

Advancing Accounting Education: A Comprehensive Approach to Inventory Materials Learning through Online Applications and the Smith-Ragan Model

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Abstract

Information technology has significantly influenced accounting and financial practices, driving a shift from manual accounting processes to computerized accounting systems supported by accounting software. Although online teaching materials for Accurate Online exist, they rarely explain the underlying logic of its features and the basic rules involved, suggesting that computer-based learning resources discussing inventory management within Accurate Online could be developed further. This research aims to develop computer accounting teaching materials supported by the Accurate Online application, integrating lesson plans, media, student worksheets, and assessment instruments. It introduces an inventory module based on Accurate Online to help students learn computer accounting material more easily through a scientific approach and problem-based learning. The Smith-Ragan model was used to test student responses to the learning innovation and to analyze student learning outcomes. The subjects of this study were 19 sixth-semester students in the Accounting Education Study Program at Universitas PGRI Madiun. The study develops learning innovations comprising lesson plans, modules, student worksheets, learning media, and evaluation instruments. The validation results show that the computer-based learning innovation achieved a very valid category overall, with validity percentages of 95.42% for the module, 96.4% for the lesson plan, 96% for the worksheets, 92.5% for the learning media, and 96.25% for the evaluation instrument. Student responses to the Accurate Online-based inventory module achieved a practicality percentage of 87%, indicating that the module is very practical and can be used without revision. Student learning outcomes improved after participating in the Accurate Online-based accounting computer learning program, with 89% of students scoring above the Minimum Completeness Criteria following the structured learning program.

Keywords: *accurate online*, advancing accounting education, education system, learning innovation, learning programme, Smith-Ragan model



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1. Introduction

Information technology has significantly influenced accounting and financial practices, marking a shift from the manual processing of

accounting data to computerized accounting systems supported by accounting software (Yuliana & Triandi, 2013).

As competition in business and industry continues to increase, there is a growing need for human resources with strong determination, talent, and competence. Enhancing the knowledge and abilities of the younger generation of Indonesian workers helps boost the added value of human resources (Darmayanti et al., 2021). Reliable graduates are needed to support the growth of business and industry in the era of the digital economy and the Industrial Revolution 4.0 (Milaningrum & Rahmawaty, 2020). However, because the workforce skills required by business and industry fluctuate over time, there is constant pressure to keep pace with society's demands, making life skills essential in the era of globalization (Setyaningsih et al., 2022). The Accounting Education Study Program aims to produce competent graduates connected to the industrial sector, which requires reliable human resources to meet this demand. To improve graduates' transition into today's highly competitive job market, where employers seek increasingly skilled personnel, accounting education graduates are equipped with strong accounting skills (Prawiyogi & Toyibah, 2020).

The Accounting Education Study Program at Universitas PGRI Madiun uses the Certified Accurate Professional (CAP) competency certification, an advanced-level accounting computer practice examination based on Accurate software. Accurate has more than 20 years of experience and has received the Top Brand Award for six consecutive years, and it is trusted by more than 377,000 users across different business backgrounds (Ibnu, 2021). The CAP program requires students to understand the features of Accurate Online rather than simply follow predetermined steps, preparing them for a world of work that is now fully computerized (Yusdita et al., 2022).

Interviews and field observations conducted in the Accounting Education Study

Program at Universitas PGRI Madiun revealed that students felt burdened and struggled due to limited reference sources, particularly for the Computer Accounting course involving Accurate Online. Students need a better understanding of the inventory feature in Accurate Online, as well as clearer guidance on classifying and recording inventory transactions. Common errors include skipping steps when recording the receipt of goods transferred to a destination warehouse under the goods requisition feature; forgetting to change the adjustment type when recording inventory reductions during inventory adjustment transactions; and confusion over the steps required to create new goods in group units.

To address these problems, the researcher developed an inventory module based on Accurate Online, since the educational version of Accurate Online-based learning resources discussing inventory remains limited. Although some Accurate Online learning resources exist, they rarely explain the rationale for using all available features or the underlying basic guidelines (Yusdita et al., 2022).

The researchers developed learning tools integrated with a scientific approach and problem-based learning. A scientific approach to the learning process can increase student activity, motivate students, and improve student achievement (Firman et al., 2018), requiring students to explore knowledge through observing, questioning, experimenting, concluding, and communicating. However, a scientific approach must be accompanied by an appropriate method to be effective (Ain & Huda, 2018).

Problem-based learning is a learning model that engages students in solving problems encountered during the learning process. It encourages active and collaborative learning and allows students to choose what they want to study (Nugroho et al., 2018). In this model, students are given problems to solve and are

then guided to increase their learning activities, making the learning process more effective (Annisa & Sukanti, 2018).

Philosophically, a textbook must meet three criteria: (a) ontologically, the validity of a textbook is critical to the learning process, since textbooks contain curriculum materials intended to achieve instructional aims at school; (b) epistemologically, textbooks are prepared by experts in their respective fields, targeted at specific instructional goals and particular educational levels; and (c) axiologically, textbooks are used by teachers and students to facilitate understanding of the subjects outlined in the curriculum. In particular, textbooks help guide the learning process to achieve the following objectives: (a) improving students' ability to reach a certain level of language qualification, and (b) improving their ability to communicate efficiently and effectively, both verbally and in writing, across various needs in everyday life and the workplace (Kokasih, 2021).

The learning program was updated using teaching materials developed by the researchers, including the latest version of the Accurate Online module, which discusses inventory management and inventory adjustment for trading companies. Kirana and Susilowibowo (2020) found that teaching materials were declared feasible when the material component obtained 85.9%, the language component 83.7%, and the graphic component 87.3%, all within the very feasible category. From the perspective of student responses, Rismaini et al. (2019) reported that teaching materials can be used when they obtain an average score of 93.14%. Teaching materials should not only support learning programs but should also improve student learning outcomes; Akbar et al. (2018) found that the teaching materials they developed increased high school students' accounting achievement by 31.25 points, from 57.81 to 89.06,

with a post-test score difference of 18.75 points between the control class (70.31) and the experimental class (89.06).

Based on this explanation, although accounting teaching materials have been developed, their implementation within complete learning programs remains limited. This research aims to develop computer accounting teaching materials supported by the Accurate Online application, integrated with lesson plans, media, student worksheets, and assessment instruments, using the Smith-Ragan model to test student responses to the learning innovation and analyze student learning outcomes. This study focuses specifically on two learning sessions of 100 minutes each: the first session addresses students' conceptual development using the Accurate Online-based inventory module, while the second focuses on working through case studies and evaluating the achievement of the learning objectives.

2. Method

This study uses the research and development (R&D) method to improve, develop, and evaluate the education system (Yuliani & Banjarnahor, 2021), specifically applying Smith and Ragan's (1993) development model. This model comprises eight stages: analyzing the learning environment, analyzing student characteristics, analyzing learning tasks, writing test items, developing learning strategies, producing learning programs, conducting formative evaluation, and revising the learning program (Tyanto & Manoy, 2013).

This study was conducted at Universitas PGRI Madiun. The field-trial sample consisted of 19 sixth-semester students from the Accounting Education Study Program. Sixth-semester students were selected because they were taking the Computer Accounting course to prepare for the CAP examination, and no other practitioner class programs in that

semester influenced lecture activities outside the lesson plan.

The data collection techniques used were as follows: (a) observation of learning needs within the Computer Accounting learning program at Universitas PGRI Madiun; and (b) questionnaires used to assess and validate the

eligibility of the learning tools and the learning process, completed by an expert in computer accounting learning a computer accounting teacher at SMKN 2 Madiun. Questionnaire items were scored using a 1–5 Likert scale, as shown in Table 1.

Table 1. Scoring Using a Likert Scale

Score	Category	Conclusion
5	Strongly Agree	SS
4	Agree	S
3	Disagree	KS
2	Disagree	TS
1	Strongly Disagree	STS

Source: (Kartini & Putra, 2020)

Calculation of final value data from validation results is carried out using the equation:

$$V = \frac{x}{y} \times 100\%$$

Information:

V = validity value

X = score obtained

Y = maximum score

Table 2 shows the category of validity:

Table 2. Learning Device Validity Category

No	Criteria	Validity Level
1	85,01% - 100%	Very valid
2	75,01% - 85,00%	Valid
3	60,01% - 75,00%	Fairly valid
4	50,01% - 60,00%	Not valid
5	<50,00%	Very invalid

Source: (Osin et al., 2019)

The student response questionnaire was administered to sixth-semester students to assess the practicality of the compiled accounting computer teaching materials and the implementation of learning in the classroom. All data from the assessment questionnaire were

then compiled, and each statement item was calculated using the following formula:

$$P = \frac{\text{total score resulting from data collection}}{\text{number of criteria scores}} \times 100\%$$

Table 3 presents the practicality level:

Table 3. Practicality Criteria

No	Score Intervals (%)	Practicality Level
1	85,01% – 100,00%	It is very practical and can be used without revision
2	70,01% – 85,00%	Quite practical, can be used but needs revision
3	50,01% – 70,00%	It is not practical, and it is recommended not to use it because it needs major revisions

No	Score Intervals (%)	Practicality Level
4	01,00% – 50,00%	Not practical or should not be used

Source: (Alvionita et al., 2019)

Documentation was collected throughout the process of preparing the learning tools, validating their feasibility with experts, and conducting the learning process and field trials with Accounting Education students at Universitas PGRI Madiun.

Interviews were conducted with students and lecturers of the Computer Accounting course in the Accounting Education Study Program at Universitas PGRI Madiun to identify problems that arose during the learning process.

3. Result and Discussion

The development of the Accurate Online-based computer accounting learning program for inventory material followed the eight stages of the Smith-Ragan model. The steps taken by the researcher to create the learning program are described below.

a. Learning Environment Analysis

The analysis of the learning environment showed that the learning facilities provided by the Accounting Education Study Program are adequate, comprising classrooms and computer laboratories equipped with desks, chairs, computers, a blackboard and writing equipment, an LED TV, speakers, an LCD projector, air conditioning, and fans. According to Hasibuan (2018), learning facilities such as learning spaces, stationery, and learning media facilitate and expedite student learning activities, helping students solve problems that arise during learning and better understand lessons and assignments given by lecturers.

The curriculum and syllabus follow the Merdeka Belajar Kampus Merdeka (MBKM) framework. According to Nurdiansyah et al.

(2022), the MBKM curriculum is significantly related to students' understanding of computer accounting courses, and students participating in Kampus Merdeka activities gain additional insight into these courses. The Minister of Education asserts that learning must be meaningful and relevant so that students are adequately prepared to face the real world (Awaludin et al., 2022).

In the learning process, the lecturer not only conducts classroom instruction but also gives students opportunities to study independently at home through assigned tasks. However, the learning resources used consist only of practice questions for Accurate Online, without any explanation of its features.

Learning facilities and infrastructure, including learning resources, are external factors that can affect student learning outcomes. Students are expected to approach learning with strong enthusiasm and make better use of the available resources, as computer accounting learning outcomes are positively influenced by the use of learning tools (Kumar et al., 2019).

b. Analysis of Student Characteristics

Interviews with lecturers who teach computer accounting courses, together with observations and assessments made during the learning process, show that students are less active and less enthusiastic. Student activity depends on enjoyable learning that keeps students motivated, and it can also be developed through discussion and question-and-answer sessions among students and between students and lecturers (Rikawati & Sitinjak, 2020).

The results also suggest that students still have problems with honesty in completing their assignments. To address this, the lecturer provides intensive guidance on the tasks that must be completed. Teachers should not only impart knowledge in the cognitive domain of honesty but also cultivate its affective dimension and translate it into actual behavior. Teachers must instill the value of discipline, since discipline in turn instills honesty in students (Munif et al., 2021). To help students acquire the knowledge and skills required for entry into the workforce, the fundamental learning activities in higher education should also help shape students' character (Thambu et al., 2021). The ability to praise, motivate, and advise is an essential component of character education for children in today's disruptive era (Prayitno et al., 2019).

The results also suggest that problems remain in the assessment of student learning outcomes. Learning media can improve the quality of learning because it enables lecturers to actively deliver material while also allowing students to be active and engaged in the learning process, making it easier for students to absorb what lecturers teach (Nurrita, 2018). Lecturers provide knowledge to students, who in turn need to actively construct that knowledge in their own minds (Sugrah, 2019).

c. Learning Task Analysis

The Accurate Online computer accounting assignments given by the lecturer in the Accounting Education Study Program take the form of practical questions, including case studies and short-answer items, which are almost identical to the CAP test questions. While the CAP test contains multiple-choice, case study, and short-answer questions, the lecturer's assignments did not include multiple-choice items. These

assignments are completed systematically through eLMA (e-Learning UNIPMA), which allows students to access and complete the questions anywhere and at any time, meaning the lecturer does not directly supervise the assignments.

The accounting computer learning program developed by the researchers is guided by specific learning objectives: students are expected to analyze and apply inventory features in Accurate Online, and to record inventory management transactions, honestly and responsibly. The assignments given consist of student worksheet questions in the form of practicum tasks modeled on the CAP test format, along with evaluation questions containing knowledge items. Practicum questions are expected to enhance students' understanding of using accounting software in real-world accounting practice (Sastra, 2022), while evaluation questions are needed to measure students' thinking skills during learning, as reflected in their ability to answer the evaluation questions (Mariati, 2018).

d. Writing Test Items

At this stage, the researcher wrote the items for the pre-test, student worksheets, and evaluation questions for sixth-semester students in the Accounting Education Study Program at Universitas PGRI Madiun. The pre-test items were developed from merchandise inventory materials and consist of ten multiple-choice questions, each worth 10 points.

The Student Worksheet questions require students to practice inputting inventory transactions using the Accurate Online-based inventory feature and consist of six items, each carrying a different point value.

The evaluation questions cover the inventory feature material based on Accurate Online. The compiled multiple-choice

questions were tested for validity and reliability using SPSS 25. Following the formula $df = N - 2$, the degree of freedom is $df = 19$

$- 2 = 16$. At $df = 16$ and a significance level of 0.005, the r -table value is 0.479.

Table 4. Summary of Test Results for the Validity of Pre-Test Questions

No. Question	r count	r table	Conclusion
1	0,653	0,479	Valid
2	0,723	0,479	Valid
3	0,792	0,479	Valid
4	0,573	0,479	Valid
5	0,653	0,479	Valid
6	0,739	0,479	Valid
7	0,620	0,479	Valid
8	0,788	0,479	Valid
9	0,706	0,479	Valid
10	0,671	0,479	Valid

The validity test results presented in Table 4 indicate that all ten pre-test multiple-choice items met the required validity criteria, as each item obtained an r -count value greater than the corresponding r -table value (0.479). These findings demonstrate that every question was capable of measuring the intended construct consistently and was therefore suitable for assessing students' initial understanding of inventory concepts before the implementation of the learning program. The satisfactory validity of the pre-test

instrument also strengthens the credibility of the baseline data collected, ensuring that subsequent comparisons between pre-test and post-test performance accurately reflect changes in students' learning outcomes rather than weaknesses in the assessment instrument itself. Consequently, the validated pre-test provided a reliable foundation for evaluating the effectiveness of the Accurate Online-based inventory learning module developed using the Smith-Ragan instructional design model.

Table 5. Summary of Post-Test Validity Test Results

No. Question	r count	r table	Conclusion
1	0,818	0,479	Valid
2	0,840	0,479	Valid
3	0,609	0,479	Valid
4	0,893	0,479	Valid
5	0,709	0,479	Valid
6	0,872	0,479	Valid
7	0,462	0,479	Invalid
8	0,945	0,479	Valid
9	0,927	0,479	Valid
10	0,893	0,479	Valid

The validity test results for the post-test questions in Table 5 show that of the ten multiple-choice items, one was invalid and nine were valid, based on the criterion that r -count exceeds r -table. Invalid questions should

ideally be revised and retested (Lestari et al., 2016); however, due to time constraints, the researcher did not revise and retest the item, and the assessment therefore included only nine questions. Accordingly, the researcher

adjusted the scoring guidelines to account for the invalid item when calculating the maximum score.

Reliability was measured using Cronbach's Alpha (α) statistical test in SPSS 25

for Windows. A research instrument is considered reliable if Cronbach's Alpha exceeds 0.50 (Son, 2019). The reliability test results for the pre-test questions are shown in Table 6.

Table 6. Summary of Pre-Test Reliability Test Results

<i>Cronbach's Alpha</i>	<i>N of Item</i>	<i>Conclusion</i>
0,506	10	Reliable

The reliability analysis presented in Table 6 indicates that the pre-test instrument achieved a Cronbach's Alpha coefficient of 0.506, suggesting that the ten-item instrument possesses an acceptable level of internal consistency for measuring students' prior knowledge of inventory accounting concepts. Although the reliability coefficient falls within the moderate category, it remains sufficient for exploratory educational research and for assessing students' baseline competencies before the implementation of the learning innovation. This result demonstrates that the items function consistently in measuring the same

construct while still allowing for variations in students' initial understanding. Establishing the reliability of the pre-test instrument is essential because it ensures that differences in students' scores are primarily attributed to their actual level of knowledge rather than inconsistencies within the measurement instrument. Consequently, the pre-test can be confidently used as a dependable baseline for evaluating subsequent improvements in learning outcomes following the implementation of the Accurate Online-based instructional program.

Table 7. Summary of Post-Test Reliability Test Results

<i>Cronbach's Alpha</i>	<i>N of Item</i>	<i>Conclusion</i>
0,707	9	Reliable

The reliability analysis presented in Table 7 demonstrates that the revised post-test instrument achieved a Cronbach's Alpha coefficient of 0.707, indicating a high level of internal consistency among the nine valid test items. This result confirms that the remaining items consistently measure students' mastery of inventory accounting concepts after participating in the learning program. The increase in reliability compared with the pre-test instrument also suggests that removing the invalid item improved the overall quality of the assessment by strengthening the

coherence of the measurement instrument. A highly reliable post-test is particularly important because it provides more dependable evidence of students' learning achievement and minimizes measurement error during the evaluation process. Therefore, the post-test instrument can be considered appropriate for assessing the effectiveness of the Accurate Online-based inventory module and for generating trustworthy data regarding students' cognitive learning outcomes after completing the instructional activities based on the Smith-Ragan model.

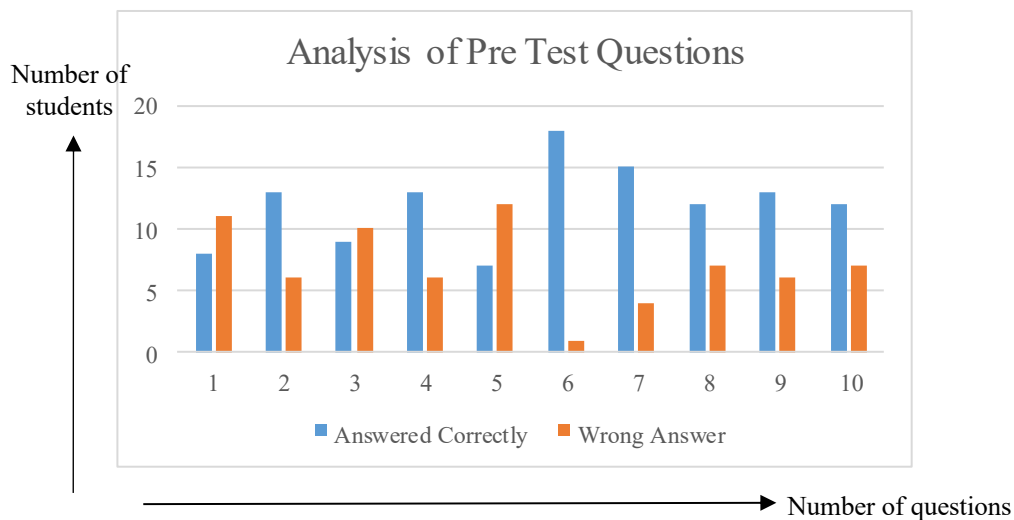


Figure 1. Analysis of Pre-Test Questions

Question 1 concerned the inventory valuation method for goods with unique identification. Fifty-eight percent of students answered using the FIFO method, whereas the correct answer was the specific identification method; most students appear not to have read the question carefully, leading to incorrect answers.

Question 3 concerned inventory recording for items not suited to the physical (periodic) method. Fifty-three percent of students answered “expensive goods,” whereas the correct answer was “mass-produced goods.” Question 5 presented data using the physical

or periodic inventory method; 63% of students answered “average,” which was incorrect. These results indicate that students need further guidance in understanding how to record inventory using the physical or periodic method. Based on these findings, the researcher revisited the pre-test analysis results with the students.

During the implementation of the post-test (evaluation questions), two questions produced the most errors: questions 1 and 8. The analysis of the post-test questions is shown in Figure 2.

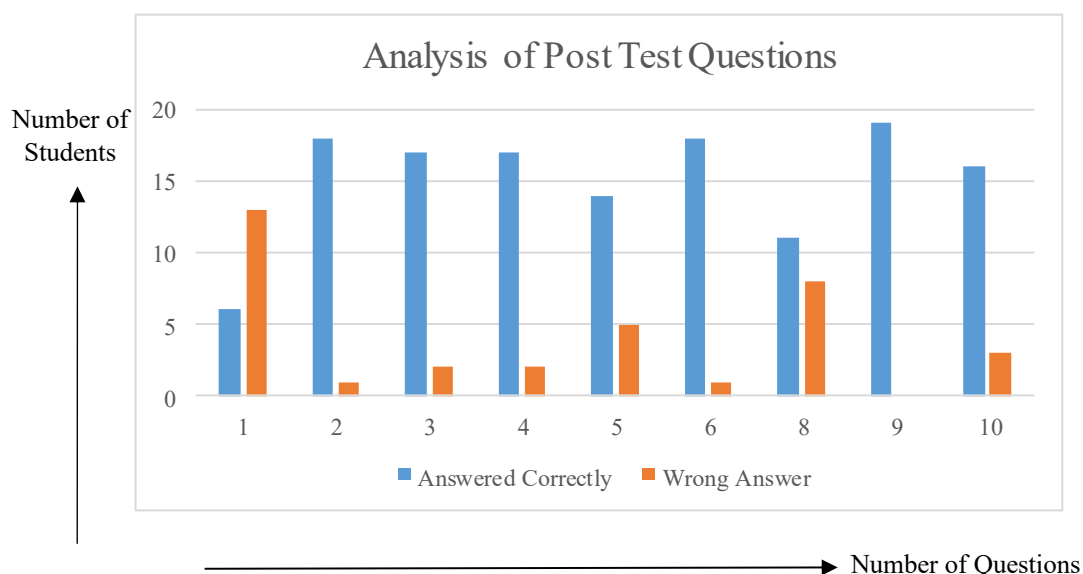


Figure 2. Analysis of Post-Test Questions

Question 1 asked which feature should be used when the warehouse requests to purchase goods because stock is running low; the correct answer was the goods request feature, but 68% of students answered “adding raw materials.” This indicates that students need further help understanding the recording cycle for depleted or low warehouse stock, as well as clearer guidance on the function of the adding-raw-materials feature. The researcher therefore revised the module sections covering the goods request feature and the adding-raw-materials feature.

Question 8 concerned a transaction involving an order that differed from the company's usual production. The correct steps required using the inventory feature followed by the job order feature, but 42% of students answered “order fulfillment” and “adding raw materials.” This indicates that students needed clearer guidance on the functions of the job order and order fulfillment features, prompting the researcher to revise the corresponding module sections. After making these revisions, the researcher reflected on the changes made to the teaching materials; however, further testing was not conducted due to time constraints.

What is simple for teachers can sometimes be challenging for students; the difficulty level of a question should be determined by students' ability to answer it, not by the assumptions of the teacher who wrote it. Test items can distinguish between students who have mastered the material and those who have not (Son, 2019; Utomo, 2018). Preparing materials, assignments, and quizzes for use as a final assessment produces learning aids that encourage students to participate more actively in their academic activities (Yahya et al., 2020).

e. Determining Learning Strategies

The learning strategy used in this program is problem-based learning, implemented through problem orientation, organizing students, guiding individual or group investigation, developing and presenting the work, and analyzing and evaluating the problem-solving process. Students responded positively to the learning program, as reflected in the distributed questionnaires, which assessed the novelty, attractiveness, clarity, and usefulness of the program and yielded a practicality percentage of 87%.

The classroom learning process using problem-based learning improved student learning outcomes. Before the intervention, students completed pre-test questions, with only 21% scoring above the Minimum Completeness Criteria and the remaining 79% scoring below it. After learning with the problem-based learning strategy, 89% of students scored above the Minimum Completeness Criteria, indicating an improvement in student learning outcomes.

Problem-based learning helps students develop independent learning, investigation, problem-solving skills, and behavior (Gumartifa et al., 2023). In this approach, the learning process begins by presenting problems that students then identify and analyze, with the aim of helping them recognize issues relevant to the subject matter (Setyaningsih et al., 2022). Problem-based learning methods can positively affect students in the computer accounting learning process, particularly in increasing student achievement (Jaya, 2022).

Iswinar (2019) documented an increase in average achievement scores in computer accounting subjects using problem-based learning strategies. Similarly, Nurcahyani et al. (2022) show that applying problem-based learning strategies can improve computer

accounting learning outcomes in the cognitive, affective, and psychomotor domains.

f. Producing Learning Programs

Producing learning programs begins with developing learning tools, including a lesson plan, teaching materials in modules, Student Worksheets, learning media, and evaluation instruments.

1) Developing the Learning Implementation Plan

The Computer Accounting Learning Implementation Plan in the Accounting Education Study Program is guided by the CPL

(Program Learning Outcomes) and CPMK (Course Learning Outcomes) to direct student learning activities toward achieving competency. The Lesson Plan developed includes the CPL, CPMK, Sub-CPMK, learning objectives, learning materials, approaches, learning models and methods, media, learning resources, learning steps, and assessment of learning outcomes.

The lesson plan for the computer accounting course was assessed by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun, with the results of the assessment presented in Table 8.

Table 8. Validation Analysis of Learning Implementation Plans by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Formulation of the purpose of the problem	15	15	100%	96,4%
Selection and organization of presentation teaching materials	18	20	90%	
Selection of learning resources/learning media	10	10	100%	
Learning Activities	23	25	92%	
Assessment of learning outcomes	15	15	100%	

The validation analysis shows that the Computer Accounting lesson plan achieved a very valid category, with a final validation percentage of 96.4%. A learning device is considered valid if it achieves a minimum criterion score of 78.57% (Nasution & Oktaviani, 2020).

The researchers used the lesson plan as a reference to ensure that each learning step was carried out in a structured manner, managing the learning process according to the plan they had created. This shows that implementing learning with well-designed teaching materials and learning strategies proceeds smoothly (Weriyanti et al., 2020), a finding consistent with Yahya et al. (2020), who also developed lesson plans and

teaching materials as learning tools. A learning program is considered practical if at least 85% of students score above the Minimum Completeness Criteria, meaning the learning tool used here can be considered valid, practical, and efficient.

2) Developing an Accurate Online-Based Inventory Module for Service and Trade Companies

The content of the inventory module was aligned with the applicable CPMK in the Accounting Education Study Program, which defines the learning objectives students must achieve. The module includes a cover, preface, table of contents, instructions for use, an explanation of the inventory cycle, a description of the inventory features in Accurate

Online, illustrations of how to use these features and solve related problems, material summaries, knowledge questions, and skills questions.

The Accurate Online-based inventory module for service and trade companies was

assessed by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun and material expert in computer accounting learning. The results of the module assessment are presented in Table 9.

Table 9. Analysis of Module Validation by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Content Eligibility	57	60	95%	95,42%
Eligibility of Presentation	28	30	93,33%	
Language	14	15	93,33%	
Usefulness	10	10	100%	

The validation analysis shows that the Computer Accounting Module for Inventory Features Based on Accurate Online achieved a very valid category, with a final validation percentage of 95.42%. A module is considered valid if its average feasibility score is at least 86.18% (Ambarwati & Rochmawati, 2020).

The steps taken in preparing contextual teaching materials were: (1) reviewing core and basic competencies to identify teaching materials based on facts, concepts, principles, and procedures, allocating study time, and developing indicators and assessment tools; (2) determining learning time and assessing learning outcomes; (3) selecting teaching material competencies and building learning tools based on topic competencies; (4) designing learning materials and assessment tools using appropriate learning strategies; and (5) compiling learning scenarios and activities using a suitable learning approach (Cahyadi, 2019).

In the learning process, the researchers used the module as a learning resource, with each student receiving their own copy so they

could study its contents freely. The module also includes pictures and illustrations to help students understand the material more easily. According to Setiyadi et al. (2017), scientific-based learning modules meet effectiveness criteria when student learning outcome tests achieve classical completeness of at least 84.21%.

3) Compiling Student Worksheets

Computer Accounting Student Worksheets are designed to simplify the learning process and support effective interaction between students and lecturers. Student worksheets can also increase student learning activity and achievement (Zamrodah, 2020).

The student worksheets include a cover, course information, target semester, CPL, CPMK, Sub-CPMK, learning objectives, learning materials, a brief overview of the Accurate Online-based inventory features, and practice questions. The worksheets were assessed by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun, with the results presented in Table 10.

Table 10. Analysis of Computer Accounting Student Worksheets Validation by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Student Worksheets Structure	24	25	96%	

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Writing Organization	23	25	92%	96%
Language	15	15	100%	

The validation analysis shows that the Computer Accounting Student Worksheets achieved a very valid category, with a final validation percentage of 96%. Student worksheets are considered valid if the validation results meet a minimum criterion of 75.01%–85.00% (Osin et al., 2019).

Worksheets are needed to increase student participation and activity in the teaching and learning process, shift learning from teacher-centered to student-centered, and help guide students in constructing concepts (Zamrodah, 2020). Through the summaries and example questions they contain, worksheets help students understand the material, learn independently, participate actively, and take responsibility for their assigned tasks, while also making it easier for teachers to direct the learning process. The effectiveness of worksheets as a learning tool can be

assessed from the results of student learning tests (Osin et al., 2019).

4) Developing PowerPoint Learning Media

Choosing appropriate learning media can make computer accounting learning more enjoyable, and it serves as a means of conveying the inventory material in Accurate Online. The PowerPoint design includes a title page, learning objectives, the concept of the inventory cycle, a learning video, and an explanation of the Accurate Online-based inventory feature.

The computer accounting PowerPoint learning media was assessed by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun, with the results of the assessment presented in Table 11.

Table 11. Analysis of Learning Media Validation by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Material	10	10	100%	92,5%
Illustration	9	10	90%	
Quality and Display	9	10	90%	
Attractiveness	9	10	90%	

The validation analysis shows that the computer accounting PowerPoint learning media achieved a very valid category, with a final validation percentage of 92.5%. Learning media is considered valid if it achieves a score of $\geq 61\%$ (Bintiningtiyas & Lutfi, 2016).

One engaging learning medium that can be used is the interactive PowerPoint application, which has been shown to increase student interest and motivation and improve learning achievement (Wulandari, 2022).

Learning media also serve as a resource that teachers can use to explain material to students, and tools such as application-based learning media can make students more interested in learning (Muftizar et al., 2020). The use of learning media has been shown to improve student learning outcomes by making the teaching and learning process easier and more engaging, helping students understand lessons more easily (Nurrita, 2018).

5) Developing Evaluation Instruments

Evaluation instruments are designed to collect and process data on student learning outcomes. The instrument compiled comprised a test component (evaluation questions) and a non-test component (an attitude assessment observation sheet), including an

attitude assessment rubric, attitude observation sheets, knowledge and skills assessments, and scoring guidelines. This instrument was assessed by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun, with the results shown in Table 12.

Table 12. Analysis of Evaluation Instrument Validation by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Question Material	18	20	90%	96,25%
Content Construction	19	20	95%	
Language	15	15	100%	
Time	5	5	100%	

The validation analysis shows that the computer accounting evaluation instrument achieved a very valid category, with a final validation percentage of 96.25%. According to Fatmawati (2016), learning tools are classified as sufficiently valid when the validation percentage exceeds 70%.

The evaluation instruments used in the learning process include affective (attitude) assessment rubrics, student observation sheets, knowledge and skills assessment sheets, and scoring guidelines. According to Imania and Bariah (2019), instruments for measuring successful learning should address both cognitive and affective aspects. The learning tools developed proved practical in supporting learning activities, as reflected in students' cognitive learning outcomes meeting the Minimum Completeness Criteria (both individually and collectively), the cognitive learning process being rated as good, and students' psychomotor learning outcomes being rated as appropriate.

Thus, the learning tools are valid, practical, and effective (Fatmawati, 2016). Their practicality is further supported by the very good learning implementation results and positive student responses, while evaluation

tools based on Bloom's taxonomy can improve student understanding (Mariati, 2018).

g. Conducting the Formative Evaluation

Formative evaluation was carried out by administering test questions to students. A test is an instrument used to measure student performance on a specific scale, and learning outcomes were assessed using both test and non-test measures. Based on the test results, lecturers can make decisions about the learning process (Ananda & Fadhilaturrahmi, 2017), and instruments for measuring learning success should involve both cognitive and affective aspects (Imania & Bariah, 2019).

The researcher administered pre-test and post-test questions to measure the change in student learning outcomes before and after the intervention. The results of the formative evaluation were calculated using the prepared assessment instruments and measured against the Minimum Completeness Criteria, set at a score of ≥ 71 . Student results are declared complete if they meet or exceed this criterion (Osin et al., 2019).

Of the 19 sixth-semester students who took the pre-test, only four were declared complete, while the remaining 15 scored

below the Minimum Completeness Criteria that is, 21% of students met the criteria and 79% did not.

After completing the pre-test, students took part in the learning process conducted by the researchers, following the prepared Lesson Plan and using a problem-based learning strategy. The purpose of the computer accounting learning session was for students to analyze and apply inventory features in Accurate Online, and to record inventory management transactions, honestly and responsibly.

After the learning process, students completed the prepared evaluation questions, which included practical or skills questions from the Student Worksheets as well as knowledge questions. Their work was then assessed using the prepared evaluation instruments, covering affective (attitude), knowledge, and skills assessments.

The formative evaluation of the computer accounting course shows that 89% of students achieved scores above the Minimum Completeness Criteria set by the Accounting Education Study Program at Universitas PGRI Madiun. A learning product is considered effective if student scores achieve classical learning mastery of at least 85% (Yahya et al., 2020).

At this stage, an expert assessment was also conducted on the implementation of learning in the classroom by Hariyadi, S.Pd., M.Si., a computer accounting teacher at SMKN 2 Madiun. The expert validation sheet contains 23 items: nine for the introductory component, ten for the core activity component, and four for the closing component. The results of this expert assessment are presented in Table 13.

Table 13. Analysis of Learning Implementation by Material Experts

Assessed Components	Earned Score (X)	Maximum Score (Y)	Validity Percentage (V)	Final Validity Percentage
Introduction	42	45	93,33%	93,44%
Core activities	46	50	92%	
Closing	19	20	95%	

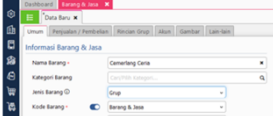
The expert assessment shows that the implementation of the Accurate Online-based inventory feature learning innovation achieved a very valid category, with a final validation percentage of 93.44%. A product is considered valid once it has been validated by an expert in the relevant field and achieves at least a valid category (Yahya et al., 2020).

h. Revising the Learning Program

At this stage, the researcher adjusted the scoring guidelines to account for the invalid item when calculating the maximum score. Such revisions help improve the evaluation tool that has been developed (Ananda & Fadhillaturrahmi, 2017). The evaluation instrument before revision is shown in Table 14, and the revised version is shown in Table 15.

Table 14. Analysis before Revising the Learning Program

Before Revision			Information
7. PT Ananda moved the goods from the front warehouse to the spare warehouse because the goods were damaged. The steps to input the transaction are ... a. Inventory – transfer of goods b. Inventory – goods per warehouse c. Inventory – warehouse d. Inventory – opname stock order	A	True = 2 False = 0	Scoring of question 7 before the validity and reliability testing, where a correct answer to question 7 was worth 2 points.

Questions	Key Answer
1. Transaction 1: June 1st, 2022 PT Indah Ceremlang provides a promo packet with the following details: a. Name of promo : Ceremlang Ceria b. Unit : Packet c. Price : IDR 90,000/packet d. Content : oval plate and 1 mug-made glass e. Tax : 11%	

Before the revision, because question 7 was found to be invalid, skill question 1 was worth 10 points as originally determined by the researcher.

		14
Maximum Scores		72

The maximum total score for the skills assessment is 72 points.

$$\text{Maximum scores} = \text{effective score} + \text{score of knowledge} + \text{score of skill} = 100$$

Ex: Maximum Score = $8 + 20 + 72 = 100$

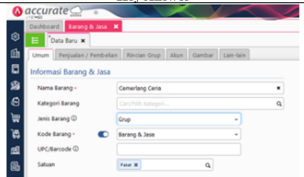
Table 14 illustrates the condition of the assessment instrument before the revision process was undertaken. The analysis indicates that the scoring system was still based on the original test composition, including question number 7, which was later identified as invalid during the validity testing stage. Maintaining the original scoring procedure without modification could potentially reduce the accuracy and fairness of the assessment because students' final scores would still be influenced by an item that did not meet the required psychometric standards. Therefore, a systematic revision of the

scoring guidelines became necessary to preserve the quality of the evaluation instrument. Revising the assessment procedure not only improves the accuracy of score interpretation but also ensures that the measurement of students' knowledge and practical skills reflects their actual learning achievement. This revision process demonstrates the researchers' commitment to developing a valid, reliable, and accountable assessment instrument as part of the continuous improvement process within the Smith-Ragan instructional design model.

Table 15. Analysis After Revising the Learning Program

After Revision		Information
Questions	Reviewer A	Reviewer B
7. PT Ananda moved the goods from the front warehouse to the spare warehouse because the goods were damaged. The steps to input the transaction are ... a. Inventory – transfer of goods b. Inventory – goods per warehouse c. Inventory – warehouse d. Inventory – opname stock order	Invalid	Invalid

Question number 7 was removed from the scoring calculation because it was invalid.

After Revision		Information
Questions 1. Transaction 1: June 1st, 2022 PT Indah Cemerlang provides a promo packet with the following details: a. Name of promo : Cemerlang Ceria b. Unit : Packet c. Price : IDR 90,000/packet d. Content : 1 pcs of oval plate and 1 mug-made glass e. Tax : 11%	Key Answer 	Scoring 4 4 4
		14
Maximum Scores		74

Maximum scores = effective score + score of knowledge + score of skill = 100

Ex: Maximum Score = 8 + 18 + 74 = 100

The revisions presented in Table 15 demonstrate the researchers' commitment to continuously improving the quality of the learning program based on empirical findings obtained during the validation and evaluation stages. The adjustment of the scoring guidelines ensured that the removal of the invalid test item did not negatively affect the overall assessment structure or students' opportunities to obtain the maximum score. Instead, the redistribution of scores to the practical assessment component maintained the proportional balance between knowledge, skills, and affective assessments. This approach

reflects an important principle in educational assessment, namely that modifications to evaluation instruments should preserve measurement fairness while maintaining alignment with the intended learning outcomes. By revising the scoring system systematically, the researchers ensured that the assessment instrument continued to provide an accurate representation of students' competencies and supported more valid interpretations of the effectiveness of the Accurate Online-based inventory learning program developed using the Smith-Ragan instructional design model.

Table 16. Module Revision Based on Problem Number 1

Before Revision		After Revision		Information	
A.	Features of Demand for Goods The goods request feature in Accurate Online is used to record requests for goods arising from purchases or from transfers between warehouses. In manufacturing companies, goods requests generally originate from the production department because they relate to the production process. In other types of companies, requests are generally made by the warehouse department in relation to merchandise stock to be sold.	A.	Features of Demand for Goods The goods request feature in Accurate Online is used to record requests for goods arising from purchases or from transfers between warehouses. In trading and service companies, requests are generally made by the warehouse department in relation to merchandise stock to be sold. This feature is used when the warehouse requests the purchasing section to buy goods because stock is running low or has run out.	In trading and service companies, the goods request function is generally carried out by the warehouse department in relation to merchandise stock to be sold.	
E.	Features of Adding Raw Materials The Adding Raw Materials feature serves two functions: adding raw materials due to a shortage during order	E.	Features of Adding Raw Materials The Adding Raw Materials feature serves two functions: adding raw materials due to a shortage during order		

Before Revision	After Revision	Information
production, using the raw materials addition (take goods) option, or adding raw materials back to inventory due to a surplus after production (returns). Both taking and returning raw materials can be done before the order is completed. This feature is typically used by manufacturing companies.	production, using the raw materials addition (take goods) option, or adding raw materials back to inventory due to a surplus after production (returns). Both taking and returning raw materials can be done before the order is completed. This feature is typically used by manufacturing companies.	materials because of a shortage of raw materials.

The revisions presented in Table 16 were intended to improve the clarity and completeness of the instructional content related to the goods request and adding raw materials features in Accurate Online. The evaluation findings revealed that many students experienced difficulties distinguishing the functions and implementation procedures of these features during inventory management activities. Therefore, additional explanations and contextual descriptions were incorporated into the module to provide more explicit guidance regarding when and how each feature should be applied in different business situations. These

improvements not only enhance students' conceptual understanding but also reduce misconceptions that may occur during practical exercises. Furthermore, aligning the module content with authentic business processes enables students to relate theoretical concepts to real accounting practices, thereby supporting meaningful learning. Through these revisions, the inventory module becomes a more comprehensive learning resource that facilitates students' mastery of Accurate Online features while strengthening their readiness to perform computer accounting tasks in professional settings.

Table 17. Module Revision Based on Problem Number 8

Before Revision	After Revision	Information
D. Job Order Features The Job Order feature is used to produce finished goods based on customer orders. It can also be used to issue goods for the company's own use, for example as promotional samples. 	D. Job Order Features The Job Order feature is used to produce finished goods based on customer orders. It can also be used to issue goods for the company's own use, for example as promotional samples. In manufacturing companies, this feature is also used to record orders that differ from the company's usual production. 	The job order feature is used to produce finished goods for customer orders. In manufacturing companies, job order records differ from those of standard production.
E. Features of Adding Raw Materials The Adding Raw Materials feature serves two functions: adding raw materials due to a shortage during order production, using the raw materials addition (take goods) option, or adding raw materials back to inventory due to a surplus after production (returns). Both taking and returning raw materials can be done before the order is completed. This	E. Features of Adding Raw Materials The Adding Raw Materials feature serves two functions: adding raw materials due to a shortage during order production, using the raw materials addition (take goods) option, or adding raw materials back to inventory due to a surplus after production (returns). Both taking and returning raw materials can be done before the order is completed. This feature is typically used by manufacturing companies.	Order fulfillment provides users with information about the stock adequacy of goods ordered (Sales Orders) by customers, allowing them to determine (1) which items need to be purchased due to insufficient stock, and (2) which orders can be shipped because sufficient stock is available.

Before Revision	After Revision	Information
feature is typically used by manu- facturing companies.		

1) Student Responses to the Accurate Online-Based Accounting Computer Learning Program Using the Smith-Ragan Model

Analysis of the questionnaire on student responses to the learning innovation covering its novelty, attractiveness, clarity, and usefulness yielded a practicality percentage of 87%. This indicates that the Accurate Online-based computer accounting inventory module is practical and valid, and can be used without revision.

Alvionita et al. (2019) state that learning media is practical if it achieves a score between 70.01% and 85%. CTL-based textbooks for computer accounting subjects using Accurate received a positive response from 94.5% of students, indicating that the textbooks were feasible to use (Ambarwati & Rochmawati, 2020). Similarly, student responses to interactive learning media achieved a rating of 88%, indicating that learning media can increase student interest and improve learning outcomes (Yahya et al., 2020).

2) Student Learning Outcomes for the Accurate Online-Based Accounting Computer Learning Program on Inventory Materials Using the Smith-Ragan Model

Only four students were declared complete based on the pre-test results, while the remaining 15 scored below the Minimum Completeness Criteria. After the pre-test, students took part in the learning process conducted by the researchers, which followed the prepared Lesson Plan.

Students used the developed modules and learning media as learning resources

throughout the process. After participating in the learning process, students completed evaluation questions comprising Student Worksheet items and knowledge questions. The results show that 89% of students achieved scores above the Minimum Completeness Criteria set by the Accounting Education Study Program at Universitas PGRI Madiun.

This demonstrates an increase in student learning outcomes following the implementation of the Accurate Online-based computer accounting inventory module. Before the intervention, only 21% of students scored above the Minimum Completeness Criteria on the pre-test, while 79% scored below it. After the learning innovation was implemented, 89% of students scored above the Minimum Completeness Criteria on the evaluation questions, confirming this improvement in learning outcomes.

The learning device developed by Yahya et al. (2020) was found to be effective, as 86% of students scored 75 or above, and the tool was considered valid, practical, and efficient. Similarly, Nasution and Oktaviani (2020) developed learning tools that improved students' mathematical problem-solving skills; after revision, their mathematics learning tools comprising lesson plans, worksheets, instructional media, and assessment instruments were deemed suitable for use in schools.

The learning tools developed effectively support learning activities, as reflected in the cognitive learning outcomes that achieved completeness (both individually and collectively), the cognitive learning process being rated as good, and students' psychomotor learning outcomes also being rated as good.

Overall, the learning tools developed are valid, practical, and sufficiently effective for use in learning (Fatmawati, 2016).

4. Conclusion

The advantages of developing this Accurate Online-assisted computer accounting learning program are as follows: (1) the Accurate Online-based inventory module is among the first of its kind, given the scarcity of similar, up-to-date resources; (2) developing a learning program using the Smith and Ragan model can serve as a reference for further research, since studies using this model remain limited; (3) the teaching materials, learning media, worksheets, and assessment instruments developed using the Smith-Ragan model were produced through clear and coherent stages; (4) the learning program innovation meets a very valid criteria according to material experts; and (5) the comprehensive development of this learning innovation can improve student learning outcomes.

This research contributes to insight and knowledge regarding inventory management and inventory adjustment in Accurate Online, and it applies concepts from educational planning coursework. The Smith-Ragan model was used to test student responses to the learning innovation and to analyze their learning outcomes.

This research was limited by technical constraints related to internet connectivity, which caused the field test to deviate from the planned time allocation. In the validity testing of the evaluation questions, one item was found to be invalid; although the researchers reflected on the need to revise the compiled modules, further testing could not be conducted due to time constraints.

The results of this study can serve as a comparison and reference for further research. In the validity and reliability testing

stages, revisions should be made before re-testing to obtain optimal results. For further research, it is recommended that the implementation of learning be assessed directly (offline), and that researchers reflect carefully on the specific difficulties revealed by the questions with the most errors.

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6. Authors Contribution

Alifia Ganeshi Anggarini: Conceptualization, Methodology, Software, Investigation, Data Curation, Formal Analysis, Writing – Original Draft; **Elly Astuti:** Supervision, Conceptualization, Methodology, Formal Analysis, Writing – Review & Editing; **Elana Era Yusdita:** Software, Investigation, Formal Analysis, Writing – Review & Editing; **Titik Ulfatun:** Validation, Formal Analysis, Writing – Review & Editing; **Rosemarie J. Pascua:** Formal Analysis, Writing – Review & Editing; **Uly Yunita Nafizah:** Methodology, Formal Analysis, Writing – Review & Editing.

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