



IMPLEMENTATION OF THE MODULAR SYSTEM FOR MATHEMATICAL LEARNING ACTIVITIES IN TECHNICAL-VOCATIONAL HIGH SCHOOL - ESCOLA DE ECONOMIA E COMÉRCIO, DILI, TIMOR LESTE

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ABSTRACT

This study aims to describe the implementation of the modular system for mathematics learning activities in Ensino Secundário Técnico Vocacional – Escola de Economia e Comércio. The method used in this study is qualitative, with a case study approach. The result of this study showed that (1) mathematics lessons in every class are divided into several modules, such as first grade composed module one until module six, second grade composed module one until module six, and third grade composed module one until module five (2) The exam is carried at the end of the module (3) use a credit system (4) the exam schedule is determined by the teacher (5) students are not allowed to take the exam if they are absent for three times in each module (6) there are still teachers who do not understand well about how to implement module-based learning activities.

INTRODUCTION

One of the educational systems in high schools that is still active is vocational schools. Students who graduate from junior high school can continue their studies in that education (Hadi, 2021). This education has a strategic role in preparing human resources to work (Utomo, 2021). This education is also considered to develop human

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resources with the skills and knowledge to support a country's economy (Ridwan, 2021).

Timor-Leste is a developing country that needs improvements in various areas of education, especially vocational education. The use of effective learning methods is crucial in pedagogic activities, as it enhances students' skills and knowledge across all subjects. Mathematics is one of the essential subjects that students should study, particularly to equip them for various fields such as business, accounting, and engineering. According to Sumandya & Widana (2022), mathematics is vital for vocational school students due to the ongoing advancements in science and technology.

One of the biggest problems in learning activities in vocational schools in Timor-Leste is the conventional learning process. According to Damica et al. (2022), learning activities like this are considered tiring. This learning often fails to involve students in connecting the theories with the world of work. In connection with this problem, Direção Nacional do Ensino Secundário Técnico-Vocacional, Ministério da Educação de Timor-Leste, issued a policy for the implementation of module-based learning in all vocational and technical high schools based on Decree-Law No. 2/2008 of 16 January.

Modular learning is a flexible, student-centred approach that can improve learning outcomes. Modules are teaching materials designed to support student learning (Thamrin et al., 2022). In addition, with this module-based learning, students' abilities also increase (Maksum & Purwanto, 2022), and students can adapt to the characteristics of their environment (Setiyani et al., 2020) compared to the conventional teaching approach (Castroverde & Acala, 2021).

This research focuses on implementing a modular system for mathematics teaching at Escola de Economia e Comércio (School of Economics and Commerce), a vocational and technical high school in Dili, Timor-Leste. The school has three study programs. Such as Curso Técnico de Administrasau Secretariado, Curso Técnico de Contabilidade, dan Curso Técnico de Comercio. Based on the phenomenon the researcher observed in the Ensino Secundário Técnico Vocacional - Escola de Economia e Comércio de Becora (ESTV-EEC), the modular approach helps teachers and students understand and appreciate the system in the learning process. This research aims to describe the implementation of the modular system for

mathematics learning activities.

METHOD

This study used a descriptive qualitative method with a case study approach. Qualitative research is a broad field that describes meanings and moments in human life (Abad & Abad, 2022). Qualitative research aims to understand a phenomenon within a specific situation (Santos et al., 2020). A case study is a research strategy based on a set of procedures and involves more than one case (da Silva et al., 2021).

This research was conducted at the Ensino Secundário Técnico Vocacional – Escola de Economia e Comércio (ESTV-EEC), Dili, Timor-Leste. The subjects of the study were Mathematics Teachers, Students, and school or academic directors. The study's subjects were selected through purposive sampling. According to Lenaini (2021), this technique is a sample selection method used by researchers to ensure that the established criteria align with the research objectives.

Research data will be collected through in-depth interviews with teachers, students, school directors, and academic staff, and analysed using thematic analysis. According to Marques & Graeff (2022), thematic analysis is a qualitative method that can be applied in various fields, including education.

RESULT AND DISCUSSIONS

The results of this study indicate that the four informants were students and teachers, consisting of two students, one mathematics teacher, and one vice director. To facilitate analysis of the interview results, the researchers assigned labels to each informant: "inf 1M" for the teacher, "inf 2M" for the vice director, and "inf 1A and inf 2A" for the students.

In this study, the data obtained from the interview showed several main findings that reflect the implementation of the modular system in mathematics lessons at *Ensino Secundário Técnico Vocacional Escola de Economia e Comercio* (ESTV-EEC), such as the role of mathematics, mathematics modules, implementation of the modular system, the uniqueness of the modular system, and the advantages and disadvantages of the modular system. The following are the results.

A teacher at ESTV-EEC said that mathematics plays an important role in

interviews conducted by researchers with informants and in their discussions. The study programs offered include the Comércio e Contabilidade program. In line with this perspective, Sumandya & Widana (2022) stated that mathematics plays a very important role in the development of science and technology. Therefore, students need to learn in vocational schools.

"Implementation of a modular system for mathematics learning activities at ESTV-EEC de Becora, [...] in my observation, mathematics is also very important to be learned by students in the commerce and accounting study programs, [...]. (inf 1M, 2024)."

The mathematics learning materials taught in both study programs from grades one to three consist of several modules. Mathematics for grade one consists of 6 modules, grade two of 6, and grade three of 5. According to Putri et al. (2020), the use of modules in learning activities can significantly benefit students. Additionally, numerous studies have been conducted on the development of modules, particularly for mathematics education in vocational schools (Baidowi et al., 2023).

Implementation of the modular system for Mathematics Learning activities in ESTV-EEC de Becora consists of modules 1 to 6 for grade 10, modules 7 to 12 for grade 11, and modules 13 to 17 for grade 12. [...]. (inf 2M, 2024).

According to students, mathematics learning activities are carried out through theoretical and practical activities. However, students feel that mathematics is difficult because there are many calculations and modules. According to Harun et al. (2021), mathematics is a difficult subject that students find challenging and affects their learning outcomes. Therefore, practical activities are needed to improve students' skills (Putri et al., 2022).

The application of a modular system for mathematics learning activities at ESTV-EEC de Becora is carried out through theory and practice. [...] mathematics is difficult, there are many calculations, [...]. Mathematics has many modules [...]. (inf 1A, 2024).

Mathematics learning activities [...] are the same as other materials that start from one module at a time. If a module requires practice, we practice. (inf 2A, 2024).

Learning activities in technical-vocational schools differ from those in general high schools, where the learning process is based on a module system. Exam activities are carried out based on completed modules. At the end of each module, students must complete assignments through research activities based on the module material. Hadi (2021) said that learning activities in Vocational and General High Schools are very different. In Vocational Schools, learning activities are more

dominated by practice aimed at improving student skills. Approximately 70% of the learning focuses on practical activities, while only 30% on theoretical content (Suharno et al., 2020).

[...] The implementation of mathematics is similar to other subjects, following the same evaluation criteria. Students participate in modular exams and complete various tasks that involve research and analysis. They then present their findings in the classroom and prepare reports on topics assigned by the teacher, [...]. (inf 2M, 2024).

Unlike general high schools, where exams are typically conducted simultaneously across trimesters, technical-vocational schools administer exams based on completed modules. In this module system, teachers must make a schedule for when the module will be completed and then submit it to the calendar. Regarding exam activities, Putra et al. (2020) stated that in vocational schools, exams are conducted as competency tests, an effort by the government to improve students' skills and knowledge.

Firstly, the teacher must prepare a schedule. The schedule for teachers has been set in the curriculum, so teachers must make a schedule to determine when the module will be completed and then confirm the schedule in the curriculum section to adjust. If the module is complete, based on the teacher's schedule, especially the lesson plan for the module, the teacher prepares the calendar. (inf 2M, 2024)

One unique feature of Technical-vocational schools that is not found in general high schools is the credit system. At the end of each module, if students do not meet the graduation criteria, they will not pass that module, which is known as the credit system. The credit system is an educational innovation that can facilitate students who possess the capability to master (Fitriyanto & Purnomo, 2021) and complete various lessons in a short time (Baitiyah et al., 2024).

[...] this modular system uses a credit system, [...]. (inf 1M, 2024).

Implementing this module system has both advantages and disadvantages. The advantage of this module system is that if students fail one module, they still have the opportunity to improve their results and pass, and this depends on each teacher's method. Exams are a systematic process for measuring student achievement (Kamil & Pramulia, 2019), while retakes are other teachers' strategies to motivate students in learning activities (Tambunan, 2020).

The advantage of using the modular system [...] is that if some students do not pass or receive credit in a module, they can meet with the module's teacher to discuss recovery options, depending on the teacher's approach, [...]. (inf 1M, 2024).

[...] and if some students receive credit or fail a module, they have the right to recover their value for the module they received credit for (inf 2M, 2024).

Another advantage of the module system is that examination activities in technical-vocational schools differ significantly from those in general high schools. The examination activities are carried out at the end of each module, so students have time to rest before continuing to the next module, and the examination schedule is not tied to the Ministry of Education calendar. According to Fibrianti & Suhanadji (2020), an evaluation of the modular system can be conducted either at the end of each course module or at the end of the semester.

[...] If the modules for the learning activity are completed, students can take a break (inf 1M, 2024).

The advantage of using the modular system [...] provides flexibility for students. After the modular learning activity concludes, students can have a break because this system does not rely on the Ministry of Education calendar, unlike general secondary schools do, [...]. (inf 2M, 2024).

[...] because the modular system is examined according to modules. After one module is examined, the next module is examined. (inf 1A, 2024).

[...], Because each module examines the modular system, one module is evaluated before moving on to the next. (inf 2A, 2024).

On the other hand, the disadvantage of the module system is that if a student is absent three times in a module, they are not allowed to take the module exam.

The disadvantage of using the modular system is that students who miss 3 times in a module will not take the module's exam. They must wait for the next stage. (Inf. 1M, 2024).

[...] and students who miss each module 3 times or more will not take the exam and wait for another year, because this is a credit system. (inf 2M, 2024).

Another disadvantage of this system is that some teachers still do not fully understand how to implement learning activities aligned with the module system.

The disadvantage of using a modular system is that some teachers do not understand it and cannot adapt to it [...]. (inf 1M, 2024).

CONCLUSIONS

Based on the results and discussion, the researcher concluded that:

1. Mathematics lessons are organised into several modules: first grade has six modules, second grade has six modules, and third grade has five modules.
2. Evaluation activities at vocational-technical schools are conducted at the end of each module and use a credit system, but students still have the opportunity to retake the exam, depending on each teacher's method.
3. The teacher determines the evaluation schedule, as vocational schools do not use trimester exams.
4. Students who are absent three times in each module will not be permitted to

take the module exam.

5. Some teachers do not understand how to implement learning activities effectively based on the modusle system.

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