Journal of Office Administration: Education and Practice

Volume 6 Issue 2, pp.144-164 (2026)

Hompage: https://ejournal.unesa.ac.id/index.php/joa

Design and Expert Validation of a Multi-Type Cooperative Learning E-Module for the MPLB Business Process Element

Latifah Nur Amalia[a], Umar Yeni Suyanto[a], Muhammad Salman[b]

[a]Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[b]Government College University Lahore, Lahore, Pakistan

ARTICLE INFO

Keywords:

Cooperative Learning, E-module, Feasibility, MPLB, Business Process

Article History:

Received June 22, 2026
Revised July 24, 2026
Accepted August 10, 2026
Available online August 30, 2026

Correspondence:

Umar Yeni Suyanto, Office Administration Education, Faculty of Economics and Business, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia. Email: umaryenisuyanto@uny.ac.id

ABSTRACT:

This study addresses the limited availability of innovative learning resources aligned with the "Kurikulum Merdeka" (Independent Curriculum) for the "Business Processes" topic within the Office Management and Business Services (MPLB) field, specifically by integrating cooperative learning. The study aimed to develop and evaluate the feasibility and practicality of a multi-type cooperative learning e-module for Grade X MPLB students at SMK Negeri 1 Bantul, employing the Research and Development (R&D) method using the 4D model (limited to the Define, Design, and Development stages). The subjects involved a content expert, a language expert, an instructional design expert, 10 students for the limited trial, and 64 students for the field trial. The e-module was created using the Heyzine flipbook platform and incorporated four cooperative learning types: Jigsaw for "MPLB Concepts," Group Investigation for "Supply Chain Management," Teams Games Tournament (TGT) for "Occupational Health and Safety (K3)," and Think-Pair-Share (TPS) for "5R" (5S). Expert assessments yielded "Highly Feasible" ratings: 98.6% from the content expert, 100% from the language expert, and 80% from the instructional design expert. Student responses indicated a "Highly Practical" rating in both the limited trial (92.9%) and the field trial (89.8%). This research contributes an e-module that aligns specific cooperative learning methods with the characteristics of each topic, thereby fostering active learning within the context of SMK Negeri 1 Bantul.

INTRODUCTION

The dynamics of education, particularly regarding quality, present a pressing issue that requires resolution. The 2022 Programme for International Student Assessment (PISA) study

placed Indonesia among the bottom three countries in ASEAN, ranking 66th out of 81 nations globally (Javier, 2023). This situation is corroborated by the 2015 Trends in International Mathematics and Science Study (TIMSS), which ranked Indonesia 44th out of 49 countries. Meanwhile, the 2024 education report indicates that vocational high school (SMK) students achieved literacy and numeracy scores of 63.48% and 59.82%, respectively, with a learning quality score of 61.37%, placing them in the "moderate" category. This situation is further compounded by the fact that the increase in learning quality scores for vocational high schools in 2024 was only 0.94% compared to 2023 (BSKAP, 2024). These findings reflect a general state of educational quality that still requires improvement across various aspects. In response to these quality-related issues, the Indonesian government launched the Kurikulum Merdeka (Independent Curriculum), which emphasizes teachers' freedom to innovate and focus on deepening competencies tailored to students' needs (Nirwana et al., 2024).

Consequently, the implementation of this curriculum is expected to serve as a strategy to drive improvements in educational quality, including at the vocational high school level. The Kurikulum Merdeka emphasizes learning flexibility and grants teachers the autonomy to select methods relevant to student needs (Wahyuni, 2022); it also promotes project-based learning through the "Project to Strengthen the Pancasila Student Profile," which aims to foster collaboration, independence, and critical thinking (Nafi'ah et al., 2023). Assessment within this curriculum encompasses both formative and summative aspects, with feedback serving as a mechanism to support student learning progress (Nirwana et al., 2024). Since its establishment as Indonesia's national curriculum through the Regulation of the Minister of Education, Culture, Research, and Technology Number 12 of 2024, the Kurikulum Merdeka (Emancipated Curriculum) has been implemented in 369,875 schools, including 13,428 vocational high schools (Kementerian Pendidikan Dasar dan Menengah, 2025). Of the 206 vocational schools implementing this curriculum in the Special Region of Yogyakarta, 45 are in Bantul Regency.

Despite widespread implementation, issues regarding the quality of learning persist. The 2024 Education Report Card places the Special Region of Yogyakarta in the "moderate" category for learning quality (BSKAP, 2024b), and the proportion of students in the province possessing adequate literacy and numeracy skills remains below the national average. In the context of vocational high schools (SMK), a challenge arises regarding graduate competency achievement recorded at 45.61%, which indicates a skills gap relative to workforce demands (Rahmadhani et al., 2022). This contributes to the open unemployment rate among SMK graduates (8.63%), which remains the highest compared to other educational levels (BPS,

2026). This situation stems from various factors, such as the unequal distribution of resources, technical and financial constraints, and low levels of teacher digital competence (Rahmawati et al., 2025; Wang, 2024). Meanwhile, a primary factor explicitly identified by the regional education agency is the limited availability of innovative teaching materials aligned with the curriculum (Disdikpora DIY, 2024). This factor serves as the focal point for further examination in this study.

The availability of innovative teaching materials plays a crucial role in ensuring that learning keeps pace with modern developments and technology. Innovative teaching strategies such as problem-based learning, inquiry-based learning, and collaborative learning are believed to enhance active student participation and engagement, ultimately impacting learning outcomes (Qureshi & Jamil, 2023). Implementing active learning strategies integrated with technology and inclusive leadership can significantly improve critical thinking skills, engagement, and overall academic performance (Bhuttah et al., 2024). Thus, the provision of innovative teaching materials is vital in producing competent SMK graduates who meet industry needs.

As a designated Vocational High School (SMK) Center of Excellence, SMK Negeri 1 Bantul faces challenges regarding the availability of innovative teaching materials. A review of the school library's collection revealed only two book titles relevant to the current curriculum for the Office Management and Business Services (MPLB) program, while the rest of the collection still aligns with the previous curriculum. Most students rely on worn-out, borrowed student worksheets that fail to cover the supply chain management competencies required under the "Business Processes" element of the Fundamentals of Office Management and Business Services subject. A contributing factor to this issue is the underutilization of the government's Merdeka Mengajar (Freedom to Teach) platform, which was specifically designed to bridge the gap in reference material availability. Nearly 60% of the school's teachers are nearing retirement age and find the platform's features overly complex (Tessa & Humaedi, 2024). Interviews with relevant subject teachers confirmed that supply chain material has never been taught due to a lack of adequate references, even though this competency is a mandatory learning outcome for the MPLB Phase E curriculum (Apriyanti, 2023).

This scarcity of resources coincides with poor student learning outcomes. Over the last three academic years, the percentage of Grade X MPLB students meeting the Minimum Mastery Criteria (KKM) in the odd-semester final assessments for the Fundamentals of Office Management and Business Services (MPLB) subject stood at only 1% (2022/2023), 0%

(2023/2024), and 21% (2024/2025). These results confirm that the limited availability of interactive teaching materials is a contributing factor to suboptimal learning processes. Further classroom observation revealed that students tended to be passive during group discussions with active participation from all members observed in only two out of six groups and rarely asked or responded to questions. Studies indicate that the cooperative learning approach fosters positive relationships among students, ultimately enhancing academic achievement (Hasanah & Himami, 2021; Nurfalaq et al., 2022). Meanwhile, the availability, development, and utilization of appropriate learning resources are widely regarded as key determinants of learning success (Samsinar, 2020). Consequently, developing interactive teaching materials based on a cooperative approach is crucial for addressing these issues.

Previous research has examined the use of electronic modules to enrich learning resources. Fidarti & Nurharini (2023) found that "Milkshake"-based digital modules were highly suitable for improving student learning outcomes. Pramana et al. (2020) and Ahdhianto et al. 2024 reported similar feasibility levels for problem-based learning electronic modules, noting their effectiveness in enhancing problem-solving and critical thinking skills. Susiliastini & Sujana, 2022 also validated flipbook-based media as an innovative and accessible learning tool. Meanwhile, Wardani et al. (2024) developed a cooperative electronic module using Canva but limited the instructional design to a single model: the Jigsaw type. Although prior studies have developed various modules to enrich learning resources, most have focused on general subjects rather than vocational competencies in office administration. Research integrating multiple types of cooperative learning remains limited, failing to fully accommodate the diverse characteristics of students and the varying objectives of the subject matter. This represents a gap in the literature regarding electronic module development, particularly within the context of cooperative learning at the vocational high school (SMK) level.

Studies indicate that cooperative learning is a model that facilitates and empowers active, procedure-based learning. It operates through small-group dynamics to maximize the learning process among students. Broadly, cooperative learning encompasses problem-based learning, team learning, collaborative learning, and PALS (W. Johnson & T. Johnson, 2019). It serves as a key mechanism for transforming students from passive to active participants; through small groups, they complete academic tasks and gain opportunities to share ideas, solve problems, and engage in argumentation (Johnson & Johnson, 2008). Furthermore, employing a design that combines multiple types of cooperative learning allows for the effective accommodation of diverse student learning characteristics (Geletu, 2022; Usman et al., 2022). This also

supports the design of the Kurikulum Merdeka (Independent Curriculum), which emphasizes instruction tailored to students' characteristics to ensure learning objectives are met (Elfitra et al., 2024; Handayani et al., 2024). Meanwhile, the product development process must consider aspects of validity, practicality, and effectiveness to ensure the module not only incorporates various types of cooperative learning but also demonstrates quality in terms of content, design, language, and usability (Aldilla & Usmeldi, 2024). Thus, cooperative learning plays a crucial role in development, particularly in fostering active student participation and enabling students to gain understanding through an independent learning process within the classroom.

Addressing this gap, this study aims to develop an electronic module that integrates various types of cooperative learning specifically for the "Office Management and Workplace Business Services" business process element for Grade X MPLB students at SMK Negeri 1 Bantul. The study offers a novel approach by combining different cooperative learning models within the electronic module to accommodate diverse student characteristics, alongside an analysis of the module's practicality. Consequently, this study contributes to the provision of interactive learning materials capable of catering to the varied characteristics of students in the vocational high school (SMK) MPLB program.

METHOD

Research Type

This study used the Research and Development (R&D) method, a research approach aimed at investigating, designing, producing, and testing the validity of a product (Sugiyono, 2023). The resulting product was a cooperative-learning-based electronic module addressing the business process element of office management and business services in the workplace for Grade X MPLB students. The development model applied was a modified 4D model (Define, Design, Develop, Disseminate), limited to the define, design, and development stages, since the study's purpose was restricted to producing a valid and feasible product rather than disseminating it widely. The 4D model, introduced in 1974 by Thiagarajan, Semmel, and Semmel (Mesra et al., 2023), was selected because its stages are well matched to curriculum-based instructional-material development (Waruwu, 2024); its concept- and task-analysis stages help translate general learning outcomes into specific, well-directed objectives (Agustina & Vahlia, 2017); and its procedures are relatively simple to implement within a limited timeframe (Maydiantoro, 2021).

Location and Time of Research

The study was conducted at SMK Negeri 1 Bantul, located on Jalan Parangtritis Kilometer 11, Dukuh, Sabdodadi, Bantul District, Bantul Regency, Special Region of Yogyakarta. Observation and interviews were conducted from January 24 to February 25, 2025. The Define stage was held from February 26, 2025 – March 15, 2025. The Design stage was held from March 16, 2025 – April 28, 2025. The Development stage was held from April 29, 2025 – August 19, 2025. Meanwhile, a limited trial was held on July 15, 2025, while the field trial was held on July 25, 2025.

Research Subjects and Object

The research subjects consisted of a subject matter expert (an MPLB "Business Processes" teacher with an educational background in office administration and teaching experience dating back to 1996), a language expert (an Indonesian grammar specialist lecturer holding a master's degree in literature), an instructional design expert (a lecturer holding a doctorate in educational management with certifications in instructional design and e-learning), 10 Grade X MPLB students for a limited trial, and 64 Grade X MPLB students for a field trial. A total of 74 students came from classes X MPLB 1 and X MPLB 2 at SMK N 1 Bantul. Grade X MPLB students were selected because they study topics related to office management business processes and workplace business services. The object of this research is an electronic module based on cooperative learning, covering the subject of office management business processes and workplace business services.

Development Procedure

The development procedure followed the modified 4D model (Mesra et al., 2023), consisting of three stages. The define stage consisted of five steps: front-end analysis (interviews with the subject teacher, document study of teaching administration and student results, observation of school facilities, and observation of classroom learning), learner analysis (identifying students' activeness and responses during learning), task analysis (identifying core competencies and formulating learning activities, indicators, and assessment forms based on the Phase E learning outcomes), concept analysis (determining and systematically sequencing the core material), and formulation of learning objectives, which were subsequently arranged into a Learning Outcome Flow (ATP) in Audience-Behaviour-Condition-Degree (ABCD) format.

The design stage consisted of four activities: constructing a criterion-referenced test (developing both a feasibility-assessment instrument for experts and students, and a diagnostic/formative assessment for measuring student understanding), media selection (the Heyzine flipbook was selected as the delivery medium), format selection (following the systematics of the 2024 Learning and Assessment Guidebook issued by the Ministry of Education, Culture, Research, and Technology, modified to the product's needs), and drafting the initial design using the Canva application.

The development stage began with transforming the initial design into the final product by uploading it to the Heyzine flipbook platform. The product then underwent feasibility validation by the material, language, and instructional design experts, followed by revision based on their input, a limited trial involving 10 students, and a field trial involving 64 students.

Instruments and Data Analysis Techniques

Four assessment instruments using a five-point Likert scale (1-5) were used in this study. Material expert instrument which includes content presentation (5 items), material presentation (5 items), and curriculum relevance (5 items); a linguist instrument that includes 12 linguistic indicators; instructional design expert instrument covering aspects of curriculum (4 items), methods (2 items), evaluation (3 items), and layout (3 items); as well as student response instruments which include aspects of material, appearance and motivation. These instruments were adapted from Ummah (2021), Fidarti & Nurharini (2023), Tsuroyya et al. (2022), Pramana et al. (2020), Ahdhianto et al. (2024), and Susiliastini & Sujana (2022) by combining statements forming the same indicators with literature considerations. Qualitative data obtained from expert and student suggestions were analyzed descriptively, while quantitative assessment data was averaged and converted into percentages using the formula: Result = (obtained score / expected score) × 100% (Sugiyono, 2023). The percentages obtained were classified into four categories: 0-20% (Very Infeasible/Practical), 21-40% (Not Feasible/Practical), 41-60% (Fairly Eligible/Practical), 61-80% (Eligible/Practical), and 81-100% (Very Feasible/Practical) with a minimum eligibility threshold of ≥61% (Modification of Croasmun dan Ostrom (2011); Saski & Sudarwanto, 2021).

RESULTS AND DISCUSSIONS

Development of a Cooperative Learning-Based E-Module

The "define" stage identified several fundamental issues. First, teacher and student access to learning resources aligned with the Kurikulum Merdeka (Independent Curriculum) remains limited. Second, the only available teaching module downloaded from the Platform Merdeka Mengajar did not cover the supply chain management competencies required by the Phase E learning outcomes. Third, classroom instruction relied heavily on lectures without presentation aids, causing students to remain passive whether prompted or when answering questions. Fourth, group discussions were suboptimal due to a lack of participation from all members. Fifth, for three consecutive years, most students failed to meet the minimum mastery criteria in their odd-semester final assessments.

These findings guided the task and concept analysis phases, resulting in the formulation of four key topics: office management and business service concepts; supply chain management in goods handling services; Occupational Health and Safety (K3); and the 5R workplace organization concept (Ringkas, Rapi, Resik, Rawat, Rajin or Sort, Set in Order, Shine, Standardize, Sustain). Each topic was paired with a specific cooperative learning method Jigsaw, Group Investigation, Teams Games Tournament, or Think-Pair-Share based on its instructional characteristics, with a time allocation of six lesson periods per topic.

During the design stage, criteria-based instruments were developed to measure product feasibility and student understanding. Heyzine Flipbook was selected as the presentation medium because it is accessible online without requiring specialized software. The module format adhered to the Ministry's official guidelines for learning and assessment, and the initial layout was created using Canva. In the development stage, the initial design was uploaded to Heyzine and refined to utilize the platform's available features. The product was then validated by subject matter experts, linguists, and instructional design experts, and subsequently revised based on their feedback. Overall, the experts provided input, and revisions were made regarding the following points.

Table 1. Subject Matter Expert Advice

Suggestion	Before	After
One of the learning activities is changed to an observation of the surrounding environment.	Learning activity 4 consists of creating a poster.	Learning activity 4 consists of creating a poster based on observations made within the school environment.

Table 2. Linguistic Expert Advice

Suggestion	Before	After
Hyphens (-) in repeated words are written without spaces.	Hyphens (-) in repeated words are written with spaces.	Hyphens (-) in repeated words are written without spaces.
Slashes (/) are written without spaces.	Slashes (/) are written with spaces.	Slashes (/) are written without spaces.
Foreign words are written in italics.	Some foreign words are still not written in italics.	All foreign words are written in italics.
The first word after a period (.) is capitalized.	Some words following a period (.) are still not capitalized.	All words following a period (.) are capitalized.
Typographical errors need to be corrected.	Some typographical errors remain.	All typographical errors have been corrected as suggested.
Some sentences have been revised to be effective.	Some sentences remain ineffective.	All sentences have been revised to be effective as suggested.

Table 3. Advice from an Instructional Design Expert

Suggestion	Before	After
The learning objectives are written using the ABCD format.	The learning objectives do not yet use the ABCD format.	The learning objectives are written using the ABCD format.
The student worksheet includes learning outcomes and learning objectives.	The student worksheet does not yet include learning outcomes and learning objectives.	The student worksheet includes learning outcomes and learning objectives.

Subsequently, the product underwent a limited trial with 10 students and a field trial with 64 students. Neither trial required further revision before proceeding to the next stage.

Final Layout of the E-Module

This e-module is designed to comprise several sections: a cover page, instructions for use, table of contents, preface, module details, learning outcomes and objectives, remedial and enrichment assessment programs, learning objective flow, diagnostic assessment, instructional content, student worksheets and assessment instruments, summative assessment, reflection, references, and the developer's profile.

Figure 1. Front and Back Cover of the Developed E-Module

This e-module incorporates navigation features to enhance usability. As shown in Figure 2, an interactive table of contents links each entry directly to the corresponding page, allowing students to access specific content, worksheets, or assessments immediately without the need to scroll through page after page. This feature supports independent learning, enabling students to progress at their own pace. Each content page also illustrated in Figure 2 follows a consistent structure comprising the topic outline, learning activities, the procedural steps (syntax) of the specific cooperative learning method employed, and the core subject matter itself; consequently, regardless of whether a unit utilizes the Jigsaw, Group Investigation, Teams Games Tournament, or Think-Pair-Share method, students always remain aware of their current position within the learning sequence.

Figure 2. Interactive Table of Contents and a Sample Material Page

Figure 3 illustrates two additional features that received positive feedback from both reviewers and students. On the left, the completed flipbook features a page-turning effect accompanied by the sound of rustling paper; this transforms what is technically a PDF document into something that looks and functions on-screen like a real physical book. On the right is an example page from the Student Worksheet, which guides students through the material overview, time allocation, tools and materials, learning outcomes and objectives, and the procedural steps for each cooperative task.

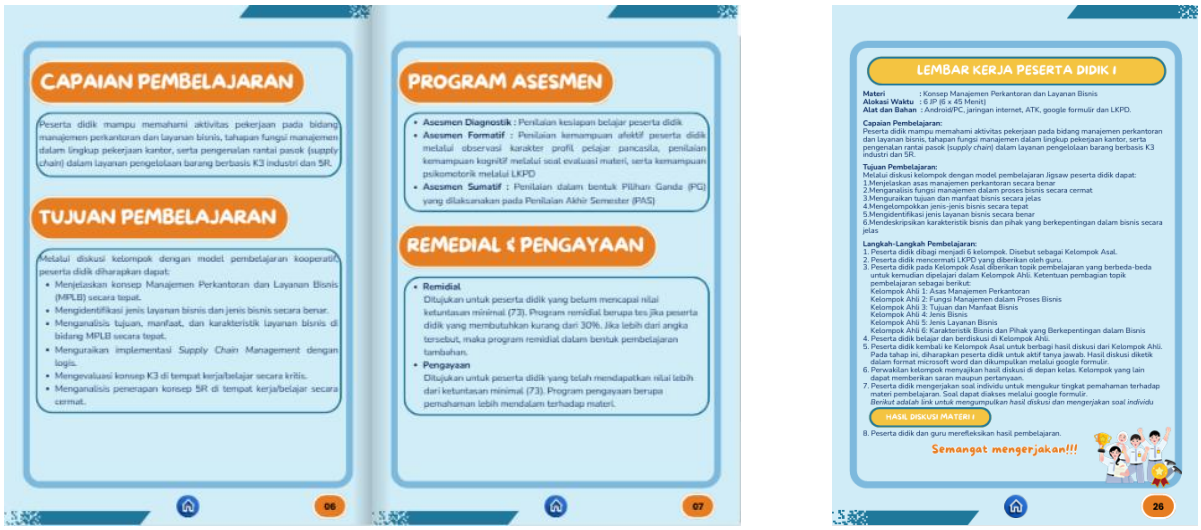

Figure 3. Book-Flip Display of the Flipbook and a Sample Student Worksheet (LKPD) Page

In addition to these static elements, the final product includes clickable links on the diagnostic assessment, discussion submission, formative assessment, and reflection pages that direct students to the corresponding Google Forms; it also displays YouTube video thumbnails

for content supported by video material, along with on-screen controls for zooming, full-screen viewing, and volume adjustment.

Feasibility of the E-Module

Feasibility data obtained from subject matter experts, language experts, and instructional design experts is summarized in the following table.

Table 4. Summary of Feasibility Results

No	Validator	Average Score	Percentage	Category
1	Material expert	4.9	98,6%	Highly Feasible
2	Language expert	5.0	100%	Highly Feasible
3	Instructional design expert	4.0	80%	Highly Feasible

Source: primary data processed.

All five validation sources placed the e-module in the "Highly Feasible" category, well above the ≥61% minimum threshold, indicating that the product is suitable for use as a learning resource for the MPLB Business Process element.

Material, Language, and Instructional Design Validation

The material expert's assessment covered content presentation (96%), material presentation (100%), and curriculum relevance (100%), yielding an average of 98%. This result indicates that the material is systematically presented and aligns closely with the Phase E learning outcomes and the dimensions of the Pancasila Student Profile. The language expert's assessment, covering twelve indicators such as accuracy of sentence structure, term standardization, and conformity with the Enhanced Indonesian Spelling System, obtained a full score of 100%, indicating that the module's language is precise, communicative, and easily understood by students. The instructional design expert's assessment, covering curriculum, method, evaluation, and layout aspects, obtained 80%, the relatively lowest of the three expert scores, mainly reflecting suggestions for clarifying the learning objectives statement; nevertheless, this score remains within the Highly Feasible category.

Student Responses: Limited Trial and Field Trial

Student responses were measured across three aspects: material, appearance, and motivation, as shown in Table 5.

Table 5. Student Response Results by Aspect

No	Aspect	Limited Trial (%)	Field Trial (%)	Category
1	Material	91.6%	89.4%	Very Practical
2	Appearance	94%	90.0%	Very Practical

No	Aspect	Limited Trial (%)	Field Trial (%)	Category
3	Motivation	93.2%	90.2%	Very Practical

Source: primary data processed.

The results of the practicality test, both the limited trial and the field trial, showed a percentage of ≥61%. This indicates that the e-module is acceptable and practical for students to use in learning. Both trials produced consistent results across all three aspects. The slightly lower percentages obtained in the field trial compared to the limited trial are consistent with the larger and more heterogeneous sample (64 versus 10 students), yet both remain firmly within the Very Practical category, indicating that the e-module is easy to understand, visually appropriate, and capable of sustaining students' motivation regardless of group size.

A closer, indicator-by-indicator comparison of the two trials, presented in Table 6, shows that this consistency holds not only at the aspect level but also at the level of individual statements.

Table 6. Detailed Results of the Limited Trial and Field Trial by Indicator

No	Aspect	Indicator	Limited Trial	Field Trial
1	Material	The material is easy to understand	4.6	4.5
2	Material	The material is presented sequentially and clearly	4.8	4.5
3	Material	The material corresponds to real-life situations	4.6	4.4
4	Material	The material encourages independent learning	4.4	4.5
5	Material	The questions help students understand the material	4.5	4.5
6	Appearance	The cover design matches the learning topic	4.5	4.5
7	Appearance	The font used is clear	4.8	4.5
8	Appearance	The images match the material	4.7	4.5
9	Appearance	The colors used make information easy to read	4.8	4.6
10	Appearance	Visual elements are neatly and consistently arranged	4.6	4.5
11	Motivation	The module helps students understand the material	4.7	4.5
12	Motivation	The module encourages collaboration through discussion	4.7	4.5
13	Motivation	The module encourages independent learning	4.5	4.4
14	Motivation	The module provides a varied learning atmosphere	4.7	4.6
15	Motivation	The module makes learning enjoyable	4.7	4.5

Source: primary data processed. Scale 1-5.

Across nearly every indicator, ratings from the ten limited-trial students and the sixty-four field-trial students converge within a narrow band of 4.4 to 4.8, with only marginal decreases in the field trial - most visibly on indicators addressing the material's connection to real-life situations and to independent learning, which nonetheless remained well above the midpoint of the scale. The highest-rated indicators in both trials were the clarity of the module's presentation sequence and its font legibility. At the same time, collaboration-related items under the Motivation aspect were consistently rated among the most favorable, lending direct support to the module's central design premise that pairing curriculum content with a matched cooperative learning type keeps students engaged whether they work in a small pilot group or a full classroom cohort.

Discussion

These findings align with previous research indicating that well-designed electronic modules possess a high level of suitability for classroom use (Fidarti & Nurharini, 2023; Pramana et al., 2020; Ahdhianto et al., 2024; Susiliastini & Sujana, 2022). This study extends that body of research by directly integrating cooperative learning into the module's instructional design, rather than treating the two as separate interventions. Unlike Wardani et al. (2024) who employed a single model (Jigsaw) in a cooperative e-module for vocational high school students—the module developed in this study incorporates a variety of cooperative learning methods tailored to the specific subject matter: Jigsaw, Group Investigation, Teams Games Tournament, and Think-Pair-Share. Consequently, each method is aligned with the characteristics and objectives of the relevant material (Hasanah & Himami, 2021; Nurfalaq et al., 2022).

Table 7. Selection of Cooperative Learning Types

Subject Matter	Tipe Cooperative Learning	Characteristics of the Subject Matter and Basis for Selection
Office Management and Business Services Concepts	Jigsaw	The material covers definitions, principles, functions, benefits, objectives, and characteristics of business. The Jigsaw method's sub-topic division allows students to become experts and then teach one another, ensuring a comprehensive understanding of the concepts.
Supply Chain Management Concepts in Goods Management Services	Group Investigation	The material requires an understanding of the key components, objectives, and implementation of supply chain management within business processes. Group Investigation activities such as investigation, information gathering, discussion, and group presentations are well-suited to facilitate this learning process.

Subject Matter	Tipe Cooperative Learning	Characteristics of the Subject Matter and Basis for Selection
Occupational Health and Safety (OHS/K3) Concepts	Teams Games Tournament (TGT)	The material focuses on mastering basic concepts and the application of OHS. Activities are needed to reinforce conceptual understanding through questions and academic games. The teamwork and academic competition inherent in TGT effectively foster active participation.
The 5R Concepts (Ringkas, Rapi, Resik, Rawat, Rajin / Sort, Set in Order, Shine, Standardize, Sustain)	Think Pair Share (TPS)	The material involves mastering concepts alongside descriptions of behaviors and practical application. It requires individual analysis, solution design, and discussion of results all of which are effectively accommodated by the TPS method.

Specific cooperative learning models were selected based on the characteristics of the material associated with each competency indicator. The "Office Management and Business Services Concepts" material utilizes the Jigsaw method to ensure that sub-concepts are distributed and integrated through knowledge exchange among students. Jigsaw is an appropriate choice because it assigns individual responsibility using "expert groups" and "home groups," prioritizing collaboration, peer learning, and communication (Jeppu et al., 2023). The "Supply Chain Management" material focuses on conceptual understanding and its implementation within business processes. Investigative activities involving the division of topics into specific tasks, discussions, information gathering, and the presentation of findings—facilitate student exploration and provide ample opportunity for constructing understanding (Hong et al., 2022). The "Occupational Health and Safety (K3)" material requires an understanding of practical applications, best addressed through exercises, teamwork, repetition, and academic competition. Teams-Games-Tournament (TGT) serves as a game-based approach that fosters engagement through group interaction, thereby maximizing learning outcomes (Kurniawan et al., 2026). The "5R" material involves identifying behaviors and solutions, as well as analyzing challenges. An instructional design that allows students to debate, test ideas, and make refinements in pairs before sharing them with the larger group—is ideal for facilitating the exchange of perspectives, critical thinking, and idea development (Li & Tu, 2024). Consequently, Think-Pair-Share (TPS) is well-suited for the 5R material.

This design aims to develop competencies that extend beyond mere collaboration; these include communication and social responsibility (via Jigsaw), as well as critical thinking, analysis, and problem-solving (via Group Investigation, TGT, and TPS). Furthermore, this approach ensures a varied and dynamic learning experience, aligning with the view that

cooperative learning fosters positive student relationships and ultimately enhances learning outcomes (Hasanah & Himami, 2021; Nurfalaq et al., 2022).

In practical terms, this e-module addresses the identified gap in learning resource availability at SMK Negeri 1 Bantul by providing for the first time supply chain management material aligned with the "Business Processes" curriculum element. The material is complemented by Student Worksheets (LKPD) and support videos, offering both teachers and students an accessible, curriculum-aligned reference that was previously unavailable. Theoretically, these findings reinforce the notion that the development of appropriate learning resources is a key determinant of instructional quality (Samsinar, 2020). The study also provides further evidence specifically within the context of office administration vocational education that cooperative learning-based digital modules can achieve high levels of feasibility regarding both content and pedagogical design.

Several limitations should be considered when interpreting these findings. First, since the module is accessed via the Heyzine flipbook platform, its use depends on internet access, and its interactivity is more limited compared to dedicated e-learning platforms; this issue was partially mitigated by directing students to Google Forms to complete exercises and provide reflective feedback. Second, the study was limited to the define, design, and development stages of the 4D model and the feasibility test; it did not extend to the dissemination stage or an effectiveness test regarding learning outcomes, as the research objective was confined to producing a valid and feasible product. The study was also limited by having only one validator in each category. Furthermore, one of the teacher-validators also participated in the needs analysis interview process, introducing a potential bias in the product assessment. The very high assessment scores indicate excellent quality; however, the results may be influenced by social desirability bias and limitations in the instrument's ability to elicit varied ratings. Consequently, the high levels of feasibility and practicality observed here warrant careful interpretation in future research.

CONCLUSION

This study developed a cooperative learning-based electronic module (e-module) covering the "Office Management Business Processes and Workplace Business Services" element for Grade X MPLB students at SMK Negeri 1 Bantul. It employed a modified 4D model, encompassing the define, design, and development stages. The define stage identified the core issues necessitating this development: a lack of curriculum-aligned learning resources,

incomplete teaching modules, teacher-centered instruction resulting in student passivity, and a failure to meet minimum mastery standards for three consecutive years. The design stage translated these findings into an initial e-module draft presented via a Heyzine flipbook, featuring four topics, each utilizing a cooperative learning method tailored to the specific material. The development stage yielded a final product validated as "Highly Suitable" by all evaluators: subject matter experts (98.6%), language experts (100%), and instructional design experts (80%). Regarding practicality, the module was rated "Highly Practical" in both the limited trial involving 10 students (92.9%) and the field trial involving 64 students (89.75%).

These results indicate that the developed e-module is suitable and practical for use as a learning resource at SMK Negeri 1 Bantul. However, these findings cannot be generalized to other schools, as the study involved only one institution and did not include an assessment of the module's effectiveness on learning outcomes. Further research is required to evaluate the module's use in vocational schools with different characteristics, as this aspect was not addressed here. The validation results regarding suitability may be subject to a "ceiling effect," given the reliance on a single validator and the fact that the subject matter expert also participated in the needs analysis process. Consequently, the findings on suitability should be interpreted with caution, acknowledging potential limitations in instrument quality and the risk of bias of social desirability. Thus, this e-module can serve as a recommended supplementary learning resource for instruction at SMK Negeri 1 Bantul.

Future research should consider implementing the module in other school contexts, involving a more diverse range of validators and participants. This study recommends utilizing multiple validators for each aspect to minimize assessment bias. Furthermore, the development of the e-module requires effectiveness testing to measure student learning outcomes. Consequently, future research could provide robust evidence regarding the effectiveness, sustainability, and generalizability of using a multi-type cooperative learning e-module in vocational high schools (SMK).

ACKNOWLEDGEMENT

The authors would like to thank the principal, the subject teacher of the Business Process element, and the Grade X Office Management and Business Services students of SMK Negeri 1 Bantul for their cooperation during data collection and product trials, as well as the language and instructional design experts who validated the developed e-module, and the Study Program

of Office Administration Education, Faculty of Economics and Business, Universitas Negeri Yogyakarta, for its support throughout this research.

REFERENCES

Agustina, R., & Vahlia, I. (2017). Pengembangan bahan ajar berbasis masalah pada mata kuliah Matematika Ekonomi program studi Pendidikan Matematika. *AKSIOMA Journal of Mathematics Education*, *5*(2), 152–160. https://doi.org/10.24127/ajpm.v5i2.668

Ahdhianto, E., Masula, S., Thohir, M. A., & Khotimah, K. (2024). Pengembangan e-modul berbasis PBL untuk meningkatkan keterampilan pemecahan masalah dan berpikir kritis siswa Sekolah Dasar. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, *10*(1), 167–178. https://doi.org/10.29407/jmen.v10i1.22376

Aldilla, E., & Usmeldi. (2024). Validity and Practicality of the Physics E-Module Based on the Orientation, Identify, Discussion, Decision, and Engage in Behavior Model to Improve Students' 21st Century Skills: Validitas dan Praktikalitas E-modul Fisika. *Jurnal Penelitian Pendidikan IPA*, *10*(8), 5768–5774. https://doi.org/10.29303/JPPIPA.V10I8.7719

Apriyanti, H. (2023). Penyusunan perencanaan pembelajaran pada kurikulum merdeka. *Education Journal : Journal Educational Research and Development*, *7*(1), 15–20. https://doi.org/10.31537/ej.v7i1.970

Bhuttah, T. M., Xusheng, Q., Abid, M. N., & Sharma, S. (2024). Enhancing student critical thinking and learning outcomes through innovative pedagogical approaches in higher education: the mediating role of inclusive leadership. *Scientific Reports 2024 14:1*, *14*(1), 24362-. https://doi.org/10.1038/s41598-024-75379-0

BPS. (2026, January 30). *Tingkat Pengangguran Terbuka Berdasarkan Tingkat Pendidikan*. https://www.bps.go.id/id/statistics-table/2/MTE3OSMy/tingkat-pengangguran-terbuka-berdasarkan-tingkat-pendidikan.html

BSKAP (Badan Standar, K. dan A. P. (2024a). *Rapor Pendidikan Indonesia 2024*. https://data.kemendikdasmen.go.id/publikasi/p/rapor-pendidikan-indonesia/rapor-pendidikan-indonesia-2024

BSKAP (Badan Standar, K. dan A. P. (2024b). *Rapor Pendidikan Indonesia Provinsi D.I. Yogyakarta 2024*. https://data.kemendikdasmen.go.id/publikasi/p/rapor-pendidikan-indonesia/rapor-pendidikan-indonesia-kota-yogyakarta-2024

Croasmun, J. T., & Ostrom, L. (2011). Using Likert-Type Scales in the Social Sciences. *Journal of Adult Education*, *40*(1), 19–22.

Dinas Pendidikan, P. dan O. D. (2024). *Laporan Kinerja Instansi Pemerintah*. https://dikpora.jogjaprov.go.id/web/berita/read/LKjIP-Disdikpora-Tahun-2024

Elfitra, E., Armanto, D., & Dewi, I. (2024). Assessing Student Characteristics With The Right Instruments: An Important Pathway To Implementing A Merdeka Curriculum In Indonesia. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *9*(4), 1153–1168. https://doi.org/10.31943/MATHLINE.V9I4.703

Fidarti, F. A., & Nurharini, A. (2023). Kelayakan modul digital berbasis milkshake untuk meningkatkan hasil belajar. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *7*(3), 397–407. https://doi.org/10.23887/jppp.v7i3.67263

Geletu, G. M. (2022). The effects of teachers' professional and pedagogical competencies on implementing cooperative learning and enhancing students' learning engagement and outcomes in science: Practices and changes. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186X.2022.2153434

Handayani, S., Nur Amalina, E., Nur Asiah, A., & Prasetyo Wati, A. (2024). Study of ``Merdeka Belajar'' Curriculum for Cultivating Student Character: Evidence from Indonesia. *KnE Social Sciences*. https://doi.org/10.18502/kss.v9i4.15086

Hasanah, Z., & Himami, A. S. (2021). Model pembelajaran kooperatif dalam menumbuhkan keaktifan belajar siswa. *Irsyaduna: Jurnal Studi Kemahasiswaaan*, *1*(1), 1–13. https://doi.org/10.54437/irsyaduna.v1i1.236

Hong, Y., Chen, L. G., Huang, J. H., Tsai, Y. Y., & Chang, T. Y. (2022). The Impact of Cooperative Learning Method on the Oral Proficiency of Learners of the Training Program for English Tourist Guides. *Frontiers in Psychology*, *13*, 866863. https://doi.org/10.3389/FPSYG.2022.866863/TEXT

Javier, F. (2023, December 15). *Bagaimana skor Indonesia di PISA 2022 dibanding negara-negara ASEAN lain?* Tempo. https://www.tempo.co/data/data/bagaimana-skor-indonesia-di-pisa-2022-dibanding-negara-negara-asean-lain--991961

Jeppu, A. K., Kumar, K. A., & Sethi, A. (2023). 'We work together as a group': implications of jigsaw cooperative learning. *BMC Medical Education 2023 23:1*, *23*(1), 734-. https://doi.org/10.1186/S12909-023-04734-Y

Johnson, R. T., & Johnson, D. W. (2008). Active Learning: Cooperation in the Classroom. *The Annual Report of Educational Psychology in Japan*, *47*(0), 29–30. https://doi.org/10.5926/AREPJ1962.47.0_29

Kementerian Pendidikan, K. R. dan T. (n.d.). *Peta Sebaran Pelaksana IKM*. Retrieved March 26, 2025, from https://kurikulum.kemdikbud.go.id/pelaksana-ikm

Kurniawan, G. P. I., Zulnuraini, Z., Kamisani, N., Azizah, A., & Guci, A. A. J. (2026). The Effect of the Teams Games Tournament (TGT) Cooperative Learning Model on the Mathematics Learning Outcomes of Fourth-Grade Students at SD Inpres 5 Lolu. *Journal of Educational Sciences*, *10*(1), 2017–2030. https://doi.org/10.31258/JES.10.1.P.2017-2030

Li, M. M., & Tu, C. C. (2024). Developing a Project-Based Learning Course Model Combined with the Think–Pair–Share Strategy to Enhance Creative Thinking Skills in Education Students. *Education Sciences 2024, Vol. 14, Page 233*, *14*(3), 233. https://doi.org/10.3390/EDUCSCI14030233

Maydiantoro, A. (2021). Research model development: brief literature review. *Jurnal Profesi Pendidik Indonesia*, *1*(2), 29–35.

Mesra, R., Salem, V., Polii, M. G., & Santie, Y. D. (2023). *Research & Development dalam pendidikan* (M. Jannah, Ed.; 1st ed.). PT. Mifandi Mandiri Digital.

Nafi'ah, J., Faruq, D. J., & Mutmainah, S. (2023). Karakteristik pembelajaran pada Kurikulum Merdeka Belajar di Madrasah Ibtidaiyah. *Auladuna: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *5*(1), 1–12.

Nirwana, R., Hidayati, aisyah I., Ifcha, F. A., Azzahra, F. S., & Jannah, A. S. R. (2024). Penilaian dalam Kurikulum Merdeka: mendukung pembelajaran adaptif dan berpusat pada siswa Madrasah Ibtidaiyah. *Jurnal Madrasah Ibtidaiyah*, *2*(2), 213–224.

Nurfalaq, M., Wahyuni, N., Prasetyo, M. M., Sitti Wirda, & Nurhidayah, N. (2022). Penerapan model pembelajaran menyenangkan (joyfull learning) dalam meningkatkan hasil belajar IPA. *Jurnal Biotek*, *10*(1), 102–116. https://doi.org/10.24252/jb.v10i1.29297

Pramana, M. W. A., Jampel, I. N., & Pudjawan, K. (2020). Meningkatkan hasil belajar biologi melalui e-modul berbasis Problem Based Learning. *Jurnal Edutech Undiksha*, *8*(2), 17–32. https://doi.org/10.23887/jeu.v8i2.28921

Qureshi, N. S., & Jamil, A. (2023). IMPACT OF INNOVATIVE TEACHING STRATEGIES ON STUDNT'S ACTIVE PARTICIPATION IN LEARNING | Pakistan Journal of Society, Education and Language (PJSEL). *Pakistan Journal of Society, Education and Language (PJSEL)*, *9*(2), 222–231. https://pjsel.jehanf.com/index.php/journal/article/view/1147

Rahmadhani, S., Ahyanuardi, & Suryati, L. (2022). Vocational High School Students' Competency Needs to the World of Work. *Mimbar Ilmu*, *27*(2), 349–355. https://doi.org/10.23887/MI.V27I1.42161

Rahmawati, S., Prestridge, S., Abdullah, A. G., & Widiaty, I. (2025). Unpacking the digital competence challenge in vocational education: A case from Indonesia. *Social Sciences & Humanities Open*, *12*, 101803. https://doi.org/10.1016/J.SSAHO.2025.101803

Samsinar, S. (2020). Urgensi learning resources (sumber belajar) dalam meningkatkan kualitas pembelajaran. *Didaktika: Jurnal Kependidikan*, *13*(2), 194–205. https://doi.org/10.30863/didaktika.v13i2.959

Saski, N. H., & Sudarwanto, T. (2021). Kelayakan media pembelajaran market learning berbasis digital pada mata kuliah Strategi Pemasaran. *Jurnal Pendidikan Tata Niaga*, *9*(1), 1118–1124. https://doi.org/https://doi.org/10.26740/jptn.v9n1.p1118-1124

Sugiyono. (2023). *Metode penelitian kuantitatif kualitatif dan R&D* (Sutopo, Ed.; 5th ed.). Alfabeta.

Susiliastini, N. K. T., & Sujana, I. W. (2022). Flipbook: media pembelajaran inovatif berbasis etnomatematika pada muatan pelajaran Matematika kelas V Sekolah Dasar. *Jurnal Pendidikan Multikultural Indonesia*, *5*(2), 105–118. https://doi.org/10.23887/jpmu.v5i2.54596

Tessa, A., & Humaedi, M. A. (2024). Upaya menguatkan link and match melalui program SMK Pusat Keunggulan: studi kasus SMKN 1 Bantul. *Jurnal Penelitian Kebijakan Pendidikan*, *16*(2), 93–108. https://doi.org/10.24832/jpkp.v16i2.751

Tsuroyya, Z. N., Yunita, L., & Ramli, M. (2022). Pengembangan media pembelajaran komik digital pada materi ikatan kimia untuk siswa kelas X IPA. *Jurnal Inovasi Pendidikan Kimia*, *16*(2), 123–130. https://doi.org/10.15294/jipk.v16i2.32351

Ummah, K. (2021). Pengembangan modul pembelajaran Biologi berbasis Reading, Questioning, and Answering (RQA) materi virus kelas X. *Jurnal Biologi Dan Pembelajarannya (JB&P)*, *8*(1), 19–25. https://doi.org/10.29407/jbp.v8i1.15264

Usman, M., Degeng, I. N. S., Utaya, S., & Kuswandi, D. (2022). The Influence of JIGSAW Learning Model and Discovery Learning on Learning Discipline and Learning Outcomes. *Pegem Journal of Education and Instruction*, *12*(2), 166–178. https://doi.org/10.47750/pegegog.12.02.17

W. Johnson, D., & T. Johnson, R. (2019). Cooperative Learning: The Foundation for Active Learning. In *Active Learning - Beyond the Future*. IntechOpen. https://doi.org/10.5772/intechopen.81086

Wahyuni, S. (2022). Kurikulum Merdeka untuk meningkatkan kualitas pembelajaran. *Jurnal Pendidikan Dan Konseling (JPDK)*, *4*(6), 13404–13408. https://doi.org/https://doi.org/10.31004/jpdk.v4i6.12696

Wang, Y. (2024). Digital Transformation of Vocational Education: Connotation, Challenges and Pathways. *Region - Educational Research and Reviews*, *6*(12), 49. https://doi.org/10.32629/RERR.V6I12.2996

Wardani, N. K., Kartika, E. D., & Wijayanti, R. (2024). Pengembangan e-modul dengan model kooperatif berbasis aplikasi canva menggunakan pendekatan open-ended bagi siswa SMK. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *8*(2), 1725–1734. https://doi.org/10.31004/cendekia.v8i2.3226

Waruwu, M. (2024). Metode penelitian dan pengembangan (R&D): konsep, jenis, tahapan dan kelebihan. *Jurnal Ilmiah Profesi Pendidikan*, *9*(2), 1220–1230. https://doi.org/10.29303/jipp.v9i2.2141