membership in the professional community. It focused on the participation in communities of practice.

- Tai & Yuen (2007) stated that *problem-based assessment* uses real world problems and tasks as initiative objects in constructing knowledge and enhancing learning experience.

- Wolf (2001) stated that *competence focused* assessment is a form of assessment that is derived from a specification of a set of outcomes; that so clearly states both the outcomes-general and specific; that assessors and students can all make reasonably objective judgements with respect to students achievements.

There are various interpretations of assessments which have been used by many people. This concept was further discussed by Neal (2009) who stated that a performance based assessment includes both a task and an accompanying rubric that describes the qualities of the performance. The task must involve creating a product or performance or in giving a demonstration that will make evidence of what they know and can do. Beck (2000) stated that there are several characteristics of performance-based assessment.

- The student must either perform a task, or something that is done in practice.

- Performance criteria and standards are clearly specified to the students at the beginning of the learning period.

- The task that the students carry out must be similar to the task encountered in professional practice.

- The use or demonstration of reasoning skills is required and assessed.

- Students must be able to explain, justify and defend his work during the task.

- Performance is directly observable.

In addition, Palm (2008) mentioned that performance is the execution of some tasks or process which has to be assessed through actual demonstration, which is a productive activity. The construction of authenticity assumes that assessment of performance involves only direct observation of the performance. It is then necessary to assess the student within the relevant learning context.

Implications for Vocational Education

Given the limitations of traditional assessment methods, vocational education programs face unique challenges in evaluating student competencies. Vocational education emphasizes "learning by doing," meaning that students must demonstrate mastery in real-world or simulated environments. Traditional assessments may not accurately capture these competencies, suggesting a need for alternative methods tailored to the practical and applied nature of vocational education. Fastré et al.. (2009) stated that it can be concluded that the use of performance-based criteria is especially beneficial for novice students because of their task-specific character.

2.4 The Role of Authentic and Performance-Based Assessments:

The limitations of traditional assessments highlight the importance of incorporating authentic and performance-based assessment methods into vocational programs. By allowing students to demonstrate skills in realistic settings, performance-based assessments align more closely with the goals of vocational training. For example, nursing students could be assessed through practical exams that require them to administer basic care procedures or demonstrate patient communication skills in a simulated environment.

Need for a Hybrid Approach:

While traditional assessments have limitations in vocational contexts, they may still serve a role when combined with other assessment forms. For instance, multiple-choice tests could assess foundational knowledge (e.g., safety protocols in construction), while hands-on assessments measure the practical application of that knowledge. A hybrid approach allows vocational programs to maintain some benefits of traditional assessments while ensuring that practical competencies are effectively evaluated.

Challenges in Implementing Alternative Assessments:

Transitioning from traditional to performance-based assessment poses logistical and resource challenges, including the need for skilled assessors, appropriate facilities, and consistent evaluation criteria. However, these adjustments are essential to align

assessment practices with vocational education's mission of preparing students for real-world careers.

Traditional assessment methods, while valuable in many educational settings, present notable limitations in vocational education. The focus on theoretical knowledge and standardized formats does not align well with vocational programs' emphasis on practical skills and real-world application. To meet the specific needs of vocational education, alternative assessments, such as performance-based and authentic assessments, offer more suitable approaches for evaluating practical competencies. Integrating these approaches alongside traditional methods may provide a comprehensive assessment strategy that captures both foundational knowledge and hands-on skills, ensuring that vocational graduates are prepared to succeed in their chosen careers.

2.5 Performance-Based Assessment in Vocational Education

Performance-based assessment (PBA) has emerged as a critical approach in vocational education, addressing the limitations of traditional assessments by emphasizing real-world application and hands-on skills. In vocational education, where students are trained for specific careers requiring technical competence and practical skills, This was also mentioned by Palm (2008) who stated that the characteristics of PBA are mostly very close resemblance with criterion situations, demand higher order thinking and communication, or involving students in accomplishments with value beyond school. PBA allows lecturers to evaluate students' abilities in realistic contexts. This chapter delves into the principles of performance-based assessment, its various types, the benefits and challenges associated with implementing PBA in vocational education, and examples of effective applications.

Principles of Performance-Based Assessment

Performance-based assessment is grounded in constructivist learning theories, which emphasize the importance of active engagement and real-world application in the learning process. PBA focuses on students' abilities to perform tasks, solve problems, and demonstrate skills in scenarios that mirror real-life situations. Rather than assessing isolated knowledge, PBA requires students to synthesize and apply what

they have learned. This is also stated by Fastre et al. (2009) that in competence-based education, authentic learning tasks based on real-life problems are the drinking force behind training, simultaneously encouraging the development of professional skills.

Key Principles:

Authenticity:

Authenticity is a core principle of PBA. Authentic assessments simulate real-world tasks, enabling students to demonstrate skills that are directly applicable to their chosen professions. For example, a PBA for an automotive student might involve diagnosing and repairing an engine problem, simulating tasks they would encounter in a professional environment.

Process and Product Evaluation:

PBA evaluates both the process (how students approach a task) and the product (the final outcome). In vocational education, this is crucial as it allows lecturers to observe not only the end result but also the methods and decision-making skills students use to complete a task, ensuring a comprehensive evaluation of competencies.

Criterion-Referenced Assessment:

PBA is typically criterion-referenced, meaning student performance is measured against predefined criteria or standards rather than compared with peers. This approach allows for clear, objective evaluation based on industry standards, which is essential in vocational training programs aiming to prepare students for specific roles.

Feedback and Reflection:

A key component of PBA is providing students with constructive feedback and encouraging self-reflection. Reflection allows students to understand their strengths and areas for improvement, helping them refine their skills and develop critical self-assessment abilities.

2.6 Types of Performance-Based Assessments in Vocational Education

PBA encompasses a range of assessment types, each designed to evaluate different aspects of student competence. Black, P. and William, D. (1998) stated that there are various types of assessments. The following are the primary types of performance-based assessments commonly used in vocational education.

Simulations:

Simulations replicate real-life scenarios, allowing students to demonstrate skills in controlled environments. For example, in healthcare programs, simulations can involve patient care scenarios where nursing students must respond to specific medical conditions. This type of PBA assesses students' ability to apply their knowledge in critical, hands-on situations.

Project-Based Assessment:

Project-based assessment involves students working on comprehensive projects that require them to apply various skills and knowledge. In construction programs, for instance, students may complete projects involving building a model structure, showcasing their understanding of construction principles, planning, and execution. Projects encourage critical thinking and problem-solving, key skills in vocational professions.

Portfolios:

Portfolios provide a collection of student work over time, reflecting their progress, achievements, and areas of growth. In fields like graphic design or media production, portfolios showcase students' practical abilities and creativity, helping them build a professional record of their work for future employers.

Performance Tasks:

Performance tasks require students to complete specific activities within a set timeframe. These tasks may be small, such as welding a piece of metal in a technical program, or larger, such as preparing a meal in a culinary program. Performance tasks are typically assessed in real-time, providing immediate insight into student capabilities.

Role-Playing and Case Studies:

In role-playing assessments, students assume specific roles relevant to their field. Case studies, on the other hand, require students to analyze real-life situations, make decisions, and justify their actions. In business or customer service training, for instance, students might role-play as customer representatives handling challenging scenarios, testing their interpersonal and problem-solving skills. This is also stated by Neal (2009) that by creating a real world context in which students must apply their knowledge and understanding to a task is another condition under which performance based assessment may be employed. This may involve the use of simulation and

frequently requires students to take on a particular role or to view a situation through a specific perspective. As well, responding to the context will typically require students to shape their response towards a particular audience.

2.7 Benefits of Performance-Based Assessment in Vocational Education

Performance-based assessments offer several key benefits that align well with the objectives of vocational education. Fastre et al. (2010) stated that authentic learning tasks based on real-life problems are the driving force behind training, simultaneously encouraging the development of professional skills and more general competences like being self-directed. Competence-based education is a dominant trend in vocational education in many European countries. The aim is to prepare students for the workplace where people are expected to be broadly educated while stimulating lifelong learning. Some of the benefits of implementing PBA in vocational education includes.

Alignment with Real-World Skills:

PBA closely aligns with the goals of vocational education by focusing on practical skills and competencies that students need in their chosen professions. Assessments in realistic settings help students develop the confidence and proficiency they need to succeed in the workforce.

Development of Critical Skills:

PBAs foster essential skills such as critical thinking, problem-solving, communication, and adaptability. In vocational education, where job success often depends on the ability to navigate complex tasks and unexpected challenges, PBA provides an opportunity for students to practice and refine these skills.

Increased Student Motivation and Engagement:

Because PBA tasks are directly related to real-world scenarios, students often find them more meaningful and engaging. In vocational programs, where students typically have clear career goals, performance tasks give them a sense of purpose, enhancing motivation and engagement with the learning process.

Enhanced Self-Assessment and Reflective Learning:

PBA encourages students to assess their own performance, which fosters self-awareness and reflection. This reflective component is especially valuable in

vocational fields, where professionals must continuously evaluate and improve their skills in response to industry changes.

2.8 Challenges in Implementing Performance-Based Assessment in Vocational Education

While performance-based assessments offer numerous advantages, they also present certain challenges, particularly in vocational education. Ferrare and McTighe (1992) stated that there are three guided fundamental principles.

Resource and Time Constraints:

PBA requires substantial resources, including equipment, materials, and skilled assessors, which can strain institutional budgets. Moreover, PBAs are often time-consuming, requiring instructors to observe and evaluate each student individually, which may be challenging in large classes. Assessments is an on-going process and instructors must assess regularly throughout the course of study.

Consistency and Objectivity in Scoring:

Validity, reliability and fairness is another concern in PBA. One of the most common challenges with PBA is ensuring consistent and objective scoring. Unlike traditional tests with clear right or wrong answers, PBA often involves subjective judgments. Developing standardized rubrics and training assessors can help improve reliability, but achieving uniformity remains a challenge.

High Demand on Instructor Skills:

A single assessment is like a snapshot of a student's performance at a point in time. Instructors will not be able to portray a student's competence with just a single assessment. Instructors must use multiple sources of information and data to fairly evaluate a student's competence. PBA demands that instructors possess specialized skills not only in the subject matter but also in assessing complex, hands-on tasks. In vocational education, where instructors often come from industry backgrounds, additional training may be needed to ensure they can effectively implement and evaluate PBAs. For students, PBA can be intimidating, particularly when assessments take place in front of others or involve high-stakes situations. In vocational fields, where assessments often simulate real-life pressures, students may experience anxiety, which can impact their performance.

2.9 Best Practices for Implementing Performance-Based Assessment

Implementing PBA effectively requires adherence to certain best practices, ensuring that assessments are structured, fair, and relevant to industry expectations. The following practices are essential for vocational lecturers seeking to create meaningful, reliable, and practical PBAs. In addition, Miller and Linn (2000) stated that there are six aspects of construct validation of performance-based assessments.

Alignment with Industry Standards:

For PBAs to be relevant and beneficial, they must reflect the skills and competencies that are required in the workforce. This alignment can be achieved by collaborating with industry experts to ensure assessment criteria mirror the expectations of employers. For instance, nursing programs might design clinical assessments based on current healthcare protocols, while culinary programs could incorporate professional standards for food preparation and presentation.

Developing Clear Rubrics and Criteria:

Clear, detailed rubrics are vital to the success of PBA, as they provide students and instructors with transparent standards for evaluation. Rubrics should outline the key skills, behaviors, and knowledge expected of students, as well as the weighting for each criterion. Instructors can also use rubrics to ensure consistency in grading, especially when multiple assessors are involved.

Providing Opportunities for Practice and Feedback:

Before high-stakes assessments, students should have multiple opportunities to practice the tasks they will be assessed on, ideally with feedback from instructors or peers. Practice sessions allow students to become familiar with assessment formats and expectations, reducing anxiety and improving performance. Constructive feedback also guides students in refining their skills and making adjustments before the final assessment.

Incorporating Reflection and Self-Assessment:

Reflection and self-assessment encourage students to consider their strengths and areas for improvement, fostering self-awareness and critical thinking. After completing a performance task, students could be asked to reflect on their approach, identify

challenges they encountered, and suggest improvements. This practice not only reinforces learning but also prepares students for lifelong skill development in their professions.

2.10 Addressing Challenges in Performance-Based Assessment

While PBA provides a more realistic measure of student competence, it also presents unique challenges. To ensure successful implementation, vocational education institutions must address these challenges proactively.

Resource and Cost Constraints:

PBAs often require specialized equipment, materials, and dedicated spaces, which can strain institutional budgets. To manage costs, institutions can consider partnerships with local businesses or industries to access resources and facilities. Additionally, incorporating low-cost digital simulations or online tools can reduce the need for physical resources while maintaining assessment quality.

Instructor Training and Support:

Implementing PBA requires instructors to have a deep understanding of both vocational skills and assessment techniques. Professional development programs that train instructors in designing, conducting, and evaluating PBAs are essential. Institutions should also consider providing ongoing support, such as mentorship programs or peer review sessions, to help instructors refine their assessment skills.

Consistency and Objectivity in Scoring:

Ensuring consistency and objectivity in PBA scoring is challenging, especially for tasks that involve subjective judgments. Standardized rubrics, calibration sessions, and inter-rater reliability checks can help ensure that multiple assessors score tasks consistently. Digital tools that assist with scoring can also support objective, accurate assessments.

Student Anxiety and Assessment Pressure:

PBA can be high stakes for students, especially in practical exams where performance is observed directly. Lecturers can help reduce anxiety by creating a supportive assessment environment, offering practice opportunities, and providing clear

instructions and criteria. Additionally, offering formative PBAs before summative assessments gives students a chance to build confidence.

Performance-based assessment, when effectively implemented, serves as a valuable tool in vocational education, providing a comprehensive view of students' practical skills and industry readiness. While there are challenges associated with resource demands, scoring consistency, and student anxiety, these can be mitigated through strategic planning and the use of technology. To optimize PBA implementation, vocational institutions should focus on alignment with industry standards, provide instructors with robust training, and incorporate technology to support authentic assessment experiences.

2.11 Analysis of Performance-Based Assessment in Vocational Education

The adoption of performance-based assessment (PBA) in vocational education has brought about significant changes in how students are evaluated, emphasizing practical skills and real-world application over theoretical knowledge alone. This chapter provides an analysis of the effectiveness of PBA in vocational education by examining its impact on student learning, the development of critical skills, and alignment with industry standards. The chapter also discusses student and instructor perspectives on PBA and identifies areas for future research and improvement in vocational assessment practices.

Evaluating the Effectiveness of Performance-Based Assessment

We must consider its impact on various aspects of vocational education, including student engagement, skill acquisition, and alignment with industry expectations. The effectiveness of PBA is often measured through student outcomes, feedback from employers, and the performance of graduates in the workforce.

Enhanced Student Engagement and Motivation:

Research indicates that PBA significantly enhances student engagement, as students find real-world tasks more relevant and meaningful than traditional assessments. In vocational programs, where students often have clear career goals, PBAs that simulate real-world scenarios make learning more engaging and help students see the value in mastering specific skills.

Improved Skill Acquisition and Application:

PBA enables students to practice and refine their skills in authentic contexts, leading to deeper understanding and better retention of knowledge. Studies have shown that students in vocational programs who are assessed through PBAs perform better on practical skills assessments and demonstrate a stronger ability to apply their skills in professional settings.

Alignment with Industry Standards:

PBAs are designed to meet the specific competencies and standards required by industries, making them highly relevant to vocational education. For example, in fields like healthcare, automotive repair, and culinary arts, PBAs require students to demonstrate proficiency in tasks directly related to their future roles. This alignment prepares students for the demands of the workplace and increases their employability.

Feedback from Employers:

Employers of vocational graduates often report that students assessed through PBAs are better prepared for job roles compared to those who primarily underwent traditional assessments. Employers value the hands-on experience and problem-solving abilities that PBAs cultivate, as these skills are crucial in vocational careers. Feedback from employers is a vital indicator of the effectiveness of PBA, as it reflects the value of these assessments in real work environments.

Student Perspectives on Performance-Based Assessment

Understanding students' perceptions of PBA is crucial for assessing its impact on learning outcomes and identifying areas for improvement. Many studies highlight the positive experiences students have with PBA, although challenges are also reported.

Positive Perceptions of Real-World Relevance:

Vocational students often report that PBAs are more meaningful than traditional assessments, as they replicate real tasks they are likely to encounter in their careers. This relevance makes learning more purposeful and increases students' intrinsic motivation, leading to improved effort and commitment.

Development of Critical Skills:

Students recognize that PBAs help them develop essential soft skills, such as problem-solving, communication, and time management. In vocational fields, these skills are as critical as technical abilities, and PBAs offer an effective way for students to practice them.

Challenges with Anxiety and Pressure:

While PBAs are valued for their authenticity, students sometimes experience anxiety and pressure due to the high-stakes nature of these assessments. Students have noted that the public or observed nature of PBAs can be intimidating, particularly for those who are less confident in their skills. Lecturers should consider providing support, such as mock assessments or stress-management resources, to help students manage assessment-related anxiety.

Instructor Perspectives on Performance-Based Assessment

Instructors play a critical role in the implementation and success of PBA. Their perspectives provide insight into the benefits and challenges of using PBA in vocational education.

Valuing Real-World Skill Assessment:

Instructors generally appreciate PBAs as they allow for a comprehensive assessment of students' skills, particularly those that are difficult to measure with traditional tests. Instructors also recognize that PBAs foster critical thinking, creativity, and practical application, which are essential for vocational success.

Challenges with Time and Resource Allocation:

Many instructors report that implementing PBAs is time-intensive and requires more resources than traditional assessments. For example, setting up simulations, coordinating project-based tasks, and evaluating portfolios are demanding on both time and institutional resources. As a result, some instructors may feel limited in their ability to implement PBA effectively.

Need for Training and Support:

The complexity of PBAs often requires specialized training to ensure consistent and objective assessment. Instructors have expressed a need for more professional

development and support, particularly in areas like rubric development, digital assessment tools, and managing performance anxiety in students.

2.12 Addressing Challenges in Performance-Based Assessment

While PBA offers numerous advantages, certain challenges must be addressed to ensure effective implementation in vocational education.

Standardizing Assessment Criteria:

A major challenge with PBAs is ensuring consistency in assessment, as performance tasks can be subjective. Clear rubrics and calibration sessions for instructors are essential to minimize variation in scoring. Standardization not only enhances fairness but also ensures that assessments are aligned with industry standards.

Resource Constraints:

PBAs can require significant resources, including specialized equipment, materials, and trained assessors. Institutions can address these constraints by collaborating with industry partners, using technology like simulations, and finding cost-effective alternatives for hands-on practice.

Supporting Student Well-being:

The high-stakes nature of PBAs can contribute to student stress and anxiety. Institutions should consider incorporating support mechanisms, such as stress-management workshops, mock assessments, and counseling, to help students manage the pressures of PBA. Offering feedback that emphasizes growth and improvement, rather than solely judging final performance, can also alleviate anxiety.

Training Instructors for PBA:

Effective implementation of PBA requires instructors to be skilled in designing, administering, and evaluating these assessments. Providing professional development opportunities focused on PBA can equip instructors with the necessary skills, ultimately improving assessment quality and consistency.

In this review of the literature, synopsis of 10 major literature sources comprising books, journals, articles and peer-reviewed research studies has been highlighted.

Beck, D. (2000). Performance-based assessment: Using pre-established criteria and continuous feedback to enhance a student's ability to perform practice tasks.

This journal focused on Performance-based assessment is a process in which pre-established performance criteria and continuous feedback are used by both the student and instructor to improve learning with an endpoint of students demonstrating their achievement of learning by performing realistic practice tasks. This manuscript describes the issues limiting widespread use of performance-based assessment, based on findings from the pharmacy, medical, and general education literature, and then proposes a model for how to successfully implement it.

Black, P., & Wiliam, D. (1998). Assessment and Classroom Learning. Assessment in Education.

This journal reviewed classroom formative assessment. Several studies show firm evidence that innovations designed to strengthen the frequent feedback that students receive about their learning yield substantial learning gains. The perceptions of students and their role in self-assessment are considered alongside analysis of the strategies used by lecturers and the formative strategies incorporated in such systemic approaches as mastery learning. There follows a more detailed and theoretical analysis of the nature of feedback, which provides a basis for a discussion of the development of theoretical models for formative assessment and of the prospects for the improvement of practice.

Smith, S. (2007). Performance-based assessment in schools.

This article addresses a 2006 article by Hojnoski, Morrison, Brown, and Matthews on the use of performance-based measurement among school-based practitioners. Their results suggest that many of their survey respondents favor the use of this form of measurement. This line of research is important and addresses an important issue in current clinical practice. However, they offer a critique of this form of assessment, in response to which the author raises four issues. First, there is a difference between tests and techniques. Second, assessment tools do not make decisions or diagnoses; clinicians do. Third, actuarial prediction and clinical expertise are mutually enhancing. Last, the relationship between science and practice should be bidirectional and integrative. These points are discussed in terms of the utility and appropriateness of performance-based measurement tools and techniques for helping psychologists answer diagnostic, placement, and treatment questions in the school setting.

Palm, T. (2008). Performance assessment and authentic assessment: A conceptual analysis of the literature.

Performance assessment and authentic assessment are recurrent terms in the literature on education and educational research. They have both been given a number of different meanings and unclear definitions and are in some publications

not defined at all. Such uncertainty of meaning causes difficulties in interpretation and communication and can cause clouded or misleading research conclusions. This paper reviews the meanings attached to these concepts in the literature and describes the similarities and wide range of differences between the meanings of each concept

Halloran, D. (2006). Task-based learning: A way of promoting transferable skills in the curriculum.

This article aims to discuss the issues surrounding the acquisition of transferable skills in the curriculum. It outlines the current thinking with regard to transferable skills and the Government's emerging agenda for a highly skilled workforce. Primarily, it will focus on the needs of the National Health Service, in particular the radiography profession, with respect to recruiting and maintaining an adaptable workforce. With the advancement of technology and the rate of change of working practices it is seen as essential that future employees are flexible and adaptable in their approach to the working environment. Furthermore, this article will introduce the concept of task-based learning, which is a unique method of learning aimed at developing transferable skills in undergraduates. Task-based learning was introduced into the radiography undergraduate programme at the University of Leeds in 1998. Within the programme it forms the basis of the professional practice modules, which are entirely clinically situated. This mode of learning allows the student to contextualize knowledge and helps develop critical appraisal and adaptability.

Fastré, G.M., van der Klink, M.R. and van Merriënboer, J.J. (2010) ‘he effects of performance-based assessment criteria on student performance and self-assessment skills.

This article reviewed that assessment criteria and standards are key clues for students to know what is essential in their study program. Fastré et al. (2009) show that drawing students’ attention to the assessment criteria that are relevant for a particular learning task improves their understanding of the criteria and subsequently leads to better test task performance and better self-assessment skills.

Newton, P. E. (2007). Clarifying the purposes of educational assessment.

This article concerns the importance of clarity in thinking and talking about certain core concepts of educational assessment. It begins by identifying three quite distinct interpretations of the term ‘assessment purpose’. It continues by challenging the supposed distinction between ‘formative’ and ‘summative’—arguing that the latter only applies to a kind of assessment result while the former only applies to a kind of use of assessment results. It ends by illustrating the wide range of uses to which assessment results might be put and stresses the importance of not concealing important distinctions by locating multiple discrete purposes within a small number of misleading categories.

Tai, G. X. L., & Yuen, M. C. (2007). Authentic assessment strategies in problem based learning.

Problem-based learning (PBL) uses real world problems and tasks as the initiative objective in constructing knowledge and enhancing learning experience. This paper looks into authentic assessment strategies in problem-based learning using an interactive multimedia project as a subject of investigation. Through the use of a range of authentic assessments like process assessment which contains of process assessment (consists of students' self reflection, peer's evaluation and task completion reports); content assessment (consists of pretest and posttest); together with portfolio assessment, this paper outline strategies that have worked, as well as those that have not in a PBL setting. The collective data showed positive feedback towards learning tasks including problem solving skills, team collaboration and knowledge enhancement.

Wolf, A. (2001). Chapter 25: Competence-Based Assessment.

In this article, Wolf illustrates the self-defeating nature of attempts to generate atomistic specifications of vocational competence and then to use these as a basis for decontextualised" objective" assessments. Her chapter stands as a marker for her even more outstanding book with the same title. In that book, Alison documents the way in which the attempt to move away from traditional knowledge-based" educational" programmes and replace them by courses in which students learned how to do things they would later need to be able to do-and testify to the outcomes in these competency-based terms-got corrupted back into the very thing that it had been hoped to move away from (ie, assessments of prescribed cognitive content) precisely because there were no appropriate means of assessing these other outcomes.

Gulikers, J. T. M., Bastiaens, T. J., & Kirschner, P. A. (2004). A Five-Dimensional Framework for Authentic Assessment.

Authenticity is an important element of new modes of assessment. The problem is that what authentic assessment really is, is unspecified. In this article, a review on the literature on authenticity of assessments, along with a five-dimensional framework for designing authentic assessments with professional practice as the starting point. Then, present the results of a qualitative study to determine if the framework is complete, and what the relative importance of the five dimensions is in the perceptions of students and lecturers of a vocational college for nursing. The implications for the framework, along with important issues that need to be considered when designing authentic assessments.

The review of the literature has shown that:

Performance-based and competency-based assessment has been widely researched and analysed in many countries including the UK, US, Australia. However, these literatures have also shown that there is no research study done in Asia especially so for a vocational institute in Singapore. Hence, it is important to investigate and study if these assessments are effective in a vocational institute in Singapore. In general.

- Performance-based assessment is used to assess observed skills and competencies for conditions that emulate the workplace;
- Performance-based assessments are usually carried out in authentic learning environment with tasks that describes the competencies.
- Feedback for performance-based assessment is used to fill the gap between attained and required skills and competencies; and
- Feedback for performance-based assessment is either on task or process oriented with the objective to reinforce and close the performance gap; and
- There is a gap in the research literature regarding the use of performance-based assessment in a vocational institute in Singapore.

The literature review provides few baselines that provide themes like the use of performance-based assessments, delivery, assessing competencies using performance-based assessment, objective and frequencies of feedback, which may be used in vocational education in Singapore. This information then can be used to explore lecturers' knowledge and experience in using performance-based assessment and feedback in a vocational institution in Singapore.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Chapter 2 provides a literature review on assessment. It presents the various types of assessment and the insights to the different types of assessment. It looked into formative, summative, performance-based and authentic assessment. These are the types of assessments that are currently adopted in the Institute of Technical Education (ITE). It also looked the various discussions amongst the researchers on the definition, purpose, strengths and the issues surrounding those types of assessment discussed.

This chapter presents the framework for the mixed method that is used to conduct the research into providing students feedback in performance-based assessments. The framework is based on the available literature. This chapter looks into various sections like the data collection methods, the use of survey, the use of focus groups, teacher and student interviews. This is followed by discussion about the research design that has been used. The final part of the chapter presents overviews of the data collection methods and the roles of the research participants in the data collection process.

3.2 Research Approach

3.2.1 Introduction

It is well documented in the literature that effective research must be reinforced by an explicit philosophical paradigm as stated by Neuman (2003), which is consistent with the phenomenon under investigation. In using mixed methods, this research investigates the perceptions, experiences and impact of lecturers and students in providing and receiving feedback respectively, after a performance-based assessment.

It follows that due to the subjective nature of how data is to be collected and used; this research has been developed with a positivist / interpretivist paradigm approach.

The positivist paradigm strives to investigate and confirms patterns of behaviours. This paradigm also involves experimenting and utilizing controlled groups. Creswell (2009) stated that positivists attempt to identify causes which influence outcomes. This research study aims to identify how the use of feedback could influence the reactions, behaviours and the impact on the students, particularly in performance-based assessments.

Pervin, N., & Mokhtar, M. (2022) stated that the interpretivist paradigm constructs knowledge through a process of interaction with others. Researchers used informal interviewing, surveys and observations to build understandings of the experience of lecturers and students within the schools and classrooms. This interaction with the research participants assist the researcher in constructing knowledge, which will be used to contribute to the development and effective use of feedback within the context of the research.

3.2.2 Ontology and Epistemology Assumptions

This research has embraced a qualitative and quantitative paradigm through the use of mixed methods. Scotland (2012) stated that researchers need to be able to recognise how these assumptions relate to the chosen methodology and methods. This understanding will further improve the comprehension of research, application of theory into the classroom and presentation of the research findings.

Freimuth (2009) stated that ontology is the study of what we know, or rather what we think we know. Ontological assumptions influenced how researchers take a position regarding their perceptions of how things really work. The use of feedback for performance-based assessments is deemed to improve students' performance through effective feedback and self-regulation. This assumption led to the investigation on the use of feedback for improving students' performance in assessments. McCarthy (2005) described ontology as realist, which incorporates a theory of truth.

Collis et al. (2003) stated that epistemology is concerned with the study of knowledge and what we accept as being valid knowledge. A valid knowledge must be defended and supported with concrete findings. An epistemological issue concerns the question of what should be regarded as acceptable knowledge in a discipline.

The different experiences by the lecturers and students with regards to feedback contribute to the different ontological and epistemological assumptions brought to the research.

In using a mixed method, both the ontological and the epistemological assumptions are relative to the experiences with “feedback”. In this research they are relative to lecturers and students experiences with feedback. As such, the experiences amongst and between lecturers are expected to be different to those amongst and between students. Nonetheless, these differences in experiences contribute largely to the whole view on the use of feedback for performance assessments. This will strengthen the ontological and epistemological assumption, which will eventually provide valid and reliable knowledge.

3.2.3 Research Paradigm

Weaver et al. (2006) stated that paradigms are patterns or practices that regulate inquiry by providing perspectives and processes in which an investigation is accomplished.

The paradigm that has been adopted in this research is the positivism qualitative approach to the collection of data. The approach has been chosen as it involves the use of online surveys and focus group interviews into the phenomenon being researched, the cause and effect of an action taken. In this respect, the cause and

effect of using feedback is being investigated. Therefore, the design of this research method must support the researcher to extract data from the samples to validate the ontological and epistemological assumptions within the research. This research design involves the researcher to illicit response, experiences and behavioural actions to the phenomenon being investigated. There will be no manipulation of data in this research because the researcher does not influence the data in any way. This research describes a cause and effect cycle, where the actions, response and experience of students and staff are being investigated to provide an informed knowledge to the phenomena being investigated.

In this research, participants provided their understanding, experience and actions for their use of feedback in performance-based assessments. This information would have arisen within their specific roles from their daily interactions within the context of context of the research.

The data collected for this research is based on point in time experience from the students and staff. It is acknowledged that the results and analysis of the data collected is based at a specific time within the specific sample specified and within the specific context.

3.2.4 Mixed Methods

3.2.4.1 Introduction

Johnson et al. (2007) stated that mixed methods research is a type of research in which a researcher combines elements of qualitative and quantitative approaches for the purpose of breadth and depth of understanding and corroboration. Torrance (2012) stated that mixed methods involve two or more methods being employed to bring different intellectual tools on the task at hand, with the assumption that different perspectives can be generated, which in turn will give a fuller and more informative picture.

Morse (2010) stated that mixed method design consist of a complete method which is also referred to as the core component, plus one incomplete method which is also known as the supplementary component, that cannot be published alone within a single study.

3.2.4.2 The Use of Sequential Mixed Methodology

Onghena et al. (2011) stated that mixed methods can be applied at the primary empirical level as well as the synthesis level. In a primary level mixed methods study a researcher collects qualitative and quantitative data directly from the research participants, for example through interviews, observations, and questionnaires, and combines these diverse data in a single study. A synthesis level mixed methods study is a systematic review that applies the principles of mixed methods research. Johnson et al. (2007) stated that mixed methods is an approach to knowledge that attempts to consider multiple viewpoints, perspectives, positions and standpoints, from the qualitative and quantitative views. This methodological approach is built upon the promise that it can be more fruitful to consider how the strengths of quantitative and qualitative can be merged within a mixed method approach.

Sequential mixed method design is a design in which one type of data collection provides a basis for the collection of another type of data. It answers one type of question by collecting and analyzing two types of data. Sequential mixed model design in which the conclusions that are made on the basis of the results of the first phase lead to formulation of questions, data collection, and data analysis for the next phase. The second phase of the study is conducted to either confirm the inferences of the first phase, or to provide further explanation for unexpected findings of the first phase. The sequential QUAN-qual mixed method design consists of a core and supplementary component where the core component consist of a survey to elicit quantitative (QUAN) data pertaining lecturers and students knowledge, perceptions, use and experiences. The supplementary component consists of focus groups and interviews to elicit qualitative (QUAL) data pertaining to problems and issues faced, and also collect personal experiences of a selective group of lecturers and students.

This research includes the use of surveys, focused group and interviews that are related specifically to the use of feedback at a vocational institution.

3.2.4.3 Justification for the Use of Sequential Mixed Methodology

Bryman (2006) stated that there are three reasons for combining quantitative and qualitative research. Mixed methods are used to enable confirmation or corroboration of each other through triangulation. It is also used to enable and develop analysis in order to provide richer data and the combinations are used to initiate new codes of thinking by attending to paradoxes that emerge from the two data sources.

Morse (2010) stated that sequential mixed methods are more comprehensive, therefore making the research richer. It gives the researcher another perspective using a different data set. Mixed methodology gives the researcher data from a different level of analysis or abstraction. Sequential mixed methods consist of a complete method; the core and the supplementary components. In mixed methods, the supplementary component provides explanation or insight within the context. Sequential mixed method begins with the researcher identifying a core component of the research. The supplementary phase is carried out after the core component is completed. The supplementary phase consists of research strategies that may be used within another method. In this research, the core component is the survey conducted at the start of the data collection process. The quantitative data is collected to form themes, collective data and baseline. Thereafter, the results of the survey are then used to develop the focus group schedule and the interviews where qualitative data will be collected, which form the supplementary component of the research. The focus group and interviews will elicit in-depth data from the results of the survey.

3.3 Research Design

3.3.1 Overview of Research Design

Friedman (2000) stated that a research design serves as a structure in which the research can be undertaken and needs to be derived from the research questions that underpin the purpose for this research.

In this research, the design adopted for this investigation, has qualitative and quantitative data components. The online survey is aligned to RQ1, where it aimed to collect baseline data on the knowledge, understanding, perceptions, use and experience of using feedback in performance-based assessments, by the lecturers and students. The focus groups are aligned to RQ2, where it aimed to explore problems, issues faced and the views, by both lecturers and students. The focus groups aimed to give the researcher; in-depth results of the data collected from the online survey. The selective interviews are aligned to RQ3, where it aimed to collect personal experiences of a selective group of lecturers and students.

3.4 Data Collection Methods

3.4.1 Introduction

In this research, three different data collection methods have been used to capture the wide experiences and perspectives of the lecturers and students. These quantitative and qualitative data collection method comprises of;

- An online survey of the lecturers and students;
- A Focus group of lecturers and students;
- Selective interviews of lecturers and students.

3.4.2 Quantitative and Qualitative Data

Aliaga et al. (2000) stated that quantitative research is explaining phenomenon by collecting numerical data that are analyzed using mathematical based methods.

Additionally, Sibanda (2009) stated that quantitative research focuses on gathering numerical data and generalizing it across groups of people.

Merriam (2002) stated that qualitative research attempts to make sense and understand phenomena from the participants' perspective. Jackson et al. (2007) stated that qualitative research is primarily concerned with understanding human beings experiences in a humanistic, interpretive approach.

3.4.3 The Use of Online Surveys

Vaus (2006) stated that a survey is a research instrument which is used to capture opinions of a large group. The survey is a technique that can be used to gather data by asking questions to respondents. A 5-point Likert scale was used in this online survey being (5) Strongly Agree (4) Agree (3) Unsure (2) Disagree and (1) Strongly Disagree.

A survey is a data collection method from a broad sample size. It is often used with the assumption that respondents have different experiences and perceptions to the issues that is being put forward. Gaski (2012) stated that surveys rely on a sample of elements from a population of interest that are measured from a single point of time. Surveys can be conducted by questioning or observing. Surveys also allow data to be collected statistically so that certain trends could be analyzed.

The purpose of using a survey as an instrument in this research was to obtain data from a sample of students and lecturers regarding RQ1 as below:

RQ1 What is the efficacy of assessment used in the institute?

The survey was chosen as the instrument for data collection at this stage because of its efficiency in which data can be collected from a large group of respondents. The distribution of online surveys also would cause minimal disruption to the classroom hours of the lecturers and students involved in the survey. This method was also selected because the respondents can complete the survey ubiquitously; at home or in school, from their tablets, smartphones, computers or notebooks, as long as there is an internet connection.

The results of the survey would be collected and data grouped according to common ideas and themes. Quantitative data would be reported to provide statistics of the response gathered from the respondents within the context of the survey. This would lead the path for focus groups and selective interviews to follow.

3.4.4 The Use of Focus Groups

Seymour (2004) stated that a focus group is best described as a group with a common interest that is brought together by a researcher, moderator or facilitator. The moderator will then leverage on this common interest or traits to elicit deeper experience or feedback about a common focus or issues that needs to be addressed.

Morgan (2002) stated that focus groups can create collective conversations between the moderator and the participants which lead to gathering of rich and relevant data to the topic that is being discussed. This provides the moderator to achieve the depth of the topic which is discussed. Focus groups also keep the conversation within the context and the responses are enhanced due to common characteristics that the participants have.

The use of focus groups enhances collective perceptions and experiences, which is deemed more valid and reliable to individual responses.

The use of focus groups in this research is to elicit in-depth response and feedback from the survey conducted earlier. The participants will be able to contribute different experiences and ideas surrounding the context of the issue. The collective response of lecturers and students will make the data richer and more reliable. The response from the lecturers and students will provide the researcher to obtain data for the research question below:

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

3.4.5 The Use of Interviews

Hannon (2007) stated that an interview seeks to gather information about an individual's attitudes, opinions and perspectives to a given phenomenon. Interviews are particularly useful to elicit participants' experiences and feedback from a given context of discussion. The selective interviews give individuals the opportunity to express and give in-depth response to their experiences, knowledge and daily practices. This information provides that room for data analysis which will provide an informed knowledge to the teaching fraternity.

In this research, selective interviews will be carried out with lecturers and students. Warren et al. (2005) stated that there are four types of interviews; structured semi-structured, unstructured or informal interviews.

Semi-structured interviews will be carried out as there will be a series of common questions directed at the participants and there will be opportunities for the researcher and participants to explore the responses, if deemed necessary. The data obtained from these semi-structured interviews will assist the research to obtain data for the following research question.

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

3.5 The Research Sample

3.5.1 Introduction

The data sample for each data collection procedure used in this research is represented in the table below. It shows the range of participants and characteristics which are categorized according to the sequence of the research.

Data Collection Instrument	Participants	Descriptors	Sample Size
Online Survey	● Lecturers ● Students	Lecturers ● Lecturers who have experienced giving feedback. Students ● Students who have experienced receiving feedback.	● 100 lecturers ● 100 students
Focus Groups	● Lecturers ● Students	Lecturers ● Teaching between 0-5 years ● Teaching between 6-10 years ● Teaching 11years and more Students ● Students who have completed their assessments	● 30 lecturers (6 groups of 5) ● 30 students (6 groups of 5)

		and have received feedback from the lecturers.	
Selective Interviews	● Lecturers ● Students	● 10 lecturers will be randomly selected from the focus group. ● 10 students will be randomly selected from the focus group.	● 10 Lecturers ● 10 Students

3.5.2 The Survey Sample

The survey was conducted with 100 lecturers and 100 students from the School of Electronics and Info-Comm Technology (SEIT). The sample selection contained a range of teaching experience and knowledge and also various experiences that the students have. The backgrounds of the lecturers and students have been identified as;

- Lecturers who are aware of the use and effectiveness of assessments.
- Lecturers who have experienced giving feedback to the students after post-assessment.
- Lecturers who have been in service for at least 1yr.
- Students who have received feedback from their lecturers, regarding their performance assessment.
- Students who have completed at least 2 performance assessments.

3.5.3 The Focus Group Sample

Armenteros et al. (2012) stated that the Anglo-Saxon focus group approach is a technique that allows the members of the group to reveal their opinions and share their experiences, generating a discussion of great qualitative richness that allows shared and individual points of view to surface. The purpose of such dynamics is to generate

and identify ideas and opinions and to produce information. Acocella (2012) added that focus groups are constituted to achieve two main aims; facilitate interaction among participants and to maximise the collection of high quality information. It is also important that people involved are interested in the topic and that they are able to discuss it thoroughly.

The focus groups schedule was used with 30 staff and 30 students, split into groups of 5. Each group will consist of lecturers from different teaching specialisations and students from the different courses. The lecturers are from the team in electronics, multimedia, info-comm technology and security specialisations. The lecturers will be randomly placed in groups of 5 to have a diverse collection of data and experience. The students will also be grouped in 5 so that these data collection will be wider as these students will have different experiences with different lecturers.

3.5.2 The Interview Sample

Doody et al. (2013) stated that an interview is a method of collecting data in which quantitative or qualitative questions can be asked. Interviews are most frequently used as a form of collecting qualitative research data.

There will be a total of 20 individual semi-structured interviews conducted which will involve10 students and 10 lecturers. Corbetta (2003) stated that in a semi-structured interview, it involves the use of predetermined questions and the researcher is free to seek clarification. The interview can be flexible, with open-ended questions and the chance to explore issues that arise spontaneously. The sample provided the potential for the participants to present a range of experiences as lecturers and students of the school because of the opportunistic nature of their selection for invitation. The interview comprised of lecturers who have had experiences with giving feedback to students after an assessment. These lecturers will be able to provide in-depth information to the planning, issues, methods and impact of giving feedback to the students. This interview also comprised of students who have had experiences in receiving feedback after a performance-assessment.

3.6 Ethics Clearance

Ethics clearance was also submitted to the Institute of Technical Education (ITE) where clearance was requested to conduct the survey, focus groups and interviews. It is noted that all times, there will be no identification of lecturers and students. All participants will remain anonymous.

Several considerations that requires specific clearance from the institute includes;

- The online survey that requires 100 lecturers to respond pertaining their knowledge and experience in giving feedback to the students after an assessment.
- The online survey that requires 100 students to respond pertaining to their experience of receiving feedback from their lecturers.
- The conduct of focus groups for 30 lecturers and 30 students to elicit in-depth information following the survey.
- The conduct of individual semi-structured interviews for 10 lecturers and 10 students to collect qualitative data which will be further analysed

3.7 Data Analysis

3.7.1 Introduction

Data analysis is a process of transforming data with goal of supporting decision making. Levine (2006) stated that data analysis is a body of methods that help to describe facts, detect patterns, develop explanations and test hypotheses. Data analysis involves transforming data into informed knowledge through statistics, transcriptions and interpretation.

Chenail (2012) stated that qualitative data analysis is a matter of managing analytical processes to transform data into information; information into knowledge and knowledge into wisdom.

3.7.2 Survey Data

The data from the survey were compiled together, transcribed and coded to produce common information and themes. The results were presented as statistical data for each question posed to the participants (lecturers and students). The results were also analysed to provide common links between the responses and the research question.

The responses of the survey will also be used as guiding questions for the participants of the focus groups and interviews. The researcher will seek to elicit in-depth responses from the focus group and the interviews.

3.7.3 Focus Group Data

In each focus group, the participants will be coded as T1, T2, T3, T4 and T5 for the lecturers group and the students will be coded as S1, S2, S3, S4 and S5. Each session will be a number starting from 1. Therefore responses presented by teacher T2 in session 3 will be coded as “T2G3” and student S4 in session 2 will be coded as “S4G2”. No teacher or student will be identified in this focus group.

The conversations will be transcribed and coded. Themes will be presented and data will be analysed to identify the co-relation between the data provided and the research question at hand.

3.7.4 Interview Data

The individual interviews will also be recorded and transcribed. As was with how the focus group participants were identified, each participant in the selective interview will be given a code to maintain anonymity. Lecturers would be coded as Teacher Interview 1 “Ti1” and so on, while students will be coded as Student Interview 1 “Si1” respectively.

The collective data from the interviews will be coded and common themes will be formed to provide data for presentation.

3.7.5 Documentation and Report

The quantitative and qualitative data were collected, sequentially organised and reported according to their relevance to the research questions. The results of the analysis were reported and presented in the later chapters.

The research framework in this chapter outlines the research paradigm, method and data collection method used to conduct this research. The sequential mixed-methodology was used to conduct this research with the three data collection instruments; survey, focus group and interviews in place to elicit the data required for this research. The samples involved in this research; lecturers and students were best considered as they would be able to provide rich data for the researcher to investigate the phenomenon. The design, development and analysis of the data collected are discussed in the following chapters.

CHAPTER FOUR
RESULTS

The previous chapters have examined the literature, the methodology and the design and development of the data collection instruments used in this research to address the stated Research Questions in Chapter 1. This chapter provides a presentation of the results from the online survey, focus group data and individual interviews that was collected using the instruments as detailed in Chapter 3.

4.2 Presentation of the results

Phase 1: Online Survey

Section	Data Collection	Question Type	Number of questions	Breakdown
Knowledge about the goals of Performance-Based Assessment (PBA).	Online Survey	Likert scale	10 questions	Lecturers [n=34] Students [n=145]
Use of Performance-Based Assessment (PBA)	Online Survey	Likert scale	17 questions	Lecturers [n=34] Students [n=145]
Goals of Assessment Feedback	Online Survey	Likert scale	11 questions	Lecturers [n=34] Students [n=145]
Use of Assessment Feedback.	Online Survey	Likert scale	13 questions	Lecturers [n=34]

				Students [n=145]

Phase 2: Focus Groups

Focus	Data collection	Question Type	Breakdown
Use, conduct, frequency and issues of PBA	Focus group	Face to face oral discussion	6 groups of 5 lecturers [n=30] 6 groups of 5 students [n=30]
Use, impact, frequency and issues of feedback	Focus group	Face to face oral discussion	6 groups of 5 lecturers [n=30] 6 groups of 5 students [n=30]

Phase 3: Individual Interviews

Focus	Data Collection	Question Types	Breakdown
Why do you think ITE used PBA?	Individual interview	Face to face oral interview	10 lecturers [n=10]
What is so good about PBA?	Individual interview	Face to face oral interview	10 lecturers [n=10]
What is PBA supposed to achieve?	Individual interview	Face to face oral interview	10 lecturers [n=10]
Who is PBA intended for?	Individual interview	Face to face oral interview	10 lecturers [n=10]
Do you think we are implementing and using PBA	Individual interview	Face to face oral interview	10 lecturers [n=10]

properly? Why do you think so?			

4.3 Results and Data Analysis

Phase 1: Online Survey

***	Lecturers	Students
Strongly Agree / Agree	97%	92%
Strongly Disagree / Disagree	3%	3%
Unsure	0%	5%

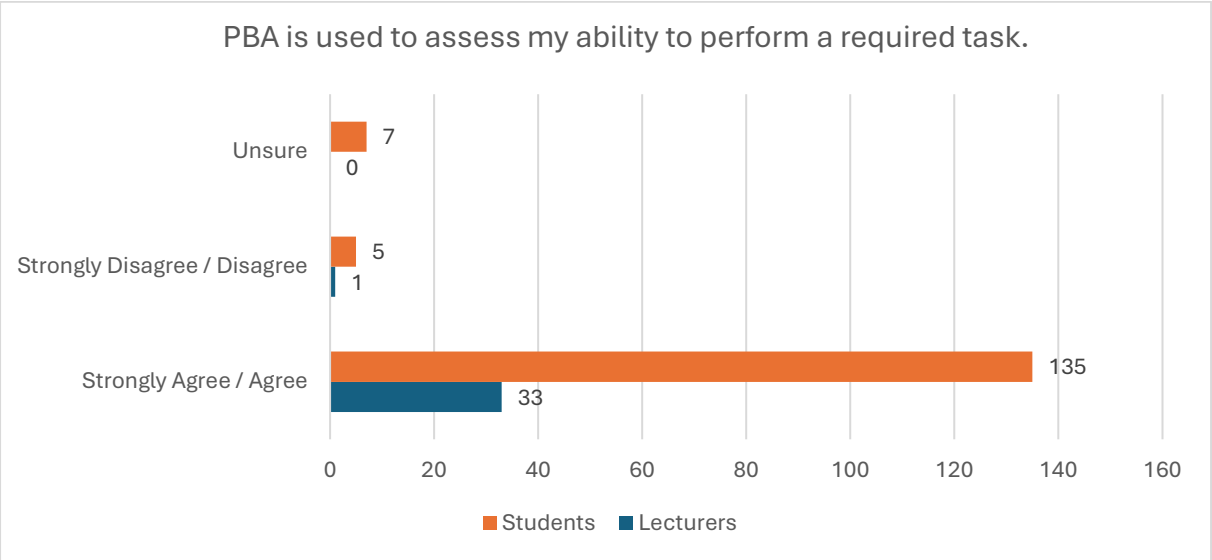

Table 1: Figure 1

With reference to Table 1 above, 97% (33) lecturers agreed to the statement that PBA is used in vocational institute to assess the student's technical competencies. This is quite identical to the student's response where 92% (135) agreed to the same statement. The correlation between them is 1 and this confirmed that most of the respondents agree to the statement above. This response indicated that most respondents knew that PBA is used in this context to assess the ability to perform a required task.

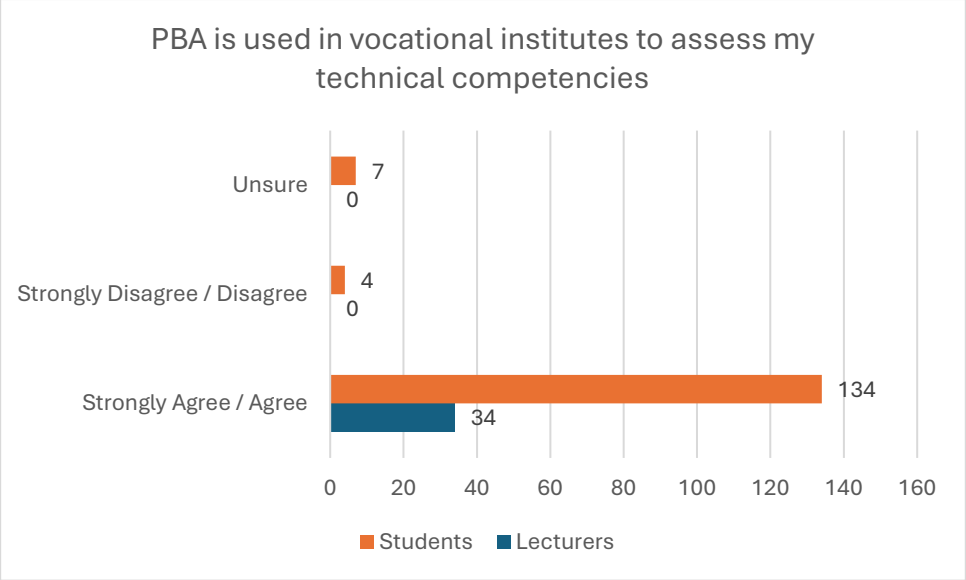

Table 2: Figure 2

With reference to Table 2 above, 100% (34) lecturers agreed to the statement that the main focus of PBA is to assess the student's technical competencies to carry out a task. This is quite close where 90% (134) of students agreed to the statement. There is also a strong correlation between the response from the lecturers and the students.

Differences

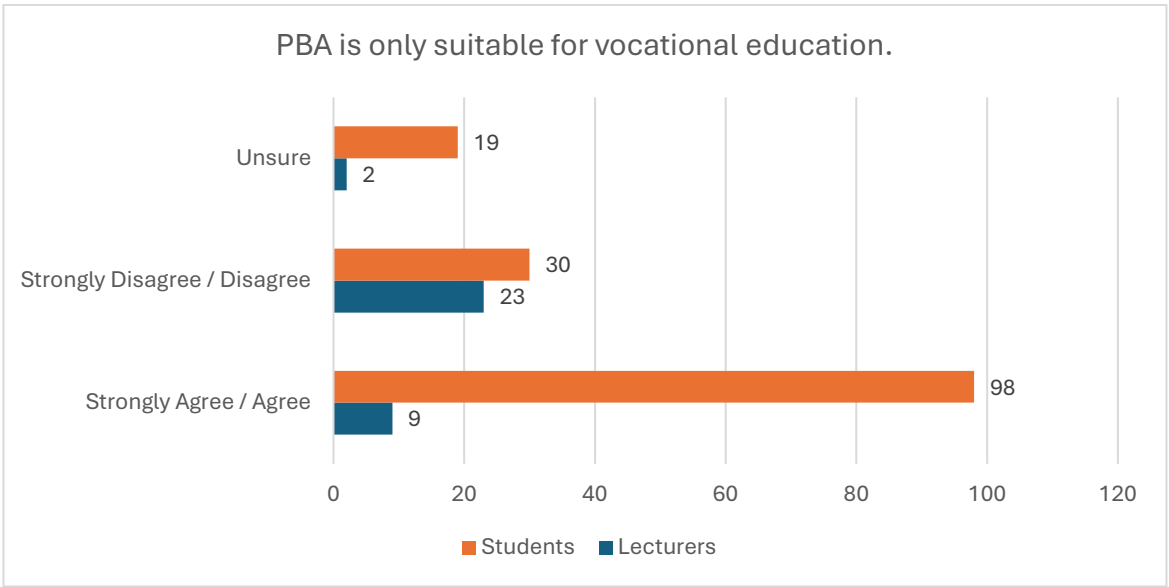

Table 3: Figure 3

With reference to Table 3 above, 26% (9) of the lecturers agreed to the statement that PBA is only suitable for vocational education. This is quite a contrast to 73% (98) students who agreed to the same statement. A significant 67% (23) lecturers disagreed to PBA is only suitable for vocational education. The correlation result showed a -1, which showed a complete difference in the opinions between the two groups of respondents.

Question 2: The Use of Performance-Based Assessment (PBA).

Similarities

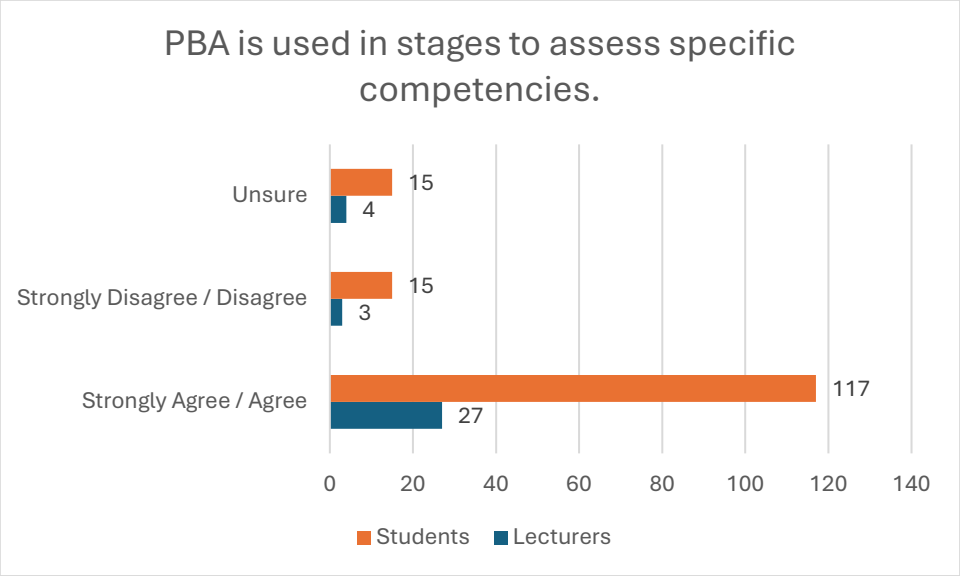

Table 4: Figure 4

With reference to Table 4 above, 79% (27) of the lecturers agreed to the statement that PBA is used at the formative stages to assess specific competencies. This is also identical to 79% (117) students who agreed to the statement above.

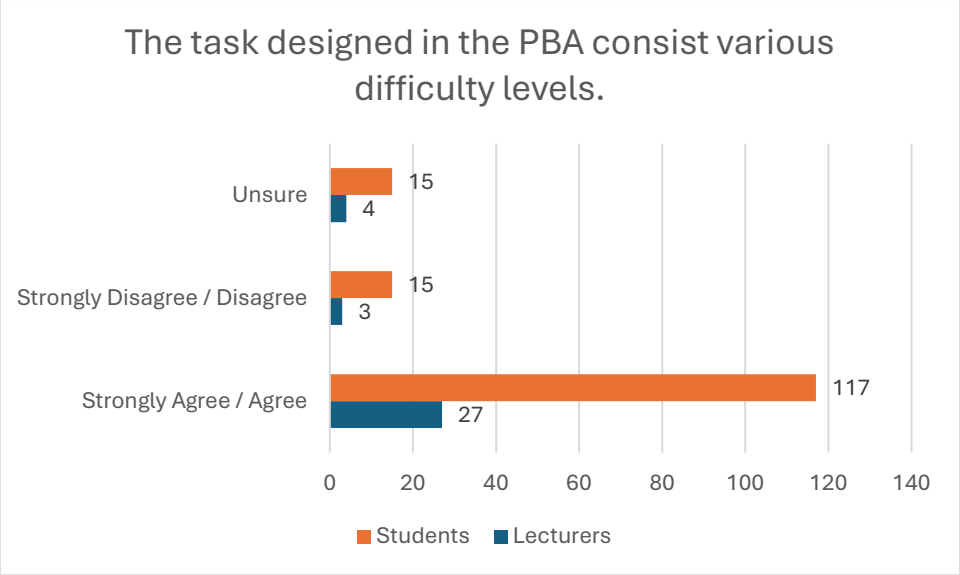

Table 5: Figure 5

With reference to Table 5 above, 79% (27) of the lecturers agreed to the statement that the task designed in PBA consist of various difficulty levels. This is also identical to 79% (117) students who agreed to the statement above.

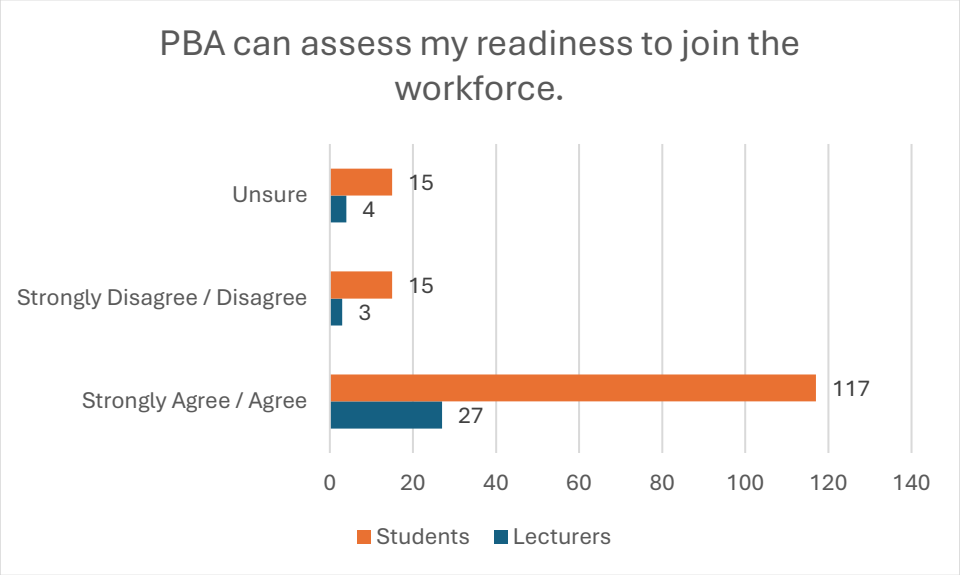

Table 6: Figure 6

With reference to Table 6 above, 79% (27) of the lecturers agreed to the statement that the PBA could assess the student's readiness to join the workforce. This is also identical to 79% (117) students who agreed to the statement above.

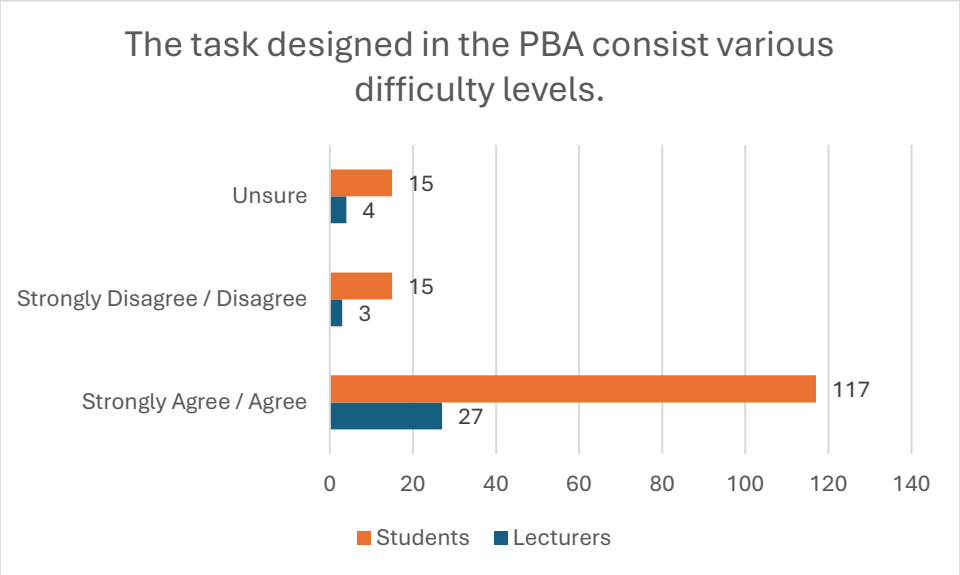

Table 7: Figure 7

With reference to Table 7 above, 79% (27) of the lecturers agreed to the statement that the task designed in PBA consist of various difficulty levels. This is also identical to 79% (117) students who agreed to the statement above.

Question 3: Knowledge about Assessment Feedback.

Differences

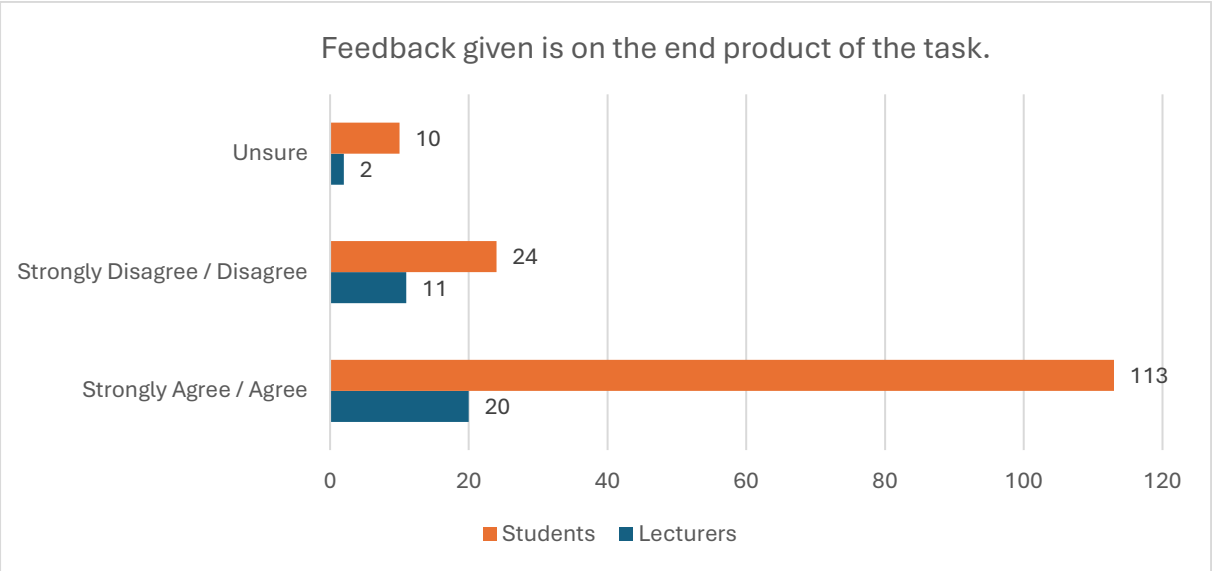

Table 8: Figure 8

With reference to Table 8 above, 58% (20) of the lecturers agreed to the statement that the focus of feedback is on the end product. This is different when a more significant 76% (113) students who agreed to the statement above.

Similarities

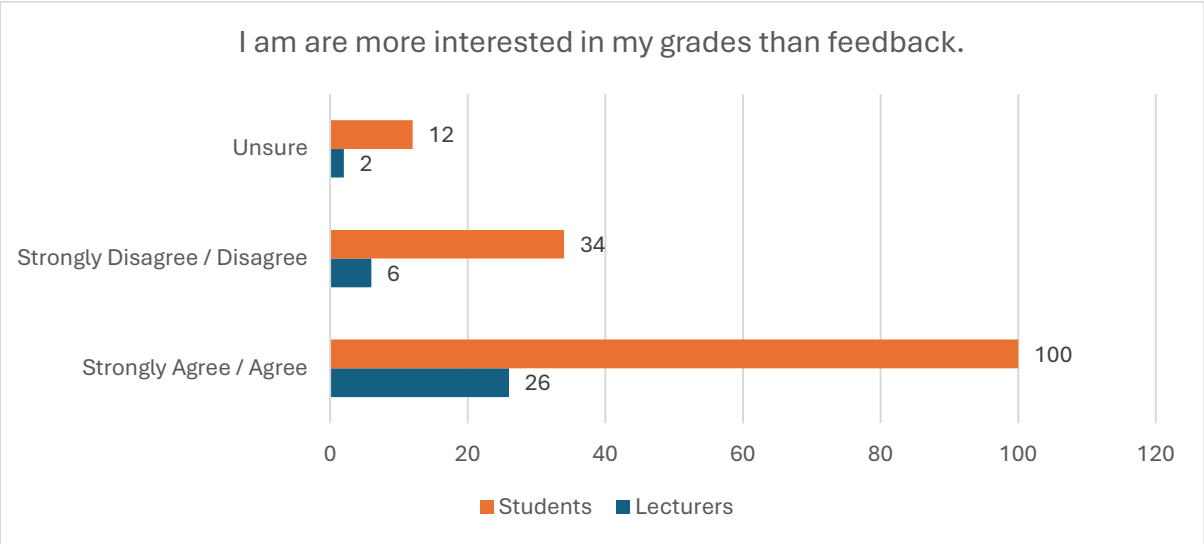

Table 9: Figure 9

With reference to Table 9 above, 76% (26) of the lecturers agreed to the statement that the students are more interested in their grades rather than feedback. This is quite similar when 68% (100) students who agreed to the statement said they are more interested in their grades rather than the feedback.

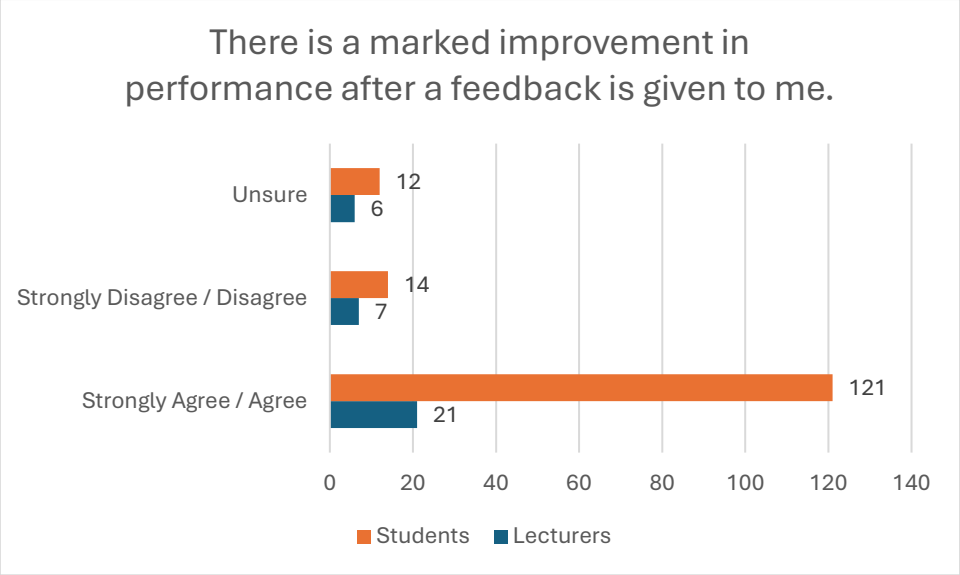

Table 10: Figure 10

With reference to Table 10 above, 61% (21) of the lecturers agreed to the statement that there is a marked improvement in the student's grades after feedback is given. This is more significant when 82% (121) students who agreed to the statement that they see a significant improvement in their performance after they receive feedback from the lecturers.

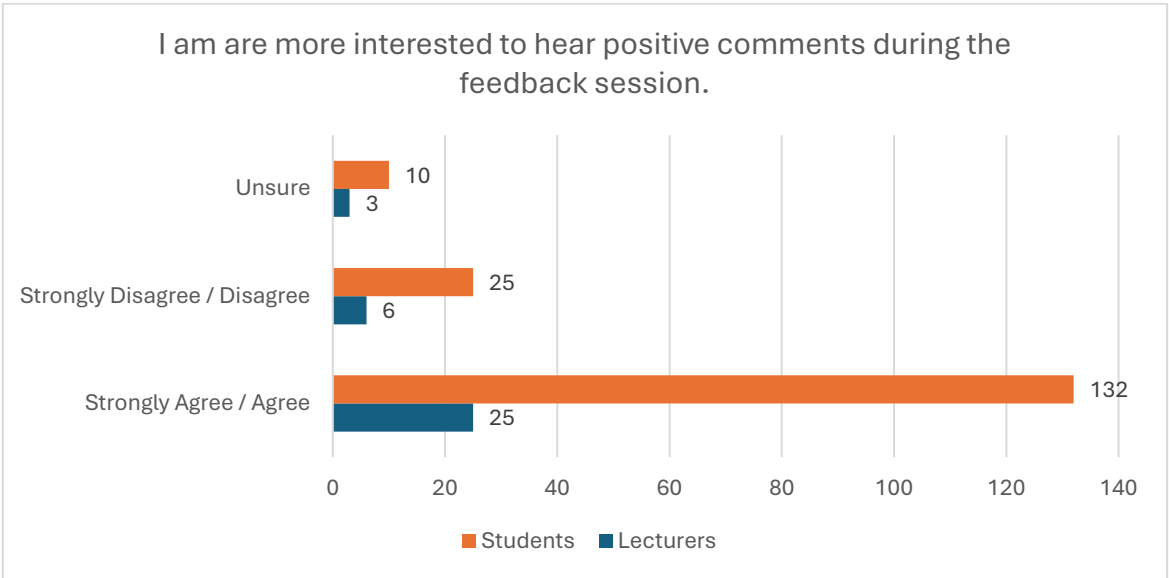

Table 11: Figure 11

With reference to Table 10 above, 73% (25) of the lecturers agreed with the statement that the students are only interested in receiving positive feedback from the lecturers. This is more significant when 89% (132) students agreed to the statement that they

are more interested in receiving positive feedback from the lecturers. This shows a high parallel correlation between the two groups.

Differences

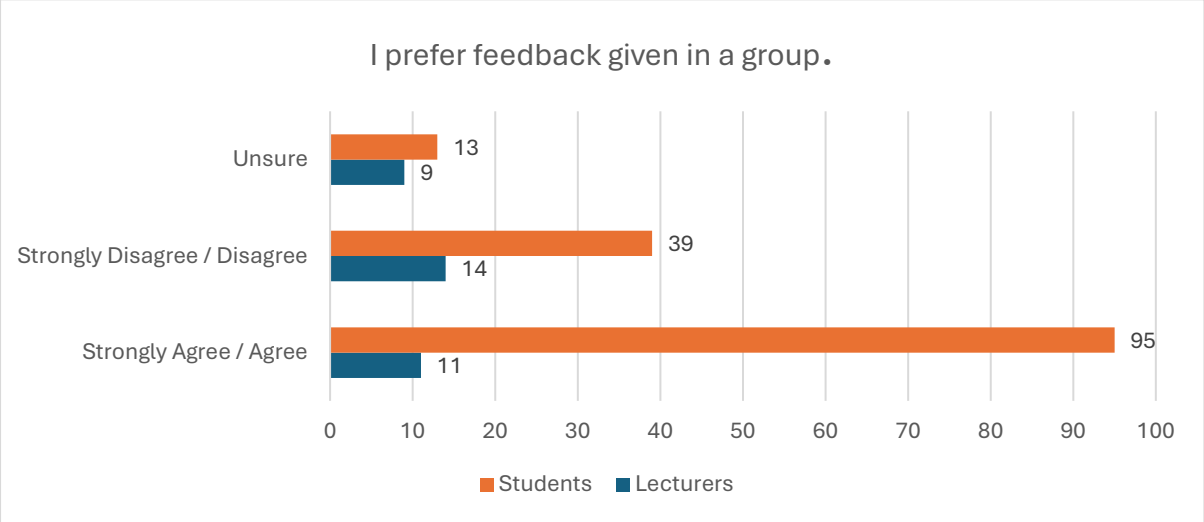

Table 12: Figure 12

With reference to Table 12 above, 32% (11) of the lecturers agreed to the statement that the students preferred to receive feedback in a group. This response is in contrast when 64% (95) students who agreed to the statement that they preferred to receive feedback in a group.

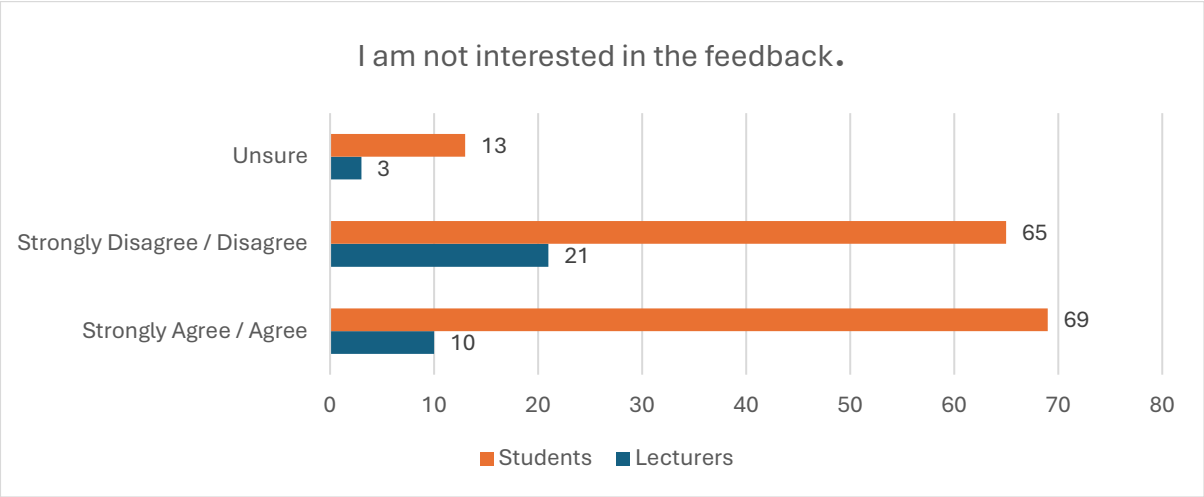

Table 13: Figure 13

With reference to Table 13 above, 29% (10) of the lecturers agreed to the statement that the students are generally not interested in feedback. This response is in contrast when 46% (69) students who agreed to the statement that they are not interested in the feedback given.

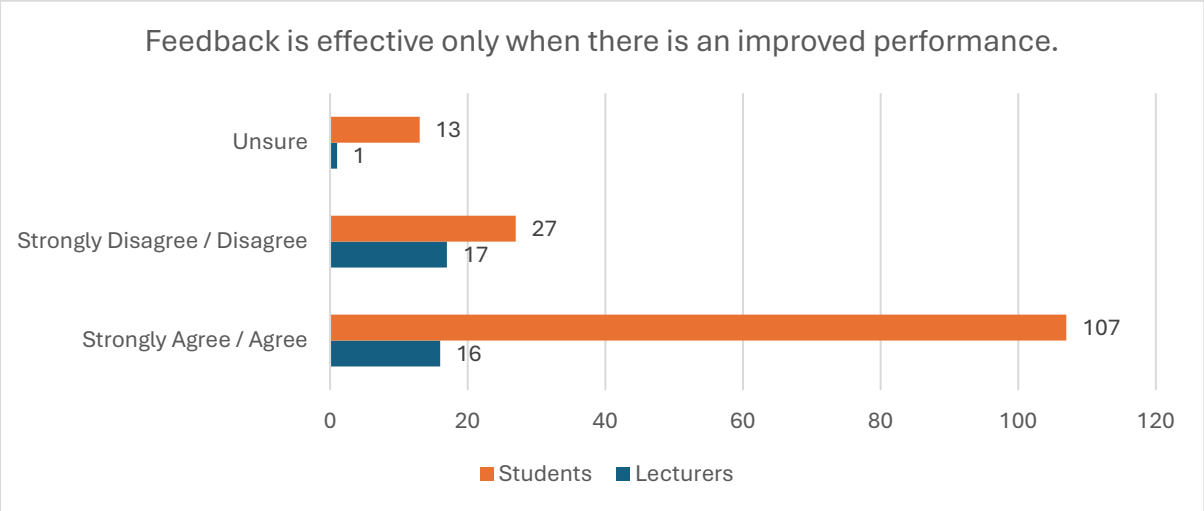

Table 14: Figure 14

With reference to Table 14 above, 47% (16) of the lecturers agreed to the statement that feedback is deemed effective only if there is an improvement in their performance. This response is in contrast when 72% (107) students who agreed to the same statement.

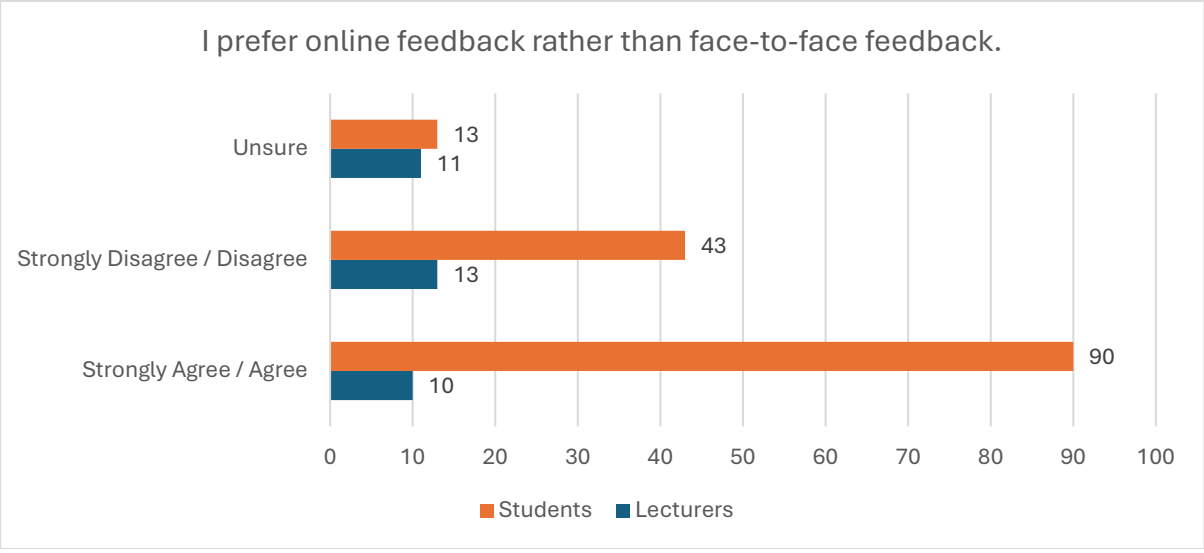

Table 15: Figure 15

With reference to Table 15 above, 29% (10) of the lecturers agreed to the statement that the students preferred online feedback rather than face-to-face feedback. This response is in contrast when 61% (90) students who agreed that they preferred online feedback instead of face-to-face feedback.

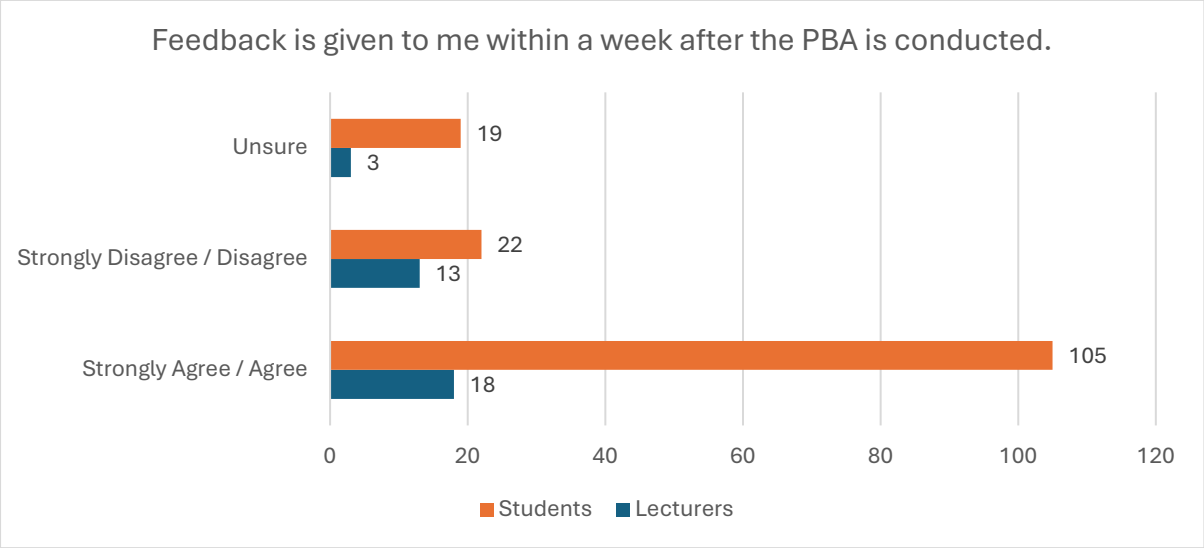

Table 16: Figure 16

With reference to Table 16 above, 52% (18) of the lecturers agreed to the statement that they give feedback within a week after the PBA is conducted. This response is in contrast when 71% (105) students who agreed that they receive feedback within a week the PBA is conducted.

Phase 2: Focus Group Interview

Use of PBA (RQ1, RQ2)

The lecturers mentioned that the PBA is used to assess the competencies acquired by the students. This method of assessment will allow the institution to assess the workplace competencies to perform a task so that they students will be ready to join the workforce. This aligned to the response from the online survey, Table 1 above where 97% of the lecturers agreed that PBA is used to assess the ability to perform a required task. It also aligned to Table 2 above where 100% of the lecturers surveyed agreed that PBA is used to assess task competencies.

This is identical to Fastre et al. (2009) who stated that the focus of performance-based assessment is the competences underlying the performance.

The students mentioned that they knew why the institute used performance-based assessment to assess their readiness to join the workforce. This aligned to Table 6 above where 79% of the lecturers surveyed agreed to the use of PBA to assess readiness to join the workforce. They mentioned that even though they have not been briefed or told about the method of assessment, it is the by the nature of the existence of the institute that they were able to appreciate the assessment methods. There were also students who mentioned that they were not informed about the methods of assessment. However, they do not question on the methods of assessment used in the institute.

Conduct of PBA (RQ1, RQ2)

The lecturers mentioned that there is no proper structure or framework or guidelines on how PBA should be conducted. All of them were modelled after senior lecturers. The way the PBA was conducted was learnt by modelling and replicating how the senior lecturers have done it. Hence, they assumed that it was the 'best practice' of conducting PBA. During the focus group interviews, they discover several differences in the conduct of the PBA. In each PBA, there are usually 2 assessors. They do not have the practice of both assessor discussing the task and rubrics prior to the assessment itself. This will give rise to issues of standardization in marking if there is an absence of inter-rater reliability. The assessor would observe how the students carry out the specified task and award marks according to level of completion of the task.

The equipment that they used is real industry-based equipment that are authentic to the industry. However, the lecturers had concerned about the validity of such equipment by the time the students completed the course. The technological changes happen very fast that the equipment that they used today may be obsolete by the time the complete the course. The lecturers also had concerns with being vendor specific. They were concerned that the students were not adaptable (cognitive agility) enough adjust themselves to using a different brand of equipment when they graduate.

The students mentioned that due to the lack of industrial equipment, the students were grouped according to batches to attempt the assessment. The assessor would observe how they would carry out the task mentioned in the test paper and would mark on the papers immediately for every task completed successfully or otherwise

This is identical to Palm (2008) who reported that PBA is an observed performance, which can be authentic in nature where the conditions emulate the conditions of the real workplace. In addition, Ronis (2006) stated that the emphasis is on the industry standards that vocational schools have set for the students.

Frequency of PBA (RQ2)

The lecturers mentioned that there are an average of four PBA's conducted per module. These PBA are a formative assessments (called Practical Assessments – PA) evenly spread out over four months. That would mean that on an average, there is one PBA in each month. This response aligned to Table 4 above, where 79% of lecturers agreed that PBA is conducted at formative levels to assess specific competencies. The students are usually notified about 1 or 2 weeks before the PBA so that they have ample time to prepare and practice for the PBA. A performance-based assessment is also conducted at the end of the module, called Phase Test (PT) in the context of the vocational institution. Hence, there would be a total of three PA's and one PT per module. The tasks involved in the Phase Test are usually a myriad of task that they have acquired in the Practical Assessments.

This is align to Halloran (2006) who stated that task-based learning includes learning about the task and capability to do the task.

In between the PA's, the students would be having practical lessons that would scaffold their competencies before the next formative assessment is carried out.

In addition to what the lecturers have mentioned, the students also mentioned that the difficulty level of task increased at every PA. They are usually concerned if they can complete all the tasks in the given time constraint of the assessment.

This 'duration' constraint is also mentioned by Wiggins & McTighe (2005) who stated that one of the criteria in conducting performance-based assessment is that the "task must have constraints".

Issues of PBA (RQ2) and Task Design of PBA (RQ2)

Lecturers mentioned that the issues they faced in conducting PBA are availability of equipment, types of task designed, validity of task designed and reliance on a specific equipment brand. This response supported the online survey results in Table 5 above, where 79% of lecturers responded that the task designed in the PBA consist of various difficulty levels.

The lack of the number of equipment available for testing makes the assessment process too lengthy and tedious. In a normal cohort of 3 classes with a total 120 students, the number of equipment are not adequate such that the students have to be divided in batches. These assessments could easily take 3 days to complete.

The difficulty of task designed in the PBA is also an issue that the lecturers' encounter. In many instances, the task difficulty level is too low such that it becomes difficult to really differentiate between the competent and the non-competent students. In many other instances, the task has no correlation to each other and that makes performing the task seemed meaningless.

The lecturers also mentioned that because of the intensity of the assessment, each batch is assessed by two staff and there will be difference in standards should both assessor did not standardized the expectations before the assessment. There are many cases where the same module is undertaken by students from 5 different class, giving a total of 200 students. The assessors in each class have different expectations during the assessment and this will again lead to the different standards in performance and marking. This extends from the online survey response in Table 7 above, where 79% of the lecturers responded that the students are given scores based on the difficulty of the task.

In the design of task to be assessed during the PBA, many lecturers raised the issue of validity of the task. The task that has been designed during the assessment may not be a valid or critical task anymore by the time the student graduates from the course. In this context, information technology changes very rapidly and the competencies that we acquire today may not be valid tomorrow.

Lecturers mentioned that in many PBA, the task designed in the assessment is skewed and relied too much on a particular brand of equipment which is used during the assessment.

The students mentioned that they were concerned with the validity of competence that they acquired by the time they complete the course. They were concerned if the task or procedures that they learnt & assessed will still be valid upon course completion.

Use of Feedback (RQ3)

Lecturers mentioned that they knew very well that feedback is used to inform students on how they have performed during the PBA. The use of feedback will encourage them to improve and reflect on their performance during the assessment.

Feedback also served to motivate so that the students can improve their performance in the next assessment.

This knowledge is identical to Miller (2011) who stated that feedback is conventionally understood as a mechanism for helping students see and then close a performance gap. This is also identical to William (2011) who described that feedback as an important component in assessment for learning.

The lecturers also mentioned that feedback is given based on the nature of the feedback. The mentioned that feedback on low-level task are usually given in a group while feedback on high-level task are usually given individually.

The response from the students aligned to those from the lecturers who mentioned that they knew what the use of feedback is after an assessment. This supports the response from the online survey in Table 8 above, where 58% of the lecturers responded that the focus of their feedback is on the end-product. The students also added that feedback is important for them to be able to reflect where they have gone wrong and how should they move on to improve on the weaker areas.

Impact of Feedback (RQ3)

The lecturers mentioned students who are academically inclined are the ones who are more concerned with their performance. They consistently seek feedback and raised questions. These are the students who are eager to learn from mistakes and improve

on their performance during the next assessment. The lecturers felt that there were many students who were naturally concerned with the performance during the assessment that they seek feedback even before the lecturers have finished grading the assessments. They also mentioned that they were a percentage of students who are not concerned on making the grades but instead were just concerned that they do not fail in the assessment.

The lecturers also mentioned that generally they see a pattern of improvement from the students after feedback is given to them.

The students mentioned that most of them were very interested in the feedback as they would like to know the mistakes they have made and how to avoid such mistakes in future.

This is also stated by Hattie & Timperley (2005) that one of the aims of providing feedback is for students to reflect from the mistakes and improve on their next performance.

Frequency of Feedback (RQ3)

The lecturers mentioned that feedback is provided on a regular basis, not just for feedback after a performance assessment. The students were given feedback regularly after their daily practical lessons. This daily feedback gives students the information they needed to correct and improve on the practical skills in preparation for their performance assessment.

Feedback for performance assessment were given usually within a week after the assessment is conducted.

The student's response aligned with the lecturers where they mentioned that the feedback were usually given within a week after the assessment is conducted.

Experience in giving/ receiving Feedback (RQ3)

The lecturers mentioned that generally they have no problems in giving feedback. They were able to provide feedback based on the criticality and the nature of the task. In most cases, they were able to switch between process-oriented or product-oriented

feedback depending on the task and the outcome of the performance assessment. The lecturers also mentioned that there were times where an urgency to give feedback is required. This happens when most of the students could not perform a task which is deemed critical in order to be competent.

They were also able to identify the need for individual or group feedback, depending on the objective of the task and objectives of the feedback. The lecturers also stated that in general, the students were receptive to the feedback and an improvement in performance were noticed amongst the students after succinct feedback was provided.

The lecturers also mentioned that they preferred to give a face-to-face feedback as they will be able to respond to questions immediately and they would be able to judge the response from the students. They mentioned that giving feedback online or using social media does not give them the assurance that the students read and understand the feedback correctly. There were also many times that feedback session must be explained with the aid of the equipment for demonstration. This could not be possible if feedback is done online.

The students mentioned that there were times when they need individual feedback time with the lecturer when they realised that they have made excessive mistakes during the assessment. In usual cases, group feedback of three to four seemed acceptable with the students. The students also mentioned that feedback using online or social media is possible depending on the criticality and the nature of the feedback.

Phase 3: Individual Interviews

Individual interviews were conducted with 5 lecturers to infer greater insights from the online survey and the focus group discussions. The focus during the individual interviews was to find out the knowledge of the lecturers pertaining to the objectives and implementation of PBA in the institute.

There were mixed responses from the lecturers.

66% lecturers responded that the reason as to why the institute uses performance-based assessment is to measure how well students can apply the acquired knowledge into real-world situations and to measure the employability of the students. 18% responded that PBA was used by the institute to replicate authentic task and work environments. 16% provided a more generic answer that PBA was used by the institute to assess what the students have learnt in the classroom.

Why do you think ITE used PBA?

The respondents stated that PBA is used mainly as a common gauge to determine the technical competency of the student who can qualify to the next level of their higher pursue in their education. They also mentioned that PBA is also used to measure how well the students can apply what they know in real-world situations. Generally PBA is tied to their knowledge or skills develop during their classroom training and is always proven to work well in a typical vocational institute widely practice even in developed country like Japan.

The students are required to perform tasks for practical sessions and the ability to perform these tasks assessed during practical assessments. They also mentioned that these tasks are authentic in nature to replicate real work situations and challenges.

What is so good about PBA?

The respondents mentioned that PBA requires students to apply the competencies from the "disciplines" which include the technical, methodological, social and personal skills. It helps lecturers support students in developing a deeper understanding of content, where they apply concepts into real-situations. They also added that the students get to do hands-on practices, which will be relevant to the real work.

The respondents also mentioned that PBA allows the lecturers to identify the areas, which the students can improve, based on task-performance.

What is PBA supposed to achieve?

The respondents mentioned that PBA is supposed to achieve skills competency, where they are required to demonstrate and perform the mastery of skills. They also mentioned that PBA is supposed to benchmark the standards required by the industrial workplace so that the students will level up their competencies before joining the workforce.

The respondents also mentioned that PBA is supposed to give the students the authentic experience, of being in the work environment and performing task, which are identical to those at the workplace

Who is PBA intended for?

The respondents mentioned that PBA is applicable to various types of learners, irrespective of their learning styles, provided they are familiar with the performance of tasks, framework of assessment lists and are supported in a culture of creativity and risk taking. This assessment is highly suitable for students who are preparing to join the workforce.

Do you think we are implementing and using PBA properly? Why do you think so?

The respondents mentioned that they were not sure if the institute is implementing the PBA correctly in the classrooms. The respondents further explained that there are students who were able to complete the task without much giving much thought into the task itself. They also mentioned that PBA is not a complete assessment for the students, as it does not assess other work skills like creativity and communication skills. However, it helps lecturers to support students in developing a deeper understanding of content.

This chapter has presented the results obtained through the data collection from the online survey, focus groups and individual interviews.

Use of PBA

Generally, the lecturers and students agreed that the institute uses PBA to assess the technical competencies of its students. This is done formatively such that the students acquire the competencies in stages. These competencies will equipped the students to join the workplace upon graduation.

While the students felt that PBA is suitable only for vocational education, the lecturers responded that PBA is also applicable in any assessment that involve practical task and requires an observable performance.

The respondents mentioned that PBA is supposed to achieve skills competency, where they are required to demonstrate and perform the mastery of skills. They also mentioned that PBA is supposed to benchmark the standards required by the industrial workplace so that the students will level up their competencies before joining the workforce.

Issues of PBA

The issues with PBA from the focus groups and interviews focused in to a few areas.

The respondents highlighted the concern with the task difficulty that the task designed is to low level such that all the students were able to achieve high scores. This made is become difficult to really differentiate between the competent and the non-competent students. In many other instances, the task has no correlation to each other and that makes performing the task seemed meaningless.

The respondents also highlighted the issue of differences in expectations and standards in marking. The assessors in each class have different expectations during the assessment and this will again lead to the different standards in performance and marking.

The task that has been designed during the assessment may not be a valid or critical task anymore by the time the student graduates from the course. This becomes a

concern as information technology changes very rapidly and the competencies that we acquire today may not be valid tomorrow.

They also mentioned that PBA is not a complete assessment for the students, as it does not assess other work skills like creativity and communication skills. However, it helps lecturers to support students in developing a deeper understanding of content.

Use of feedback

The respondents mentioned that they knew well that feedback is used to inform students on how they have performed during the PBA. The use of feedback will encourage them to improve and reflect on their performance during the assessment. They also noted that the feedback is also used to motivate the students to enhance their performance during the assessment.

Experiences with feedback

The lecturers also mentioned that they preferred to give a face-to-face feedback as they will be able to respond to questions immediately and they would be able to judge the response from the students. They mentioned that giving feedback online or using social media does not give them the assurance that the students read and understand the feedback correctly. There were also many times that feedback session must be explained with the aid of the equipment for demonstration. This could not be possible if feedback is done online.

The students mentioned that there were times when they need individual feedback time with the lecturer when they realised that they have made excessive mistakes during the assessment. In usual cases, group feedback of three to four seemed acceptable with the students. The students also mentioned that feedback using online or social media is possible depending on the criticality and the nature of the feedback.

SUMMARY

This chapter discussed the results of the data collected from the lecturers and students pertaining to the use of performance-based assessment and the use of feedback. The

next chapter discusses the findings and analysis of the data collected in a deeper approach.

CHAPTER FIVE
FINDINGS AND DATA ANALYSIS

The online survey was completed by 34 lecturers. The results from the frequency tables showed that these lecturers has a minimum of 1yr teaching experience in the institute and had undergone some pedagogical training prior to conducting lessons in the institute. The lecturers also had experience in conducting a PBA and in giving feedback to the students.

The online survey was conducted to collect baseline data for the research questions specified in Chapter 1.

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

Data from the online survey was obtained from 34 lecturers, which consisted of 53 statements pertaining to the goals of PBA (10 statements), use of PBA (17 statements), goals of feedback (13 statements) and use of feedback (13 statements).

5.2.2 Goals of PBA

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

This section presents the results from the 34 lecturers for each of the 10 statements about the goals of the PBA. The lecturers were required to respond from series of statements using a Likert scale of 0 (Unsure), 1 (Strongly Disagree), 2 (Disagree), 3(Agree) and 4(Strongly Agree).

Table 7.2 below presents the results of the mean and the standard deviation for each of the 10 statements which were analyzed from the frequency tables attached in the Appendix.

It can be seen that in general, most of the respondents selected ‘Agree’ to ‘Strongly Agree’ to most of the questions in the section, as shown below.

Furthermore, the table shows that the question item 1 “*PBA is used in vocational institutes to assess the student’s technical competencies*” has the highest mean score of 3.41 and item 4 “*PBA is used to assess the student’s ability to perform a required task*” has a mean score of 3.41 also as the highest mean score.

The statement item 9 “*PBA is only suitable for vocational education”* has the lowest mean score of 1.97. It can be seen that most of the lecturers do not agree to this statement. It is also noted that this statement does not refer to the goals of the PBA but instead seek an opinion from the respondent on the use of PBA.

The standard deviation scores showed the distribution of responses closest the mean score. In Table 7.2 below, item 1 “*PBA is used in vocational institutes to assess the student’s technical competencies*” has the lowest standard deviation score of 0.48, which shows that most of the respondents have selected ‘Strongly Agree” or “Agree” in their response to this statement. The statement item 6 ‘*PBA tasks are designed with reference to Blooms’ taxonomy levels*’ has the highest standard deviation score of 1.13, which shows the responses from the respondent are widely spread out across all the options from “*Unsure*” to “*Strongly Agree*”. It was also observed that both item 1 and item 6 are different in their objectives, as item 1 seeks the respondent’s knowledge on the goals of PBA and item 6 seeks the respondents knowledge on the design and development of task for the PBA.

It can be seen from the table below that group 1[item 1, 2, 4, 5 & 10] statements focused on the goals and use of the PBA. Group 2[item 3, 6, 7 & 8] statements focused on the design of PBA while group 3[item 9] statement focused on the respondent’s opinion about the use of PBA. In the table below, item 1, 2, 4, 5 & 10 has a mean score of more than 3.00, item 3, 6, 7 & 8 has a mean score of below 3.00 and item 9 has a

mean score of below 2.00. These differences showed the different pattern of questions in the survey and the mean scores swing according to the focus of the statements.

The items in group 1 that suggested the goal of PBA has a mean score of more than 3.00 This means that most of the respondents has selected "*Agree*" and "*Strongly Agree*" in their responses to the statements.

The results below showed there that there are different response patterns for the different groups of statements presented to the respondents. The group of statements that centers on the goal of PBA has an overall higher mean response scores as compared to the other types of statements within the same pool of statements.

The results for the item statements fall into 3 groupings of results. Item 2,4,5 & 10 concern themselves with goals and use of PBA and have a mean score of above 3.00. That is the respondents have selected "strongly agree" and "agree" for all the items.

Lecturer knowledge about the goals of Performance -Based Assessment (PBA).		
Answer Options	**Mean**	**SD**
1. PBA is used in vocational institutes to assess the student's technical competencies.	± 3.41	± 0.48
2. PBA is used in vocational institute to ensure that the students are ready to join the workforce.	± 3.35	± 0.57
3. PBA is conducted only at the end of the term.	± 2.06	± 0.92
4. PBA is used to assess the student's ability to perform a required task.	± 3.41	± 0.63
5. PBA is used to assess the student's technical skills.	± 3.24	± 0.79
6. PBA tasks are designed with reference to Blooms' taxonomy levels.	± 2.79	± 1.13

7. The task in the PBA adhered to the authentic task that is carried out at the workplace.	± 2.85	± 0.99
8. PBA tasks are designed according skills standards specified by the panels from the workforce.	± 2.76	± 1.12
9. PBA is only suitable for vocational education.	± 1.97	± 0.87
10. PBA is used to assess the student's competencies to perform workplace tasks.	± 3.09	± 0.64

Table 7.2 Lecturer's knowledge about the goals of PBA

5.3 Lecturer results from the Focus Groups

Lecturer's use of Performance -Based Assessment (PBA)		
Answer Options	**Mean**	**SD**
PBA is used after students acquire the 1st set of competencies	± 2.68	± 1.00
PBA is used a few times in a term.	± 3.29	± 0.61
PBA is used in stages to assess specific competencies.	± 3.32	± 0.46
The students are notified in advance prior to using a PBA.	± 3.12	± 0.74
The students have enough time to prepare and practice for the PBA.	± 3.26	± 0.46
PBA is effective for students in vocational and technical education	± 3.03	± 0.77
PBA is able to assess student's technical competencies.	± 3.12	± 0.90
PBA can assess student's readiness to join the workforce.	± 2.82	± 1.29
PBA can assess the specific skill sets that students need to develop further.	± 3.18	± 0.69

PBA is able to validate the competencies that is needed for the students to be able to perform at the workplace.	± 2.85	± 1.11
The task designed in the PBA is authentic to the task that is carried out at the workplace.	± 2.65	± 1.02
The task designed in the PBA consist various difficulty levels.	± 3.32	± 0.74
The student's competence are verified through observable performance.	± 3.12	± 0.88
The students are given scores based on the difficulty of the task.	± 3.12	± 0.91
The students are given the opportunity to attempt the task again at a reduced maximum score if they are not successful at the 1st attempt.	± 3.12	± 0.80
There are always 2 lecturers present during the Performance-Based Assessment (PBA).	± 2.76	± 1.14
The 2 lecturers deliberate on the rubrics before conducting the Performance-Based Assessment (PBA).	± 2.74	± 1.02

Table 7.3 Lecturer's use of Performance-Based Assessment

The previous chapters have examined the literature, the methodology and the design and development of the data collection instruments used in this research to address the stated Research Questions in Chapter 1. This chapter presents of the student's results from the online survey, focus group data and individual interviews that was collected using the instruments earlier. This chapter consist of three major sections:

- Student's results from the Online Survey
  This section will discuss the data obtained from the 43 statements put forward to the students concerning PBA.

- Student's results from the Focus Groups
  This section will discuss the findings obtained from the focus groups interviews following the obtained from the online survey.

- Student's results from the Face-to-face interviews
  This section will discuss findings from the focus group discussion. The interviews provide the opportunity for the students to share personal experiences and thoughts to strengthen the discussions from the focus groups.

5.4. Results from the Online Survey

Data from the online survey was obtained from 147 students, which consisted of 43 statements pertaining to the goals of PBA (7 statements), use of PBA (14 statements), goals of feedback (9 statements) and experience with feedback (13 statements).

Goals of PBA

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

This section presents the results from the 147 students of each of the 7 statements about the goals of the PBA. The students were required to respond from series of statements using a Likert scale 0 (Unsure), 1 (Strongly Disagree), 2 (Disagree), 3(Agree) and 4(Strongly Agree): Table 8.2 below presents the results of the mean and the standard deviation for each of the 7 statements concerning the goals of PBA.

It can be seen that from the table, in general, most of the respondents selected 'Agree' for most of the statements in the section, as shown below. In particular, the table shows that the statement 5 *PBA is used to assess my technical skills*
has the highest mean score of 3.13.

Statement *6 PBA is only suitable for vocational education* has the lowest mean score of 2.52, which can be interpreted that most of the students do not agree to this statement. It is also noted that this statement does not refer to the goals of the PBA but instead seek an opinion from the respondent on the use of PBA.

Table 8.2 shows that the standard deviation scores show that the distribution of response is close to the mean score. The statement 5 *PBA is used to assess my technical skills* has the lowest standard deviation score of 0.74, which shows that most of the respondents have selected Agree in their response to this statement. Statement *6 PBA is only suitable for vocational education* has the highest standard deviation score of 1.15, which shows the responses from the respondent are widely spread out

across all the options from *Unsure* to *Strongly Agree*. It was also observed that both statement 5 and statement 6 are different in their objectives, as statement 5 seeks the respondent's knowledge on the goals of PBA and statement 6 seeks the respondents' knowledge on the use of PBA.

Student's knowledge about the goals of Performance -Based Assessment (PBA).		
Statements	**Mean**	**SD**
1. PBA is used in vocational institutes to assess my technical competencies.	± 3.02	± 0.82
2. PBA is used in vocational institute to ensure that I am ready to join the workforce.	± 2.95	± 0.91
3. PBA is conducted only at the end of the term.	± 2.53	± 1.08
4. PBA is used to assess my ability to perform a required task.	± 3.04	± 0.86
5. PBA is used to assess my technical skills.	± 3.13	± 0.74
6. PBA is only suitable for vocational education.	± 2.52	± 1.15
7. PBA is used to assess my competencies to perform workplace tasks.	± 2.93	± 0.93

Table 8.2 Student's knowledge about the goals of PBA

Use of PBA

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

This section presents the results from the 147 students of each of the 14 statements about the use of the PBA. The students were required to respond from series of statements using a Likert scale 0 (Unsure), 1 (Strongly Disagree), 2 (Disagree),

3(Agree) and 4(Strongly Agree): Table 8.3 below presents the results of the mean and the standard deviation for each of the 14 statements concerning the use of PBA.

It can be seen that from the table, in general, most of the respondents selected 'Disagree' to 'Agree' for most of the statements in the section, as shown below. In particular, the table shows that the statement *6. PBA is able to assess my technical competencies* has the highest mean score of 2.99.

Statement *1 PBA is used after I acquire the 1st set of competencies* has the lowest mean score of 2.71, which can be interpreted that most of the students do not agree to this statement.

Table 8.3 shows that the standard deviation scores show that the distribution of response is close to the mean score. The statement *5 I have enough time to prepare and practice for the PBA* has the lowest standard deviation score of 0.80, which shows that most of the respondents have selected 'Disagree or Agree' in their response to this statement. Statement *14 There are always 2 lecturers present during the Performance-Based Assessment (PBA)* has the highest standard deviation score of 1.15, which shows the responses from the respondent are widely spread out across all the options from *Unsure* to *Strongly Agree*. It was also observed that the students might not be clear of the statement, as statement 14 seemed more like how PBA was carried out instead of use of a PBA.

It is observed that the mean scores and the standard deviations all the statements are very close to one another, which can be interpreted that all the students have selected 'Disagree' or 'Agree' to all the statements.

It is also observed that none of the statements has a mean score of 3.00 (Agree) as compared to the other statements in the other sections. This could be interpreted that the students were unsure or disagree to the statements.

Student's use of Performance -Based Assessment (PBA)		
Statements	**Mean**	**SD**
1. PBA is used after I acquire the 1st set of competencies	± 2.71	± 1.10
2. PBA is used a few times in a term.	± 2.77	± 1.10
3. PBA is used in stages to assess specific competencies.	± 2.89	± 0.91
4. I am notified in advance prior to a PBA.	± 2.84	± 1.01
5. I have enough time to prepare and practice for the PBA.	± 2.94	± 0.80
6. PBA is able to assess my technical competencies.	± 2.99	± 0.87
7. PBA can assess my readiness to join the workforce.	± 2.87	± 0.95
8. PBA can assess the specific skill sets that I need to develop further.	± 2.97	± 0.81
9. The task designed in the PBA is authentic to the task that is carried out at the workplace.	± 2.74	± 1.09
10. The task designed in the PBA consist various difficulty levels.	± 2.98	± 0.88
11. My competence are verified through observable performance.	± 2.92	± 0.86
12. I am given scores based on the difficulty of the task.	± 2.75	± 1.08
13. I am given the opportunity to attempt the task again at a reduced maximum score if I am not successful at the 1st attempt.	± 2.82	± 1.05
14. There are always 2 lecturers present during the Performance-Based Assessment (PBA).	± 2.80	± 1.15

Table 8.3 Student's use of Performance-Based Assessment

Goals of Feedback

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

This section presents the results from the 147 students of each of the 9 statements about the goals of feedback. The students were required to respond from series of statements using a Likert scale 0 (Unsure), 1 (Strongly Disagree), 2 (Disagree), 3(Agree) and 4(Strongly Agree): Table 8.4 below presents the results of the mean and the standard deviation for each of the 9 statements concerning the goals of feedback.

It can be seen that from the table, in general, most of the respondents selected 'Agree' to 'Strongly Agree' for most of the statements in the section, as shown below. In particular, the table shows that the statement *2 I need to know which areas do I do and not do well* has the highest mean score of 3.30. Statement *5 Feedback given is on the end product of the task* has the lowest mean score of 2.76, which can be interpreted that most of the students do not agree to this statement.

Table 8.4 shows that the standard deviation scores show that the distribution of response is close to the mean score. The statements *1 I need to know how I fare so that I can take steps to improve and statement 2 I need to know which areas do I do and not do well* has the lowest standard deviation score of 0.72, which shows that most of the respondents have selected 'Strongly Agree or Agree in their response to this statement. Statement 5 *Feedback given is on the end product of the task* has the highest standard deviation score of 1.02, which shows the responses from the respondent are widely spread out across all the options from *Unsure* to *Strongly Agree.*

Goals of Assessment Feedback.

Statements	Mean	SD
1. I need to know how I fare so that I can take steps to improve.	± 3.20	± 0.72
2. I need to know which areas do I do and not do well.	± 3.30	± 0.72

3. Feedback must be given to me as immediate as possible so that I can act upon it.	± 3.16	± 0.73
4. Feedback assists me to self-regulate my learning.	± 3.14	± 0.68
5. Feedback given is on the end product of the task.	± 2.76	± 1.02
6. Feedback given focused on the process of performing the task.	± 2.92	± 0.93
7. It is important for me to receive assessment feedback.	± 3.16	± 0.73
8. Feedback must fill in the gap between the acquired and desired competence.	± 2.99	± 0.80
9. Feedback must provide motivation for me to acquire the desired competence.	± 3.10	± 0.78

Table 8.4 Student's knowledge on the goals of assessment feedback.

Use of Feedback

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

This section presents the results from the 147 students of each of the 13 statements about the use of feedback. The students were required to respond from series of statements using a Likert scale 0 (Unsure), 1 (Strongly Disagree), 2 (Disagree), 3(Agree) and 4(Strongly Agree): Table 8.5 below presents the results of the mean and the standard deviation for each of the 13 statements concerning the use of feedback.

It can be seen that from the table, in general, most of the respondents selected 'Disagree' to 'Agree' for most of the statements in the section, as shown below. In particular, the table shows that the statement *13 Feedback is given to motivate me to acquire the desired competence* has the highest mean score of 2.94. Statement *10 I prefer online feedback rather than face-to-face feedback* has the lowest mean score of 2.45 which can be interpreted that most of the students do not agree to this statement.

Table 8.5 shows that the standard deviation scores show that the distribution of response is close to the mean score. Statement *4 I am more interested to know if I pass or fail* has the lowest standard deviation score of 0.94, which shows that most of the respondents have selected 'Disagree or Agree in their response to this statement. Statement *9 Feedback is given to me within a week after the PBA is conducted* has the highest standard deviation score of 1.16, which shows the responses from the respondent are widely spread out across all the options from *Unsure* to *Strongly Agree.*

It is also observed that none of the statements has a mean score of 3.00 (Agree) as compared to the other statements in the other sections. This could be interpreted that the students were unsure or disagree to the statements.

Experience with Assessment Feedback.

Statements	Mean	SD
1. Feedback is effective only when there is an improved performance.	± 2.69	± 1.07
2. Feedback is given to me regardless of performance scores.	± 2.86	± 1.02
3. I am not interested in the feedback.	± 2.26	± 1.13
4. I am more interested to know if I pass or fail.	± 2.91	± 0.94
5. I prefer feedback given in a group.	± 2.54	± 1.11
6. I am more interested in my grades than feedback.	± 2.65	± 1.08
7. There is a marked improvement in performance after a feedback is given to me.	± 2.81	± 0.97
8. I am more interested to hear positive comments during the feedback session.	± 2.77	± 0.99

9. Feedback is given to me within a week after the PBA is conducted.	± 2.58	± 1.16
10. I prefer online feedback rather than face-to-face feedback.	± 2.45	± 1.11
11. Feedback is focused on the competencies which I did not acquire.	± 2.61	± 1.12
12. Feedback is given to me to enhance my competency to perform workplace task.	± 2.87	± 1.00
13. Feedback is given to motivate me to acquire the desired competence.	± 2.94	± 0.98

Table 8.5 Student's experience with assessment feedback.

This section has presented the mean score and standard deviation results of all the 43 statements conducted during the online survey. In general, most the students *Agree* to 43 statements presented to them. It is also observed that none of the statements had a mean of 3.00 (Agree) or more for *Use of PBA and Use of Feedback* as compared to the other 2 groups of statements that had statements that had mean scores of above 3.00.

5.5 Results from Focus Groups

Introduction

This section outlines the process following the online survey. This section also described the responses from the participants of the focus groups that lead to the development of constructs and themes for the qualitative data collection.

RQ1 What is the efficacy of assessment used in the institute?

RQ2 What are the lecturers' level of knowledge, skills and experience in using performance-based assessment?

RQ3 What are the lecturers' level of knowledge and skills in the use of student feedback for performance-based assessments?

Description of constructs and evidences in data

This section sets out description of constructs used in data collection including references from the literature review, descriptions and evidences for the relevant constructs in the data collected for this research.

The construct *Assessment*

Description of *construct*

Whitaker & Nanavati (2012) state that assessment is objective, focuses on what students know, attempts to measure acquisition as a proxy for skill acquisition. Assessment focus on what students can demonstrate and measure student's skills acquisition in simulated scenarios.

Generally, student assessment is a process of collecting information to enhance and accredit students' academic performance. It focuses on students learning and development outcomes. Assessment is critically important for education as its serves to support students learning and is a form of student's accreditation of their acquired knowledge. Harlen (2005) stated that the main purpose of assessment is to aid students learning and for summarizing learning.

Evidence of Construct in data

The student's use of the construct *assessment* was that of performance-based assessment adopted by the institute to assess the student's competencies. This assessment was conducted at both the formative and summative level during the school term. For example, the students used the terms *practical assessment* and *phase test* to refer to the performance-based assessment that is conducted in the institute. In this focus group, the assessment refers to the practical assessment and the phase test that the students take during the semester. On an average, there are a total 3 practical assessments (formative) and 1 phase test (summative).

Table 8.6 lists the words and phrases used by students to convey the *assessment* construct within the data collected.

The construct *assessment*

Phrases and words used by the students

- We take about 3 practical assessments and 1 phase test
- The practical assessment is conducted a few times.
- We practice before we attempt that practical assessment
- The assessments measure our ability to carry out the task.
- The assessment measures our technical skills.
- The assessment is a check of how much we already learnt.
- There are many tasks for us to perform during the assessment.
- The assessment is to get us prepared and ready for the internship.
- The assessment is conducted every few months.
- The teacher assesses my progress in learning.

Table 8.6 Examples of phrases and words used by the students as evidence of *assessment*

The construct *competence*

Description of Construct

In the literature, the construct competence tends to be very closely tied to authentic learning. For instance, Guliker et al. (2006) stated that authenticity is preparing student for the dynamic world of the workplace, hence lecturers must prepare the students to acquire the skills and competencies relevant for the workplace. Furthermore, Achtenhagen & Winther (2014) state that the assessment style for measuring workplace competence must be based on the requirements of the labor market.

Evidence of Construct in the data

In this research, the students used the construct Competence to refer to the ability to perform and carry out workplace-related tasks.

Table 8.7 list the words and phrases used to convey the *competence* construct within the data collected.

The construct competence
Phrases and words used by the students

- Assess our technical skills
- I am able to perform the task
- There are many tasks that I perform in a practical assessment
- The task prepares me to be work-ready for my internship
- The practical assessment measures my competence in small chunks
- The assessment measure if I can remember how to perform the task

Table 8.7 Examples of phrases and words used by the students as evidence of *competence*

The construct *feedback*

Description of Construct

Hattie et al. (2007) defines the construct feedback as information provided by an agent (e.g. teacher, peer) regarding the aspects of one's performance or understanding. Feedback is a critical component in formative assessment. In addition, Shute (2008) stated that the timing of the given feedback is also very important and that a delayed feedback could make it ineffective.

Hattie & Gan (2011) stated that feedback at the regulation level is related to the processes in the mind of the learner, like self-regulation, self-assessment and the willingness to receive feedback.

Evidence of Construct in the data

The construct *feedback* in this research as used by the students refers to the process of receiving feedback after a performance-based assessment. In this research the construct feedback studied the method, frequency, content and response of feedback received by the students. For example, the students used the terms *change* and *mistake* to refer to the process of giving feedback.

Table 8.9 list the words and phrases used to convey the *feedback* construct within the data collected.

The construct feedback
Phrases and words used by the students
• I received feedback individually and also sometimes in groups • We were told of our mistakes and how to change them • We can use the feedback to improve • We do not repeat the same mistakes again • The feedback helps us prepare for our next assessment

Table 8.9 Examples of phrases and words used by the students as evidence of *feedback*

Word Count and Frequency of constructs

The keywords *Assessment, Competence and Feedback* were identified respectively during the data analysis. The word clusters are presented in the sections that follow

It can be seen from *Table 8.11* below that the keyword *assessment* has the highest word count of 102. The keyword *people* have the second highest count of 44 and keyword *feedback* has the third highest count of 40. As seen from *Table 8.11*, the keywords assessment, feedback, people and think have the highest word count during the focus groups. These words were most repeated during the focus groups interviews.

The construct *Assessment* associated with the words: people, think, feedback, understanding, remember, change, teacher, small chunks, month and technical skills are mentioned by the students in the interviews pertaining to the conduct of PBA in the institute.

The construct *Competence* links the words: think, remember, understanding, prepare, technical skills and experience is mentioned by the students in the interviews pertaining to the use of PBA in the institute.

The construct *Feedback* links the words: progress, individual, group, effective, change, technical skills, measure, prepare and questions are mentioned by the students in the interviews pertaining to the use of feedback in the institute.

Word	**Word Count**	**Assessment**	**Competence**	**Feedback**
Assessment	102	√		
Competence	44	√	√	√
Feedback	40	√	√	√
Think	31	√	√	√
Student	23	√	√	√

School	16	√	√	
Understanding	14	√	√	
Group	14			√
Individual	12			√
Teacher	11	√		
Remember	11	√	√	
Change	11	√		√
Message	9			√
Benefit	8			√
Month	7	√		
Taught	6		√	
Small Chunk	5	√	√	
Progress	5	√	√	√
Effective	4			√
Mistake	4			√
Technical skills	3	√	√	√
Experience	3		√	√
Prepare	2	√	√	√
Question	2			√

Table 8.11: Focus Group Word Frequency

Word Category clusters for constructs

Assessment

The *assessment* category has keywords that were associated with one another. This was generated using the NVivo software. It has 3 broad categories; *people, think and feedback*, which evidently has amongst the highest, word frequency. These 3 categories represent the major ideas of the discussion for the assessment construct, as shown in Figure 1.

Most of the students also agreed that one of the objectives of the assessment is to measure if the students *know* how to perform the task. They mentioned that formative practical assessment measure their technical skills in small chunks, measuring if they could remember how to perform the core tasks. The students also mentioned that the performance-based assessment also measure their adaptability to think in differentiated scenarios. This is where the lecturers will observe if the students could apply the core knowledge to perform critical tasks.

They also mentioned that feedback is an important component in formative assessment. These feedbacks provided by the teacher aims support their learning progress. The feedback given to them will help them to change and correct their mistakes.

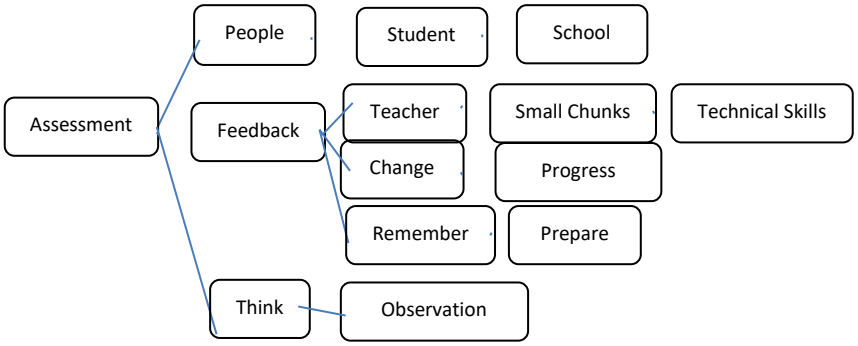

Figure 1: Word cluster for *Assessment*

Competence

The *Competence* category has keywords that were associated together. The students mentioned that *competence* is measured by the ability to perform a *task*. This includes the ability to *think* how a task has to be performed. Competence is linked to the acquisition of technical skills that is needed to join the workforce and to be ready for their internships. It is also linked to the understanding of how a task is to be effectively carried out.

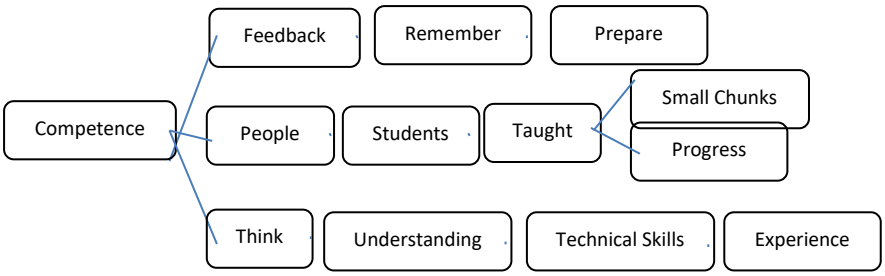

Figure 2: Word cluster for *Competence*

Feedback

The *Feedback* category has keywords that were linked together. The keyword feedback was linked to think, student, group, individual, progress and technical skills. The students mentioned that feedback was given in groups and individuals. It depends on the nature and context of the feedback. The students also mentioned that there were instances where feedback is given through messages on their smartphones. They understood the benefits of receiving feedback, which is useful for them to progress in their learning.

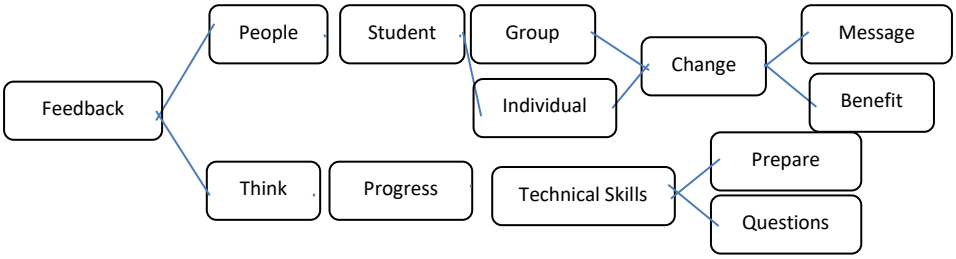

Figure 3: Word cluster for *Feedback*

The focus group results indicate that the students were aware of the objective and the conduct of the assessment for vocational education. The students were also aware that the assessments were necessary to measure their competence, which is to prepare them to join the workforce. The students also knew the importance of receiving feedback, so that they could make improvements and progress to their learning.

It can be seen from the above that there are common words when assessment comes to mind. These words like competence will automatically link to several other words like *technical skills, small chunks and feedback* in which the group has mentioned many times during the focus group discussions.

5.6 Results from Individual Interviews

The individual interviews with the students followed the data captured during the focus group interviews. The aim of the interview is to infer further, the data collected from the focus group interviews.

The construct *Assessment*

Evidence of construct in data

The construct *assessment*
Phrases and words used by the student

- I took about 3 practical assessments and 1 phase test per module
- Each assessment has many tasks that I need to complete
- I am given time to practice before each assessment
- The tasks vary in difficulty levels
- The teacher explains and demonstrate the task
- Assessment is important for me to know if I can carry out the task
- Assessment focus on technical skills

Table 8.10 Examples of phrases and words used by the student as evidence of *assessment*

The construct *Competence*

Evidence of construct in data

The construct *competence*
Phrases and words used by the student

- I am able to perform the task
- The assessment is measuring our competence to perform the task
- The task is important to prepare us for internship
- The assessment prepares me with the skills to join the workforce.
- The assessment tasks are similar to those done at the workplace.
- The tasks challenge my technical skills.
- I am quite confident I can perform the tasks.

Table 8.11 Examples of phrases and words used by the student as evidence of *competence*

The construct *Feedback*

Evidence of construct in data

The construct *feedback*
Phrases and words used by the student

- I need to know my mistakes
- I prefer to receive feedback in groups
- I prefer to receive feedback individually
- Feedback helps me to do it better the next time
- It is important for me to know what I have done wrong
- I will not repeat the same mistakes again
- It helps me to understand better

Table 8.13 Examples of phrases and words used by the student as evidence of *feedback*

Word Count and Frequency of constructs

It can be seen from *Table 8.14* below that the keyword *assessment* has the highest word count of 53. The keyword *competence* has the second highest count of 28 and keyword *feedback* has the third highest count of 25.

Word	**Word Count**	**Assessment**	**Competence**	**Feedback**
Assessment	53	√		
Competence	28	√	√	√
Feedback	25	√	√	√
Mistake	18	√	√	
Group	14			√
Individual	14			√
Remember	10	√	√	
Change	9	√		√

Message	9			√
Technical Skills	8	√		
Taught	6		√	
Small Chunk	5	√	√	
Progress	5	√	√	√
Effective	4			√

Table 8.14: Individual Interview Word Frequency

This section establishes the data collected from the individual interviews. It can be seen from the above that the data collected during the individual interviews aligned with the data collected from the focus groups. The most repeated word *assessment, competence* and *feedback* are both prominent in the focus group and individual interviews.

This chapter established evidence for and the findings of the data collection that seeks to answers all the research questions set in Chapter 1. It studied in a deeper context, the results from the online survey, focus group interview and individual interviews. It has also provided descriptions of each of the three constructs used by the students to describe their knowledge and experience using PBA. It also shows the word frequency and word clusters for each of the constructs.

CHAPTER SIX
DISCUSSION

This chapter presents the discussions, suggestion and the difficulty faced during the practical implication of performance-based assessments in a vocational institution in Singapore. This chapter also provides limitations, suggestions, and further areas of research and improvements.

The research has well been conducted and all the answers to the research questions has been clarified and verified in the previous chapters.

Discussion of Research Objectives and Findings

Issues of PBA

The issues with PBA from the focus groups and interviews focused into a few areas. The respondents highlighted the concern with the task difficulty that the task designed is to low level such that all the students were able to achieve high scores. This made is become difficult to really differentiate between the competent and the non-competent students. In many other instances, the task has no correlation to each other and that makes performing the task seemed meaningless.

The respondents also highlighted the issue of differences in expectations and standards in marking. The assessors in each class have different expectations during the assessment and this will again lead to the different standards in performance and marking.

The task that has been designed during the assessment may not be a valid or critical task anymore by the time the student graduates from the course. This becomes a concern as information technology changes very rapidly and the competencies that we acquire today may not be valid tomorrow.

They also mentioned that PBA is not a complete assessment for the students, as it does not assess other work skills like creativity and communication skills. However, it helps lecturers to support students in developing a deeper understanding of content.

Use of feedback

The respondents mentioned that they knew well that feedback is used to inform students on how they have performed during the PBA. The use of feedback will encourage them to improve and reflect on their performance during the assessment. They also noted that the feedback is also used to motivate the students to enhance their performance during the assessment.

Experiences with feedback

The lecturers also mentioned that they preferred to give a face-to-face feedback as they will be able to respond to questions immediately and they would be able to judge the response from the students. They mentioned that giving feedback online or using social media does not give them the assurance that the students read and understand the feedback correctly. There were also many times that feedback session must be explained with the aid of the equipment for demonstration. This could not be possible if feedback is done online.

The students mentioned that there were times when they need individual feedback time with the lecturer when they realised that they have made excessive mistakes during the assessment. In usual cases, group feedback of three to four seemed acceptable with the students. The students also mentioned that feedback using online or social media is possible depending on the criticality and the nature of the feedback.

Limitation of the study

This research is not without its limitations. These factors below state the limitation of the research study.

Scope

The scope of this study is limited to staff and students of only one faculty. Therefore, the results revealed only the knowledge and understanding from this sample set of

respondents. This could be further improved in the next research by expanding the scope to the staff and students from the other faculty and colleges.

Response rate
The responses rate from the lecturers were below the intended projection. While the intended rate was 100, the actual respondents were 34 lecturer. This was due to the busy teaching schedule and all other administrative duties that the staff must manage. This could be further improved by extending the deadline of the online surveys so that the staff has more ample time to respond.

This is in contrast with the student's response rate. While the intended sample size was 100, a remarkable 145 students responded to the online survey.

Data privacy
Data privacy is another concern, some of the staff were concerned that they response to the online survey would not be anonymous. This concern was flagged out even when their concerns were addressed before the online survey was administered. This could also be another reason for the low response rate from the staff.

Further Areas of Research and Suggestions

Areas for Future Research in Performance-Based Assessment

While PBA has shown promising results in vocational education, further research is needed to optimize its implementation and address ongoing challenges. The following areas are recommended for future research:

1. Impact of PBA on Long-Term Career Success:
    - While PBA appears to improve students' practical skills and job readiness, more research is needed to understand its long-term impact on career success. Studies could track vocational graduates over time to examine how PBA influences their performance, adaptability, and career advancement.
2. Student Well-being and PBA:
    - Research could explore the effects of PBA on student well-being, particularly in high-stakes environments. Investigating methods to reduce anxiety and build resilience could lead to better assessment practices that support both performance and mental health.
3. Use of Technology in PBA:

- Technology holds great potential for enhancing PBA, particularly through virtual simulations and digital portfolios. Future studies could examine the effectiveness of various technologies in delivering PBAs, including their impact on skill development, cost-efficiency, and scalability.

4. Instructor Professional Development for PBA:
    - Research on effective professional development strategies for instructors implementing PBA could help improve assessment quality. Studies could focus on identifying the most beneficial types of training, as well as the optimal frequency and duration of such programs.

To build on the findings of this study, further research should investigate specific aspects of PBA in vocational education to enhance its effectiveness and impact.

1. Longitudinal Studies on Career Outcomes:
    - Future research could focus on the long-term career success of vocational students who underwent PBA, examining how these assessments influence their professional growth, skill adaptability, and job performance.
2. Impact of PBA on Student Confidence and Self-Efficacy:
    - Research on how PBA affects students' confidence and belief in their abilities could provide insights into how assessments shape students' attitudes toward their skills. This research could lead to strategies for designing PBAs that support self-efficacy while maintaining rigor.
3. Effectiveness of Digital Tools in PBA:
    - Given the increasing role of technology, further research could assess the specific impact of digital tools like simulations and online portfolios on skill development, student engagement, and scalability of PBA in vocational education.
4. Strategies for Managing Assessment Anxiety:
    - Research could explore best practices for minimizing student anxiety in high-stakes PBAs. Identifying factors that contribute to stress and testing interventions—such as peer support networks or relaxation techniques—can inform practices that improve student performance and well-being.

Recommendations and Suggestions for Effective Implementation

Based on these findings, the following recommendations aim to enhance the effectiveness and sustainability of PBAs in vocational education.

1. Strengthen Industry Partnerships:

- Objective: Collaborating with industry partners can provide access to resources, expertise, and current industry standards. Vocational institutions are encouraged to establish partnerships with local companies, which can offer support in terms of funding, facilities, and materials for PBAs.
- Implementation: Institutions can organize joint workshops, invite industry experts to co-create assessments, or offer internships that complement PBAs, providing students with both simulated and real-world experiences.

2. Invest in Instructor Training:
    - Objective: Equip instructors with the skills needed to design, administer, and evaluate PBAs effectively. Professional development should focus on rubric creation, assessment consistency, and feedback techniques.
    - Implementation: Institutions should offer workshops and training sessions, as well as provide instructors with resources for continuous learning. Pairing less-experienced instructors with mentors skilled in PBA can also improve assessment quality and reduce grading variability.
3. Incorporate Technology to Support PBA:
    - Objective: Using technology can reduce costs, improve accessibility, and enhance the quality of assessments. Technologies like virtual simulations and digital portfolios allow students to demonstrate competencies in controlled, scalable environments.
    - Implementation: Institutions can integrate simulation software and online portfolio platforms into their programs. Digital platforms also allow students to collect and organize their work, which can be used for both formative assessment and end-of-course evaluation.
4. Support Students' Mental Well-Being:
    - Objective: Address the stress and anxiety associated with high-stakes PBAs to foster a more supportive learning environment.
    - Implementation: Incorporate formative, low-stakes assessments to help students build confidence before summative evaluations. Offer counselling services, stress management workshops, and peer support groups to help students manage anxiety.
5. Establish Clear Rubrics and Standardized Criteria:
    - Objective: Consistency and transparency in assessment criteria are essential for fair evaluation. Clear rubrics allow students to understand expectations and ensure consistency across multiple instructors.

- Implementation: Develop and use standardized rubrics with input from both instructors and industry professionals. Regular calibration sessions can also be conducted to align scoring practices and reduce subjective grading.

This chapter presented the discussions on the overall achievements and objectives of the research, the limitations and possible further areas of research and improvements. This could well redefine, rescope, redesign and further intensify the implementation of performance-based assessment in the vocational school in Singapore.

CHAPTER SEVEN
CONCLUSION

Generally, the lecturers and students agreed that the institute effectively uses PBA to assess the technical competencies of its students. This is done formatively such that the students acquire the competencies in stages. These competencies will equip the students to join the workplace upon graduation.

While the students felt that PBA is suitable only for vocational education, the lecturers responded that PBA is also applicable in any assessment that involves practical tasks and requires an observable performance.

The respondents mentioned that PBA is supposed to achieve skills competency, where they are required to demonstrate and perform the mastery of skills. They also mentioned that PBA is supposed to benchmark the standards required by the industrial workplace so that the students will level up their competencies before joining the workforce.

The successful implementation of PBA in vocational education has broader implications for policy and practice, particularly in terms of curriculum design, instructor development, and resource allocation.

1. **Curriculum Design**:
    - Vocational curricula should integrate PBA as a primary assessment method, ensuring that students gain practical skills alongside theoretical knowledge. Policies should encourage the use of PBAs across all levels of vocational training, promoting a consistent approach to skill development and assessment.
2. **Instructor Development**:
    - Policymakers should prioritize funding for instructor training programs that focus on PBA. Professional development initiatives could include certification programs for vocational lecturers, emphasizing assessment design, objective scoring, and student feedback.
3. **Resource Allocation**:
    - Investment in PBA requires adequate resources, from equipment to software to instructor support. Institutions should allocate funding for the necessary materials and technological tools that support PBAs. Policy

incentives, such as grants or industry partnerships, can help institutions manage these costs effectively.

Conclusion

This chapter concludes the objectives and findings from this study on performance-based assessment (PBA) in vocational education, highlighting its benefits, challenges, and impact on students and instructors. It provides actionable recommendations for institutions and policymakers to optimize PBA in vocational settings, aiming to improve both student outcomes and industry alignment. Additionally, it discusses implications for practice and areas for continued research.

In conclusion, performance-based assessment represents a significant advancement in vocational education, aligning assessments with real-world requirements and fostering a more authentic learning experience. PBAs provide a valuable framework for developing practical skills, increasing student engagement, and preparing graduates for their careers. However, successful implementation requires addressing resource constraints, providing adequate instructor training, and supporting student well-being. With the recommendations outlined in this chapter, vocational education institutions can optimize PBA to better meet the needs of students and industry partners alike.

Ongoing research and policy support are crucial to refining and expanding PBA practices in vocational education, ensuring that they continue to evolve and adapt to changing industry demands. By prioritizing PBAs and addressing their challenges, vocational education can better equip students with the competencies and confidence they need for long-term success in the workforce.

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