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Evaluation of Agricultural System Design Unit in Design and Technology Subjects Using CIPP Model: A Preliminary Study

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Abstract

One of the new subjects that has replaced the Integrated Life Skills (KH) subject starting January 2017 is Design and Technology (RBT), in which the curriculum is not divided into a mandatory and elective portion like KH subject. As a result, a variety of problems and barriers are encountered during the implementation of the new RBT curriculum, including the problem of inadequate facilities and equipment as well as teachers who lack innovation in how they provide the teaching and learning process. Therefore, this study was conducted to look at the problems, defects, and effectiveness of the unit for students utilising the CIPP assessment approach, which was specifically used in agriculture. Three secondary school teachers in Peninsula Malaysia's southern region with a bachelor's degree in agriculture and experience teaching RBT courses were interviewed for this study. The research approach employed was a semi-structured interview process. This study discovered that the information in this agriculture unit is excellent preparation for students taking the Form 3 Assessment. All respondents also agreed that the information in the RBT subject's agricultural system design unit is appropriate for the current distribution based on the most recent manpower requirements and application of technology in agriculture.

Keywords: Evaluation, CIPP Model, Agriculture, Design and Technology

Introduction

One of the key foundations for the development of any nation in creating a dynamic nation and global standard in this era of globalisation is the consolidation of the national education system. As technology advances, efforts are being made to improve Malaysia's educational system. Part of this effort involves periodically revising topic curricula to ensure that students are learning skills and knowledge that are relevant to today's demands. The Ministry of Education Malaysia (KPM) introduced and has been implementing the Secondary School Standard Curriculum (KSSM) since 2017 in the secondary education system of Malaysia.

Since 2017, one of the new curricula that has replaced the so-called ‘older’ subject, Living Skills (KH) is Design and Technology (RBT) (MOE, 2015). As opposed to earlier KH subjects,

the implementation of the curriculum in RBT subjects is not divided into discrete components. According to the RBT curriculum syllabus each student is required to take courses in every technical sector, agricultural technology, and home science (Nor & Kamarudin, 2017).

To make sure they are always relevant and fulfil the demands of the present and the future, changes to the curriculum syllabus that have been produced and put in place need to be examined. The evaluation can result in an improvement in a performance (Kelman & Friedman, 2009). The evaluation of a curriculum is essential for guaranteeing its quality in use and for identifying any problems or shortcomings that happened during implementation, so that they can be corrected.

There are several different assessment methods that can be utilised to assess a programme. One of the models that can be used is the CIPP model whereby the process includes context, inputs, procedures, and products (Stufflebeam, 2000a). This model is the basis for the evaluation of this agricultural system design unit. The CIPP valuation model has undergone substantial local and international development since 1965. One benefit of the CIPP model is that the evaluator can create many questions for each component, which serves as a helpful and straightforward tool to assist the evaluator in asking crucial questions during the evaluation process. In addition, an analysis of the research which developed based on the CIPP model is declared valid and reliable (Alvianita et.al., 2022).

The agricultural system design unit, in particular, will likely present a significant challenge to the teaching and learning process in schools for both students and teachers due to the major scale adjustments in the RBT curriculum. The National Education Philosophy's objectives can be met in large part thanks to the contributions of teachers. The efforts and hopes of the KPM to realise the goals of the nation will be hampered if the teacher, who is the main driving force, does not carry out his mission successfully.

In order to catch the attention of the next generation and alter their perspective of the agricultural industry, teachers must be given the necessary knowledge and skills in advance to conduct engaging teaching and learning. In the same way, students must always be willing to embrace new information during the teaching and learning processes at school. However, as the new RBT curriculum was only introduced starting in 2017, there is still a dearth of research on the agricultural system design unit. This raises the question of whether the four subjects in the most recent RBT agricultural system design curriculum and the six topics in the prior KHB agricultural unit curriculum are comparable and have the same or superior impact on student accomplishment.

The agricultural industry and the implementation of the RBT curriculum encounter a number of issues and difficulties, including the issue of inadequate tools and facilities as well as teachers who lack creativity in how they offer the teaching and learning process. In connection with that, it is necessary to conduct an assessment research on Design and Technology subjects in the lower secondary education system, specifically for the agricultural system design unit, in order to let students know the unit's issues, flaws, and efficacy. Based on the CIPP paradigm, the evaluation of this agricultural system design unit takes into account four different aspects: context, input, process, and product.

Literature Review

Design and Technology (RBT)

The advancement of science and technology in the modern world has had a significant impact on the creation of RBT content standards in Malaysia. The lower secondary education system in Malaysia uses RBT topics to emphasise technical and vocational features in early education. This subject is made to give students the chance to develop meaningful product concepts and technological proficiency necessary to fulfil the demands of modern industry.

Because of its importance, all students should be able to master this subject. This is due to the fact that technical and vocational sectors are crucial to the country's development, particularly in terms of providing professional, skilled, and semi-skilled labour. The curriculum requirement for this subject also exposes students to Higher Order Thinking Skills (HOTS), which encourage systematic and focused thinking as well as help students apply knowledge, skills, and values in decision-making and reflection to solve problems in daily life, plan decisions, innovate, and create new things. The RBT subject curriculum can also meet the needs and aspirations of secondary school students, especially in terms of assisting them in acquiring the 21st century skills essential to compete on a global scale and comprehend the most recent technological breakthroughs.

Agriculture

The study of agriculture is focused on the production of food and basic materials to satisfy the demands of all human existence, which are based on natural resources such soil, plants, and animals. According to a 2009 study by Abdul Rasid et. al, teaching agricultural subjects in schools can encourage students to choose careers in this industry.

Fertigation and aquaponics are two agricultural specialties that are still practised and thought to be useful for today's students to learn about in RBT subjects. In a typical irrigation system for crop production, a fertilisation system applies the usage of fertiliser (Salmiah et. al., 2016). Each crop's root portion is targeted by an irrigation system that contains a fertiliser solution. In this fertigation approach, earth is not employed as a planting media; instead, coco peat or rice husk are used as a soil substitute. While aquaponics, also known as circulation, is a type of agricultural technique that combines aquaculture (the practise of raising fish) and hydroponics (the practise of growing crops without the use of soil media) (Mohd et. al., 2017).

Even if there aren't many agricultural themes taught, there are good attempts being made to increase students' knowledge of topics connected to agricultural operations and spark their interest in jobs in agriculture. To date, agriculture is a profession that supports the nation's economic growth and has the potential to yield significant profits. Agriculture is not only a field with promising employment opportunities, but it can also be a sector that boosts a nation's economy. In other words, the agricultural sector has the potential to both elevate the reputation of the nation and make it a global focal point while producing fundamental and raw necessities.

CIPP Assessment Model

The CIPP valuation model was created by Daniel L. Stufflebeam in the 1960s. The core ideas of this paradigm, which are represented by the acronym CIPP, are context, input, process,

and product evaluation. The main goal of context assessment is to determine the benefits and drawbacks of a target, whether it be an organisation, programme, target audience, or a person. The major goal of this kind of assessment is to determine the program's overall status, pinpoint its flaws, and diagnose issues that offer remedies to enhance the program's wellbeing. Input evaluation's primary objective is to support programme planning those results in necessary modifications. The ability to operate is based on resources and plans.

This type of evaluation should find and evaluate relevant techniques in addition to aiding in the clarification and decision-making process about the location or continuation of a programme that has already been executed (including any that have already been in operation). The purpose of process assessment is to provide management and staff with information about the degree to which a program's actions have been timely, are being carried out in accordance with plan, and are effectively utilising the resources available. Additionally, it serves as a roadmap for any justifications or plan modifications that may be required. Analyzing how well a piece of software satisfies the demands of its target market is the fundamental aim of product evaluation.

Methodology

Figure 1 shows a research framework of this research which based on CIPP evaluation model by Stufflebeam (2000). This model involves and focuses on the evaluation process in terms of four forms, namely context, input, process and product. Learning objectives and results for the Design and Technology (RBT) programme, which is studied by students in Forms 1 through 3, are assessed in terms of context. The input will evaluate several facets of the curriculum content and learning outcomes of the agricultural system design unit in the RBT subject, the expertise and knowledge of the agriculture teachers who teach the agricultural system design unit in the RBT subject, and the equipment that will be used for teaching and learning the agricultural system design unit in RBT topics.

Process assessment focuses on the steps taken to accomplish the curriculum's aims and objectives, and this includes assessing how well the teaching and learning process is being put into practise, as well as how well facilities and teaching and learning tools are being utilised, as well as the evaluation techniques being used in RBT subjects for the agricultural system design unit. Lastly, the product assessment focuses on the outcomes of the evaluation of the complete section of the curriculum to fulfil the goals and objectives of the unit, which includes knowledge mastery by students who have studied RBT subjects, particularly the agricultural system design unit.

A qualitative approach was used to carry out this investigation. Two secondary schools in Johor were chosen as the study's location. This study comprised interviews with three secondary school teachers that teach RBT topics in Johor Bahru, Johor, and have professional qualifications in agriculture in order to investigate information on the agricultural system design unit. The specifics of the respondents to this study are displayed in detail in **Table 1.0**.

The research tool used is a semi-structured interview protocol with qualitative questions. Utilizing theme analysis techniques to respond to the created research questions is the strategy employed in data analysis. This form of interview refers to the questions that researchers ask study participants that have been gathered and scheduled to make sure that

the interview procedure can adequately address research questions to meet research goals (Nurul, 2013). However, study participants were given some leeway in how they responded. The researcher can modify the questions using the semi-structured interview method to better understand the phenomenon being studied. Flexibility is a must because the interview process involves the participant narrating about an experience or piece of knowledge that pertains to the participant. There are occasionally unanticipated comments made by study participants. As a result, the interview procedure must be tweaked and adjusted in light of the answers or information gleaned during the interview. **Table 2.0** shows the classification of the 4 main themes based on the CIPP Assessment, which is then broken down into several sub-themes, based on the research questions that have been developed.

Interview Data Analysis

Following is the information that was gathered from the teachers who were interviewed. These teachers teach RBT in accordance with the built-in themes and sub-themes and have specialised ikthisas certifications in the area of agriculture.

THEME 1: CONTEXT

Sub-theme 1: Program Educational Objective (PEO)

All respondents concurred that the agricultural system design unit's primary educational objective (PEO) is simple for students to grasp and apply. This is due to the fact that G1, G2, and G3 often present objective statements at the start of the learning session before diving into the learning process for each new topic. According to G3, explanations can assist students better understand the goals of each topic by combining them with support materials like extra photos from the textbook.

Sub-theme 2: Program Learning Outcome (PLO)

The program learning outcomes (PLO) of this unit can be attained by the students, based on the observations of G1 and G2. In contrast, G3 claimed that students' mastery of the information and abilities necessary for model creation will enable them to accomplish the PLO of this unit.

THEME 2: INPUT

Sub-theme 1: Content and Course Learning Outcome (CLO)

According to the input received, all G1, G2, and G3 students agree that this unit's curriculum is organised according to taxonomy level learning. To back up his earlier claim, G2 has asserted that the curriculum content for this unit has been ordered from the easiest level, which is listing, to the most difficult level, which is applying. The curriculum content for this unit has also been revealed by G3 to have been organised step-by-step in accordance with the taxonomy level, beginning with elements like introduction and types. Elements like those that are more challenging aspects come next.

For this unit, the references and notes are adequate and suitable. The teaching and learning approach for this subject was carried out by all G1, G2, and G3 using textbooks as the primary guide and supplemental reference books. Due to the fact that each school's textbooks were created by the responsible party, namely the Malaysian Ministry of Education (KPM), students are always provided with plenty of them.

Additionally, educators and students buy more reference books off the shelf for their personal use. G1 and G2 suggested that in addition to utilising the prepared textbook, they also show

supplementary images or videos in front of the class that are not included in the textbook to offer the students more exposure to a certain topic. G3 clarified that form 3 students will have access to additional special modules that can be created and distributed.

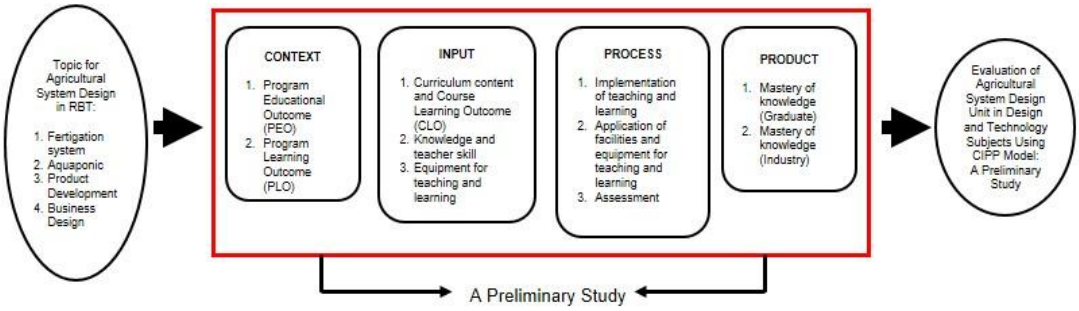

Figure 1: Research Design (adapted from Stufflebeam, 2000)

Table 1
Research Respondents

Respondent	**Subject**	**Academic Qualification (Majoring)**	**Teaching Experience**
Teacher 1 (G1)	1. Teacher of RBT subjects from Form 1 to 3. 2. Teacher of RBT subjects from Form 4 dan 5.	Horticultural Science	8 years
Teacher 2 (G2)		Agricultural Science Education	8 years
Teacher 3 (G3)		Agricultural Science Education	23 years

Table 2
Theme Classification Based on Research Questions

Research Question: The effectiveness of the implementation of the field of agricultural science in RBT from the dimensions:		
Themes	Sub-themes	List of interview questions
1. Context	Program Educational Objective (PEO)	Are the objectives (PEO) of the agricultural system design unit in this RBT subject easy to understand and follow?
	Program Learning Outcome (PLO)	Are the learning outcomes (PLO) of the agricultural system design unit in this RBT subject achievable by students?
2. Input	Content and Course Learning Outcome (CLO)	1. Is the unit content (lecture-theory topic) arranged according to taxonomy level learning? 2. Are the references and notes for this unit sufficient and compatible? 3. How many hours are allocated for learning and teaching in this unit? 4. Can the teaching schedule cover all the contents of this unit?

		5. Are the student learning hours (SLT) clear and appropriate enough? 6. Are the course learning outcomes (CLO) of this agricultural system design in line with the outcomes of RBT subjects? 7. Are the CLO of this agricultural system design in line with the level taxonomy of learning?
	Knowledge and teacher skill	Does the teacher who teaches the agricultural system design have qualifications and experience in this field?
	Teaching and learning equipment	1. Are the facilities for teaching and learning sufficient and suitable? 2. Is the equipment for the teaching and learning process sufficient, suitable and up-to-date?
3. 3. Process	Implementation of teaching and learning process	1. Is the allocation time for student learning hours (SLT) similar and comply with the SLT's standards given by KPM? 2. Is the teaching method of this unit appropriate? 3. Are the references and notes sufficient and appropriate?
	Application of facilities and equipments for teaching and learning	1. Are the facilities for teaching and learning used sufficient and suitable? 2. Is the equipment used for the teaching and learning process sufficient, suitable and up-to-date?
	Assessment	1. Is the assessment of CLO appropriate? 2. Is the assessment method appropriate? 3. Are the assessment items/criteria and marks/scores clearly stated? 4. Does the score for each item/criteria meet with the percentage given by the KPM?
4. Product	Mastery of knowledge (Graduate and Industry)	Is the content of this unit appropriate for the PT3 level?

Many review practise questions are included in the special module to help you get ready for upcoming tests or exams. For students in Forms 1 through 3, the teacher will occasionally create copies of the modules using the Per Capita Grant (PCG), a specific provision for each subject created by the KPM. Sometimes the instructor may additionally solicit a small gift from the students to buy more copies of the module (G3).

The total number of hours allocated for learning and teaching this unit is two hours each week, according to all G1, G2, and G3. There will be four class times each week, with each period lasting 30 minutes, in the schedule for studying and teaching this topic. Regarding G2, the rule of dividing the time between theoretical and practical instruction is up to the teacher, depending on the students' respective grade levels. Typically, there are two meetings every week according to the schedule. This implies that a meeting is equivalent to two times, or one hour.

As a result, G2 and G3 will impart academic knowledge during the first meeting and practical application during the second meeting. G3 advised that this matter be adopted because doing the theoretical and practical learning separately rather than all at once can result in a more thorough learning process.

All of the material covered in this unit can be covered by the teaching schedule. This is claimed to be the case since, based on G1, G2, and G3, all of the curriculum for this unit may typically be finished earlier than the allotted time. As a result, there is more time for preparation before the end-of-year exam and the conclusion of the school year for teachers and students.

According to G3, issues can occur for students who are in the lowest class or have weak subject areas. Weak students need longer time to comprehend and grasp the material, which is the intended issue. Therefore, more instructional time is needed to complete the unit's curriculum before the end-of-year exam and class period. G3 claims that the unit's curriculum content still had time to be completed and was able to be reviewed and practised, though not thoroughly.

G1 and G2 concurred that the student learning hours (SLT) provided were clear and suitable in regard to both content and context. The SLT should be expanded, according to G3, who also believes this to be a good idea. This topic's practical nature is used as justification. In order to successfully complete the practical learning exercises, students occasionally need more time. Additionally, this subject is brand-new for students to learn, particularly those in first form.

G1, G2, and G3 all agreed that the CLO of this unit is parallel to the outcomes of the RBT subjects in terms of parallelism. The Assessment Curriculum Standard Document (DSKP) or objectives can be accomplished, according to G3.
The CLO for this unit are stated by all G1, G2, and G3 in parallel with the taxonomy level of learning, according to data on the parallelism of the CLO with the level of learning. G3 adds that the learning of this unit starts with straightforward concepts like introduction and types. Then came the harder parts, like the components. As a result, the CLO for this unit have been grouped in accordance with the correct taxonomy level of learning.

Sub-theme 2: Teacher knowledge and skills
The interview data revealed that all G1, G2 and G3 have the necessary credentials and agricultural industry expertise to instruct this agricultural system design unit. G1 graduated from Universiti Putra Malaysia (UPM) with a Bachelor of Science in Horticulture. Later, at UPM, he pursued his studies in the subject of Agricultural Science for the Graduate Diploma in Agricultural Science (DPLI). He has eight years of expertise as a teacher in this subject. G2 graduated from UPM as well. His undergraduate degree is in agricultural science education. He has eight years of expertise as a teacher in this subject. For G3, she had graduated with a Diploma in Agriculture from UPM. After that, she pursued her studies at the same university, earning a Bachelor in Agricultural Science Education. She has 23 years of teaching expertise in this subject.

Sub-theme 3: Teaching and learning equipment
All G1, G2, and G3 agreed that the classroom facilities are enough for the capacity of twelve students in terms of their suitability and sufficiency for the teaching and learning of this unit. This is so that each class can have a maximum of 30 students, who are then divided into two smaller groups. As a result, two teachers often oversee the teaching and learning of this RBT subject. Only twelve students

will be taught by one teacher. This is done in a method that makes it simpler for teachers to keep an eye on a small group of students, especially while they're working on practical tasks in workshops that call for close supervision.

Ironically, this is an issue that workshops frequently deal with. The quantity of workshops, according to G1, is adequate. But occasionally, a lot of classes want to use the workshop at once. As a result, two teachers must supervise at once while two students share a workshop in a class. The number of workshops offered at G3's school was also noted as being insufficient. Typically, one class is required to participate in a workshop, with two teachers watching over it.

Next point is connected to the report on the equipment's sufficiency, applicability, and uniqueness for the teaching and learning process of this unit. G1 and G2 are notified that the necessary materials for this lesson can be shared among groups. G3 claimed that the tools in his school's workshop were adequate. All of the G1, G2, and G3 agreed that the equipment is adequate and modern in terms of its applicability and uniqueness. They believe this because each practical project will require the responsible party, the head of the RBT committee, to order and purchase fresh supplies from vendors using Per Capita Grant (PCG) Aid, a special provision created by the KPM specifically for RBT subjects.

THEME 3: PROCESS

Sub-theme 1: Implementation of the teaching and learning process

The implementation of the same number of student learning hours (SLT) that satisfied the KPM's hour guidelines was acknowledged by all G1, G2, and G3 groups. Two hours per week are set out for face-to-face instruction in both theoretical and practical subjects. Teachers have the freedom to allocate their own time for both scholarly and practical learning. In accordance with G1, students also engage in self-learning activities at home, such as revising material before tests. The first assessment test, mid-year examination, second assessment test, and end-of-year examination are all considered formal assessments. G1 also mentioned that each topic has a Classroom Assessment (PBD) that is completed throughout the year during the teaching and learning process. The teacher will use a variety of techniques, including oral and written exercises and practical application, to determine the degree of student mastery.

The instructional strategy used for this unit is suitable. For theoretical learning, G1 frequently uses the 21st Century Learning (PAK21) method, encourages students to give presentations in front of the class, and projects slides in front of the group. G2 clarified that the induction set used varies depending on the student's ability. Typically, G2 will begin teaching the topic with a video show as an introduction if the student category is weak. In contrast, if the student category is intelligent, G2 may occasionally show a video show or conduct a question-and-answer session and student experience before beginning the process of learning and teaching a new topic. G3 uses brainstorming, question-and-answer sessions, and slide displays as teaching strategies. Students and teachers will have a dialogue to resolve any issues or questions that come up after the brainstorming exercise.

The used references and comments are adequate and pertinent for this unit. The consistency of the claims made by G1, G2, and G3 students that the textbooks used as references and notes for implementing the teaching and learning process of this unit are sufficient and acceptable serves as evidence for this claim. This demonstrates that the textbook serves as the primary source of

information when carrying out the teaching and learning process for this unit. G2 further clarified in his statement that the offered textbooks are current and contain the same material as the current curriculum.

Sub-theme 2: Use of teaching and learning facilities and equipment

G1, G2, and G3 concur that the current classroom setup is appropriate for the number of students enrolled. According to G1, there are enough workshops. However, if multiple classes wish to utilise the workshop at once, it may be necessary for all students in a class to share it and have two teachers supervise. G3 has mentioned that his school doesn't offer enough workshops, which is a problem he also faces.

All G1, G2 and G3 agreed that the equipment employed for this unit was sufficient, appropriate, and modern. If equipment couldn't be given, G1 claimed he would display the footage to the students. When teaching Agricultural Science, G1 will occasionally take the students to the location where a system he created with fourth- and fifth-graders, such as the fertigation system, is being built. He will then demonstrate it for them so they may get hands-on experience even if they are unable to put it into practise. G2 stated that if the small equipment he needs for practise is not readily available, he will either purchase it himself or ask the students to do so. On the other side, the school will provide huge equipment. G3 also stated that if there is insufficient equipment, he will inform the chairman of the committee and request funding from PCG to make purchases from vendors.

Sub-theme 3: Evaluation

According to the interview data, all G1, G2, and G3 agreed that the course learning outcomes (CLO) assessment used in this unit is acceptable, consistent, and up to the KPM's criteria. G3 added in his statement that the teachers in his school have included 10% of the marks from the practical work as part of the end-of-year exam marks for students in form one and two, and mid-year exam for form three's students. This is how the teachers in his school have assessed learning outcomes (CLO) through practical work as classroom assessment (PBD). This is done as a token of appreciation from the teacher to the students who consistently put in a lot of effort and diligence to finish the practical job.

All G1, G2, and G3 respondents agreed that the unit assessment approach used is adequate when it comes to its appropriateness. The two methods of evaluation for this unit are written assessment and practical assessment. For Form One and Form Two's students, the practical work assessment method includes course work as PBD and a small percentage will be taken and added to the final exam scores. In contrast, the KPM has mandated that the Third Level Assessment (PT3) exam score for the third level comprise up to 30% of the coursework project.

The written assessment technique means that during the test or examination, students must respond to the questions that have been covered in this unit in writing on paper. For Form One, Two, and Three, there are two different kinds of written assessments: formative and summative. The first assessment test, the mid-year examination, and the second assessment test are used as formative assessments for form one and form two students whereas the final examination is used as a summative assessment. The initial assessment test and mid-year exam are the formative assessments for the third form, whilst the PT3 exam is a summative assessment.

Next, G1, G2, and G3 said that they provided students with information about the items/criteria and evaluation marks/scores in a straightforward and understandable manner. The teacher will outline the standards and degree of proficiency necessary for each topic's initial assessment in class (PBD). Before beginning the project's implementation, the evaluation criteria and marks, which comprise the standards of neatness, functionality, and labelling, are explained. It strives for students to be able to complete practical work that is correct and up to the established standards. When responding to review questions, the criteria and marks for written assessments are disclosed.

According to the proportion provided by the KPM for determining unit results and results for this subject, the marks or scores for each item or criterion are in line with that %. The marks for this topic are broken down into two categories: a written evaluation in the PT3 test worth 70% of the marks, and a coursework project worth 30% of the marks.

THEME 4: PRODUCTS

Sub-theme: Mastery of knowledge

The material of this unit is acceptable for the PT3 programme level based on the data from the interviews. This is demonstrated by the history of PT3 results, which often indicate approval levels above 80%. A few students also completed their education in agricultural classes during the fourth and fifth grades. Additionally, a few students at the university have pursued diploma and bachelor's degrees in agricultural disciplines including plantations and cattle.

There are other students who have successfully pursued careers in this area. In spite of this, G3 believed that second-graders would have a tough time understanding the idea of aquaponics. Overall, it is evident that the course material taught to PT3 students is adequate and even capable of bolstering students' knowledge and foundational skills in this area in preparation for upcoming obstacles like continuing their education and entering the workforce.

Results and Discussion

Four primary themes identified in this study will provide the basis for the discussion of research findings. In order to address the research objectives, this discussion examines the efficiency of the agricultural system design unit's implementation in the RBT subject in four dimensions based on the CIPP assessment model, namely the context, input, process, and product dimensions. The summary of results was presented in Table 3 accordingly.

Table 3
Summary of Results

Evaluation of Agricultural System Design Unit in Design and Technology Subjects Using CIPP Model: A Preliminary Study **Objective:** The effectiveness of the implementation of the field of agricultural science in RBT from the dimensions:		
Themes	Sub-themes	Results
1. Context	Program Educational Objective (PEO)	Understood and followed by the students.

	Program Learning Outcome (PLO)	Positive achievement by the students.
2. Input	Content and Course Learning Outcome (CLO)	i. The outcomes of the RBT subjects are consistent with the CLOs. ii. The content has been organized from the easiest level to the most difficult level in accordance with the learning taxonomy.
	Knowledge and teacher skill	Taught by instructors who have the necessary training and expertise in the subject.
	Teaching and learning equipment	Taught using adequate, appropriate, and modern equipment.
4. 3. Process	Implementation of teaching and learning process	SLT complies with the KPM criteria, which includes formal assessments, individual study, and face-to-face instruction.
	Application of facilities and equipments for teaching and learning	Using a various learning strategy, including video presentations by students and teachers, question-and-answer sessions, brainstorming sessions, and dialogues between teachers and students as well as student-to-student.
	Assessment	CLO was measured using a variety of assessment methodologies, including practical, written, formative, and summative assessments.
4. Product	Mastery of knowledge (Graduate and Industry)	i. This unit successfully matched the needs and experiences of the students. ii. CLOs were constructed to strengthen and prepare students to meet future challenges, such as pursuing higher education and entering the workforce, through the development of knowledge and skills. iii. More than 80% oof students passing in PT3 examination for this topic.

Context Dimension

The programme educational objective (PEO) of the agricultural system design unit in this RBT subject may be understood and followed by the students, according to the research findings. This is due to the fact that the teacher will always explain and communicate the goal for each new learning topic before the lesson begins. This step's goal is to introduce the issue to the students as a whole and provide an outline of what needs to be studied about it.

Teachers can use a variety of strategies to make learning objectives clear. The findings of this study revealed that all teachers verbally articulated the learning objectives of each topic, that is, they did so using simple sentences or language that students could easily comprehend. Some instructors use a different approach, illustrating the learning objectives with extra images in addition to the textbook. The students' degree of comprehension of the learning topic's goals has improved thanks to this technique.

The study conducted by Black and Wiliam demonstrates that teachers can also employ brainstorming techniques in groups during the learning aim explanation session 1998. Teachers and students can collaborate to accomplish the teaching objectives set forth by ARG if this description of learning objectives is put into reality 1999.

The programme learning outcomes (PLO) for the RBT subject's agricultural system design unit show that all students made progress in this unit. Students' mastery of the knowledge and abilities required for the task process might serve as evidence of their accomplishment. A strong PLO is a crucial component of any course, programme, unit, or subject. This is true because PLO serves as a road map for success and aids in achieving the goals that have been established. The study by Bateman et al (2017), which came to the conclusion that a well-planned and designed PLO can help in the achievement of programme goals, increase quality, and affirm the success of a programme, lends weight to this assertion. The PLO document is utilised as a guide for programme delivery, while the results are used as evidence of achievement during the teaching and learning process, according to Whitney et al (2015), who also corroborate the aforementioned claim.

Input Dimension

The content of the RBT subject's agricultural system design unit has been organised from the easiest level to the most difficult level in accordance with the learning taxonomy. This taxonomic hierarchy aligns with Bloom's Taxonomy, which Benjamin Bloom and his pedagogical team later established (Bloom et. al., 1956). The purpose of Bloom's taxonomy is to categorise educational goals and objectives and to offer a framework for classifying cognitive behaviour when it plays a significant role in the learning process. The six cognitive levels in Bloom's taxonomy are knowledge, understanding, application, analysis, synthesis, and evaluation, and they are arranged in a hierarchy from low to high. From simple to complicated, the levels are arranged in the hierarchy, with the lower levels serving as the building blocks for the higher levels. Anderson (2005) asserts that mastery of a lower level is a requirement for mastery of a higher one. In fact, students who have advanced to a higher level have inadvertently demonstrated their mastery of a lower one (Lister & Leaney, 2003).

The references and comments provided for the RBT subject's agricultural system design unit are always sufficient and pertinent. The use of references and notes as teaching and learning tools is crucial to the teaching and learning process. Additionally, it is a tool that aids students in problem-solving, information sharing, and thought organisation (Oshima, 2015).

Textbooks are the primary source of information and notes utilised in carrying out the teaching and learning process of this subject. Despite being viewed as a traditional approach, using textbooks in the teaching and learning process can benefit students. According to Prastowo (2012), textbooks have many advantages, including serving as a source of reference, an assessment tool, a tool for implementing the curriculum, and a guide for the teaching methods that will be used in the classroom. Additionally, textbooks are a vital tool for educating students and a powerful means of disseminating information. As a result, textbook information should be accurate and free from any doubts regarding its quality (Qhairunnisa, 2015).

The agricultural system design unit will be taught and learned for a total of two hours per week in this RBT subject. According to the student's level, the teacher is free to organise and split the hours between theoretical and practical learning. This is true because an effective scheduling of learning hours can produce the best learning outcomes (Pandang, 2013). Similar reasoning may be seen in

Hamalik's (1975) statement that time usage relative to required time determines how well students acquire new material. The above remark makes it obvious that teachers or those in charge of implementing education must spend time as efficiently and effectively as they can in order to prevent it from passing them by fruitlessly.

In order to accomplish the intended learning outcomes and even more, teachers must carefully organise their own learning. Setiawan (2000) says that there are a number of factors that must be taken into account when designing learning, including students, learning time, material organisation, thinking process development, teaching aids, and learning assessment.

All of the material in the RBT subject's agricultural system design unit can be covered by the teaching schedule. This unit's curriculum can be finished before the end-of-year exams and the end of the regular school year. In order to prepare for the end-of-year exams, teachers and students can review and practise during this period. Students can become familiar with the exam questions and recognise the crucial and frequently tested areas of the test by practising a lot. This claim is consistent with what Nawawi (2005); Salleh (2010) said when they said that repetition of exercises is a key component of effective learning strategies. Implementing repeated activities will help you become perfect at answering questions. The approach a person uses to train becomes more reliable and effective the more frequently they use it.

The outcomes of the RBT subjects are consistent with the course learning outcomes (CLO) of the agricultural system design unit. Learning outcomes are described as written directives that specify how a learner should succeed after participating in a course (Adam, 2004). This statement is compatible with Krathwohl's (2002) claim that the learning outcomes describe what the student must do or the subject's content. According to Proitz (2010), learning outcomes serve as a tool to enhance curriculum creation, planning for accountability, and evaluation of curricular efficacy. The course syllabus includes learning objectives, which are crucial since they aid instructors and students in understanding the course's goals. As it relates to course evaluation and assurance of the learning process, excellent course learning outcome (CLO) preparation is also crucial. According to Kennedy (2006), a strong course learning outcome (CLO) contributes to improved performance and content retention among students by making their learning experience more clear and meaningful. The overall goal of the learning outcomes is to make clear the knowledge, abilities, tools, and strategies that students should possess by the completion of the course.
The learning outcome (CLO) for the RBT subject's unit on agricultural system design is consistent with the taxonomy level of learning. The extent of knowledge acquisition learning in a subject is explained, described, and given assessment standards by a number of theories and taxonomies.
This RBT subject's agricultural system design unit is taught by instructors who have the necessary training and expertise in the subject. Because it is connected to learning outcomes, teachers of a subject need to have credentials, an academic background, and experience that are appropriate for the subject. Past research from several nations, including the United States (Wayne and Youngs, 2003), Finland, France, and Luxembourg (Teddlie and Reynolds, 2000), India, Mexico, and Tanzania (Luschei and Chudgar, 2016), as well as Kenya, South Africa, and Swaziland, can support this claim (Zakharov et al., 2016). Having an experienced instructor can enhance student behaviour, according to additional research by (Ladd and Sorensen, 2017). We discovered that experienced teachers are better equipped to handle a variety of educational difficulties and challenges, such as setting students' general goals and determining each student's unique needs, as is done in Malaysia (Senom et al., 2013). Additionally, having teachers who are competent in the subject, as well as having

teachers who need to have professional, social, and academic skills in addition to their teaching talents, is one of the crucial factors that favorably affects student accomplishment (Turmuzi et.al., 2022).

However, the issue that frequently surfaces has to do with the quantity and amenities of the workshop. Students utilise a lot of machinery, which increases the danger of accidents, thus the school should have enough workshops to accommodate the capacity that has been established for enrollment (Mustapha, 2000). To capture students' interest and ensure that the teaching and learning process runs smoothly in line with current technology development, workshop facilities that are up to date with needs are crucial for attaining the national dream (Hamidi, 1993).

The RBT subject's agricultural system design unit is taught using adequate, appropriate, and modern equipment. The school does have adequate equipment, but it must be used in groups. This issue needs to be resolved because typically students receive instruction and direction on how to correctly use workshop equipment (Bunawan, 2007). This is because offering quality tools for actual practise can result in engaging instruction (Saleh, 2002). In order to avoid interfering with the process of teaching and learning, comprehensive equipment must be given (Mohd, 1998).

Process Dimension

The implemented student learning time (SLT) complies with the KPM criteria. The number of hours students spend studying includes formal assessments, individual study, and face-to-face instruction. Face-to-face learning is crucial because instructors can connect with students through a direct feedback mechanism, which allows for a clearer view of student data through the gathering of feedback (Kay and LeSage, 2009; Wessels et al., 2007). According to Blasco-Arcas et al (2013), this feedback method is advantageous since it can foster greater student connection and involvement in the classroom, which will benefit students' learning.

Every student should take a more active role in their learning, including self-learning, which includes study time spent revising lessons at home. This is so that students' learning tactics, their perception of their own ability and competence, and their drive to complete assignments can all benefit from self-learning, claims (Larson, 2015). The level of student growth and mastery must also be known through formal assessment.

The use of presentations by students and teachers, question-and-answer sessions, brainstorming sessions, and dialogues between teachers and students as well as student-to-student are all common teaching techniques. Many researchers have endorsed the use of video as a teaching material (Mayer, 2005; Moreno and Mayer, 2000; Race, 2005; Zheng, 2009). Students can boost their learning and comprehend new ideas in a number of ways if various learning strategies, including video, are used. According to Clark et al (2006), using auditory and visual communication together seeks to support students with various learning preferences without taxing their cognitive processes. Additionally, this unit's teaching strategy incorporated active learning techniques. According to Koç et al (2010), students actually learn more when they actively participate in expanding their knowledge. This is true because active learning promotes critical thinking opportunities and interaction between students, teachers, and other students (Pundak and Herscovitz, 2009). When students speak, they frequently link concepts and structure their thoughts (Cook-Sather, 2011). Lessons delivered and eventually graded should be guided by course learning outcomes (CLOs) (Harden, 2002). In particular, assessment serves to gauge CLO achievement and is accomplished through the application of a variety of evaluation techniques (Biggs, 2011; Sigler and Rhee, 2014).

Day et al (2018)'s observation that the usage of various assessment methods influences students' grades and facilitates their easier and more effective achievement of learning objectives lends weight to this claim. For this unit's assessment, CLO was measured using a variety of assessment methodologies, including practical, written, formative, and summative assessments. Additionally, written assessment is critical because it is a popular and successful method of boosting student accountability (Laal et. al., 2013; Aranzabal et. al., 2019). The criteria for each assessment that is employed has been made explicit to the students. This is significant because, according to Delgado and Fonseca-Mora (2010), all assessments should include a rubric that clarifies the assessment methods and promotes better learning.

Product Dimension

Overall, the agricultural system design unit's curriculum content can help students in this RBT topic meet their learning objectives for the PT3 level. The learning in this unit successfully matched the needs and experiences of the students. The learning objectives of this subject are to strengthen and prepare students to meet future challenges, such as pursuing higher education and entering the workforce, through the development of knowledge and skills. The percentage of students passing in PT3 scores, which topped 80% passing in this Design and Technology (RBT) topic, further demonstrates the success of this unit's teaching and learning outcomes. The success of the students in being able to continue their studies at higher institutions in this sector is another indication of the program's successful product evaluation. Additionally, some students have successfully pursued careers in this industry.

Conclusion

The implementation of the agricultural system design unit in the RBT subject from the dimensions of context, input, process, and product based on the CIPP evaluation model is generally effective against the PT3 level, according to the study's findings and discussion thereof. Regarding the context dimension, students may easily grasp, follow, and attain the program's objectives and learning outcomes. The preparation of the teaching and learning process is adequate and appropriate for this unit in terms of input dimensions. The correct taxonomic level has been used to organise the curriculum's content. This unit will be taught by a teacher that is qualified and experienced in this subject. Regarding the process dimension, this unit's implementation procedures, including the way the teaching and learning process is carried out, how facilities and equipment are used, and how evaluation is done, are sufficient, appropriate, and meet or conform to the standards set by the Ministry of Education. The only issue that frequently comes up has to do with the dearth of workshops in schools where students can perform practical work. In terms of the product dimension, which is the end result of this unit's teaching and learning and includes the students' knowledge mastery, it can be said that the unit's content is appropriate for the PT3 programme level.

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