

**Development and Psychometric Evaluation of an A-Line Skirt Sewing Skills
Assessment Instrument for Vocational Students**
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Abstract

The study aimed to examine the validity and reliability of an A-line skirt sewing skills assessment instrument for students. A Research and Development (R&D) method was employed to develop and evaluate the assessment instrument. The initial product was validated by four experts to obtain content validity, followed by instrument testing involving 25 tenth-grade fashion students at SMK Negeri 5 Kendal. Content validity was analyzed using Aiken's V formula, while instrument reliability was examined through the Intraclass Correlation Coefficient (ICC) using SPSS version 27. The feasibility assessment demonstrated high validity across several aspects, including objectivity (0.85), systematic organization (0.91), construction (0.91), and language use (0.88). Item validity testing indicated satisfactory results. Of the 52 items tested, 8 items were identified as invalid, resulting in 44 valid and feasible items. The reliability coefficient reached 0.848, indicating adequate consistency and agreement among experts. The developed assessment instrument proved valid and reliable for measuring students' A-line skirt sewing skills. The instrument contributes to vocational education assessment practices by providing a more objective, systematic, and standardized evaluation tool for sewing competency assessment.

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INTRODUCTION

Sewing-related occupational skills have a significant positive impact on employment opportunities (Hasanta et al., 2025). In addition, sewing skills training programs have been shown to provide broad opportunities for individuals to start independent businesses, ranging from producing garments for personal use to Establishing small-scale garment enterprises (Dian K et al., 2017) is important because such programs not only equip participants with sewing skills but also include soft skills training, such as discipline, time management, and entrepreneurship, which are essential in the workplace. Through participation in sewing training programs, individuals gain opportunities to establish small businesses, support the development of the small-scale industrial sector, and contribute to reducing unemployment rates (Simamora et al., 2023).

Sewing skills are essential life skills because they not only develop technical competence but also foster independence and prepare individuals to enter the workforce or pursue entrepreneurship. They also facilitate the management of business ideas, product marketing, and financial management, thereby motivating individuals to pursue entrepreneurial activities. Sewing training programs have been shown to significantly enhance participants' skill levels (Astuti & Luayyi, 2019).

The Basic Fashion Studies (Dasar-Dasar Busana, DDB) course, within the elements of Basic Job Skills, Occupational Health and Safety (OHS), and Work Culture, focuses on simple garment sewing—specifically the construction of an A-line skirt—in the fashion expertise program. This course aims to develop students' technical competencies, including sewing skills, pattern comprehension, and garment finishing techniques, while simultaneously fostering essential soft skills such as accuracy, creativity, discipline, and responsibility throughout the garment production process.

Skirt-making instruction in vocational

high schools aims to develop students' technical competencies and soft skills; however, obstacles remain in achieving learning outcomes related to skill competence across three assessment aspects, namely preparation, process, and product, with a minimum mastery criterion of 75 (Yulistina & Wening, 2019). These challenges can be mitigated by integrating the curriculum with the Junior Custom Made occupational certification scheme developed by the National Professional Certification Board in collaboration with the Directorate of Partnerships and Alignment with Business and Industry (Kunjung & Kiki, 2023).

Based on observations conducted by the researchers with several teachers of the Basic Fashion Studies subject at SMK Negeri 5 Kendal, the findings indicate a need for the development of more systematic assessment instruments that are aligned with the characteristics of sewing competencies, particularly in achieving the competency elements of Basic Job Skills, Occupational Health and Safety (OHS), and Work Culture within the simple garment sewing material of the A-line skirt construction project. The existing assessment rubrics cover technical aspects—such as measurement, cutting, assembling, and finishing—in only 50% of the evaluation. Furthermore, 75% of teachers have aligned the assessment instruments with learning objectives and student characteristics. However, teachers face challenges in assessing skirt-making skills, with 50% reporting difficulties due to the lack of references or examples of assessment instruments. Additional challenges arise from the fact that some students have not yet achieved competency, resulting in the need for additional time to complete remedial tasks.

Teachers strongly require structured assessment instruments that align with competency standards referring to occupational certification schemes, take into account students' foundational abilities, ensure the availability of tools and materials for skirt-making practice, and support student learning motivation. Teachers also expect assessment

instruments for skirt and other garment construction that comprehensively cover the preparation, implementation, and final product stages as a practical solution to address diverse student abilities and ensure ease of use.

Pengembangan instrumen penilaian kemampuan menjahit rok sangat penting dilakukan untuk mengukur ketercapaian pembelajaran Dasar-Dasar Busana (DDB), mengetahui sejauhmana keterserapan materi yang diajarkan, serta untuk memperoleh hasil evaluasi yang valid dan reliabel. Penyusunan instrumen penilaian diagnostik yang tepat dapat membantu meningkatkan kualitas pendidikan (Supriyadi et al., 2022). Instrumen penilaian yang tepat dapat digunakan sebagai acuan penilaian dalam keseharian pembelajaran disekolah. Dalam pembelajaran mata Pelajaran Dasar-Dasar Busana (DDB) elemen Kecakapan Kerja Dasar (Basic Job Skills), K3 dan Budaya Kerja dengan proyek pembuatan rok A-line belum sepenuhnya mengembangkan dan menerapkan instrumen penilaian yang terstandar untuk mengukur kemampuan keterampilan siswa yang sebenarnya. Agar dalam penilaian yang dilakukan guru valid dan reliabel, maka diperlukan instrumen penilaian yang utuh mencakup aspek persiapan, proses dan hasil.

The development of assessment instruments for skirt-making sewing skills is essential to measure the achievement of learning outcomes in Basic Fashion Studies (Dasar-Dasar Busana, DDB), to determine the extent to which instructional content is absorbed, and to obtain valid and reliable evaluation results. The appropriate design of diagnostic assessment instruments can contribute to improving the quality of education (Supriyadi et al., 2022). Well-designed assessment instruments can also serve as consistent references for daily classroom assessment practices. However, in the Basic Fashion Studies (DDB) subject—particularly within the elements of Basic Job Skills, Occupational Health and Safety (OHS), and Work Culture through the A-line skirt construction project—standardized assessment instruments have not yet been fully

developed or implemented to accurately measure students' actual skill competencies. Therefore, to ensure that teachers' assessments are valid and reliable, comprehensive assessment instruments encompassing preparation, process, and product aspects are required.

A study conducted by Budiastuti et al. (2014) developed an assessment instrument for sewing a lined skirt to identify the characteristics of procedural organization and to examine the consistency between students' self-assessment and lecturers' assessments in lined skirt sewing practice within the Fashion Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta. The study employed assessment sheets, rubrics, assessment procedures, and scoring guidelines as its instruments. Validity was established through expert judgment involving lecturers of the Fashion Technology II course and measurement experts in Fashion Engineering at the Faculty of Engineering, Universitas Negeri Yogyakarta, who confirmed that the instrument adequately represented the Fashion Technology II content. Reliability analysis based on inter-rater agreement yielded a reliability index of 0.87 using Cohen's Kappa, indicating that the instrument met the criteria of a good assessment tool. The results further showed that the developed assessment procedure, which included instrument socialization, systematic evaluation from the preparation stage to the final product, and scoring consistency, achieved a Kappa coefficient of 0.69.

Another related study was conducted by Rohaeti and Astuti (2016), which focused on the development of an evaluation instrument for the bouste houer product. The study aimed to improve an evaluation tool that had previously lacked a detailed and systematic design by developing a comprehensive evaluation framework, obtaining validation results from subject-matter experts and evaluation experts, and analyzing the validation outcomes to determine the feasibility of the instrument.

The validation results indicated that the developed bouste houlder product evaluation instrument achieved a feasibility percentage of 100% and was categorized as “feasible” by material experts, while the evaluation experts’ validation yielded a feasibility percentage of 98.75%. Based on these expert validation results, it was concluded that the evaluation instrument was appropriate for use as a standard for assessing learning outcomes and as a guideline for conducting product evaluations of bouste houlder.

Karlina et al. (2020) developed a project-based independent learning model in vocational fashion education. The results of the effectiveness test indicated that learning through the Project-Based Independent Learning (PBIL) model enabled 97% of students to absorb lessons more easily, assisted 91% of students in problem solving, increased 85% of students’ confidence in expressing opinions, supported 94% of students in teamwork, motivated 97% of students to achieve higher performance, enabled 97% of students to complete post-test tasks more easily than before, motivated 97% of students to complete assignments, and fostered closer student–teacher interactions for 97% of students. These findings demonstrate that the PBIL model, developed through the ten steps of Borg and Gall, was validated by learning experts, media experts, and users, and can therefore be used as a new reference for implementing the learning process.

Based on the facts presented, it can be interpreted that the development of assessment instruments for A-line skirt sewing skills is both critical and urgent, particularly as A-line skirt construction constitutes part of the student competency assessment within the Junior Custom Made occupational certification scheme. By incorporating assessment standards aligned with the Junior Custom Made competency units into the A-line skirt construction assessment instruments used in schools, students can be more systematically guided in preparing for the Skills Competency Test.

METHODS

The research design adopted a Research and Development (R&D) approach. The resulting product was an assessment instrument for A-line skirt sewing skills intended for Grade 10 vocational high school students in the fashion program.

The development model employed in this study was based on the research and development model proposed by Borg and Gall, which includes the following stages: (1) Research and Information Collecting, (2) planning, (3) develop preliminary form a product, (4) preliminary field testing, (5) main product revision), (6) melakukan uji coba lapangan, (7) operational product revision, (8) operational field testing, (9) final product revision, (10) dissemination and implementation (Sugiyono, 2015).

The Borg and Gall development model was selected because it provides systematic stages for developing educational products, including assessment instruments, thereby ensuring that the resulting instrument demonstrates adequate validity and reliability. The development stages began with a preliminary study to identify needs and to determine indicators of A-line skirt sewing skills. A detailed overview of the research process is presented in Figure 1.

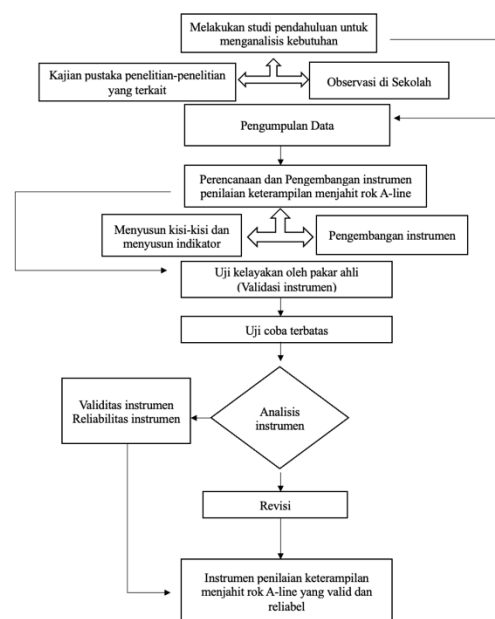


Figure 1. Stages of the Research Process
The preliminary study activities

included a needs analysis aimed at identifying the requirements for developing an assessment instrument to measure simple garment sewing skills, specifically A-line skirt construction. At this stage, the activities consisted of field observations, interviews, and document analysis to obtain information on potential issues relevant to the research. The observations focused on the assessment practices of simple garment products, particularly A-line skirts, in vocational high schools.

The development of the draft assessment instrument for A-line skirt sewing skills for Grade 10 fashion students in the Basic Fashion Studies subject was aligned with the Learning Objectives Framework stipulated in the curriculum. The draft development process began with the preparation of learning materials, followed by the construction of the assessment blueprint for A-line skirt sewing skills. Subsequently, performance test tasks used in the development of the assessment instrument were designed, along with the development of assessment rubrics and scoring guidelines. The instrument was then validated by experts, including university lecturers, assessors from LSP P1 (Professional Certification Institution), and fashion subject teachers, and subsequently revised in accordance with the feedback provided by the experts.

The subjects of this study consisted of two lecturers specializing in educational research and evaluation, one lecturer in fashion education, one vocational education practitioner who also serves as an LSP P1 assessor, and 25 vocational high school students in Kendal enrolled in Grade 10 of the fashion program during the 2025/2026 academic year. The objects of this study were the content validity and inter-rater reliability of the A-line skirt sewing skills assessment instrument for students.

Data were collected using questionnaire and performance test methods. The questionnaire method involved distributing validation questionnaires on the feasibility of the developed A-line skirt sewing skills assessment instrument to the validators. The

feasibility assessment sheet evaluated by the validators consisted of four aspects: objectivity, systematic structure, construction, and language clarity. The sewing performance test comprised three work dimensions, namely preparation, process, and product.

The work dimensions assessed at the preparation stage included preparing sewing equipment, setting up the sewing workstation, operating the sewing machine, inspecting the quality of primary raw materials for sewing, and examining the quality of supplementary materials. The work dimensions assessed at the process stage comprised checking the completeness and quality of patterns, inspecting cutting quality, sewing garment components (A-line skirt), maintaining sewing machines and auxiliary sewing tools, monitoring the sewing process, performing pressing, applying occupational health and safety practices, completing garments using hand sewing techniques, ironing the garment, and time management. The work dimensions assessed at the product stage included trimming excess threads, maintaining hand sewing tools, inspecting stitching quality, attaching labels, ensuring size accuracy, and packaging the skirt.

The content validity of the instrument was established by applying Aiken's V index model in the data analysis, in which the researchers analyzed the level of agreement among validators regarding the alignment of each item with the indicators used to measure A-line skirt sewing skills. The criteria for determining instrument validity were based on the validity coefficient values, whereby items were categorized as valid or appropriate for use (Simatupang et al., 2025). Aiken's V index is expressed by the following formula:

$$V = \frac{\sum s}{n(c-1)}$$

Description :

S : r-lo

lo : the highest validity score

c : the highest validity coefficient
r : the score assigned by a rater

This study involved three practitioners who evaluated the items of the assessment instrument developed to measure A-line skirt sewing skills. The inter-rater reliability among the three raters was calculated using the following formula:

$$ICC = \frac{\sigma_s^2}{\sigma_s^2 + \sigma_o^2 + \sigma_e^2}$$

Keterangan

σ_s^2 = subject variance

σ_o^2 = rater variance

σ_e^2 = random error variance (Murti, 2011)

Inter-rater reliability was analyzed using the Intraclass Correlation Coefficient (ICC) with the assistance of SPSS version 27. When measurements are conducted by more than two raters, reliability is appropriately assessed using the Intraclass Correlation Coefficient (ICC) (Fitriyanto et al., 2019).

RESULTS AND DISCUSSION

The development of the assessment instrument for A-line skirt sewing skills for students, based on the collected data and research findings, was described through analyses of content validity and estimates of inter-rater reliability.

a. Content Validity Analysis

The results of this study consist of scores assigned by four experts to the A-line skirt sewing skills assessment instrument. The assessment aspects comprised four dimensions, namely objectivity, systematic structure, construction, and language clarity. Table 1 presents the validators' evaluation results of the developed A-line skirt sewing skills assessment instrument for students. Instrument testing was conducted to examine the validity and reliability of the developed instrument to ensure its suitability for use in research (Sundram & Romli, 2023). A summary of

the content validity calculation and analysis results is presented in Table 1.

Table 1. Summary of Content Validity Calculation and Analysis Using Aiken's V Formula

Assessment Dimensions	Item	Validator Ahli				S				$\sum S$	V	Criteria
		1	2	3	4	S1	S2	S3	S4			
Objectivity	1	4	5	4	5	3	4	3	4	14	0.88	Valid
	2	4	5	4	4	3	4	3	3	13	0.81	Valid
	3	4	5	4	5	3	4	3	4	14	0.88	Valid
Systematicity	4	4	5	5	5	3	4	4	4	15	0.94	Valid
	5	5	5	4	4	4	4	3	3	14	0.88	Valid
	6	4	5	5	5	3	4	4	4	15	0.94	Valid
Construction	7	5	4	5	4	4	3	4	3	14	0.88	Valid
Linguistic Aspect	8	5	5	4	4	4	4	3	3	14	0.88	Valid
	9	4	5	4	5	3	4	3	4	14	0.88	Valid
	10	5	4	4	5	4	3	3	4	14	0.88	Valid
Mean											0.88	Valid

Based on the results presented in Table 1, Aiken's V value obtained was 0.88, which falls into the high validity category. This interpretation was made using the criteria that values below 0.40 indicate low validity, values between 0.40 and 0.80 indicate moderate validity, and values above 0.80 indicate high validity (Retnawati, 2016). These findings indicate that the level of agreement among the four raters was valid or highly valid. Therefore, it can be concluded that the developed instrument is appropriate for measuring students' A-line skirt sewing skill levels.

In detail, content validity was examined through four main aspects, namely objectivity, systematic structure, construction, and language clarity. In terms of objectivity, items 1–3 of the developed A-line skirt sewing skills assessment instrument obtained a validity value of 0.85, which falls into the high validity category. This indicates that, from the objectivity perspective, the developed instrument is valid and capable of objectively measuring students' skills in A-line skirt sewing learning activities. Furthermore, with respect to systematic structure, items 4–5 of the developed assessment instrument achieved a validity value of 0.91, which is also categorized as high validity. This finding demonstrates that the instrument items are well aligned with the sequence of performance assessment and the learning process,

thereby making the instrument appropriate for use as a measurement tool.

From the construction aspect, items 6–7 of the developed assessment instrument obtained a validity value of 0.91, which is categorized as high validity. This result indicates that the sentence structure and wording of the assessment instrument were formulated using correct grammatical patterns and do not contain ambiguous meanings. Furthermore, in terms of the language aspect, items 8–10 of the developed assessment instrument achieved a validity value of 0.88, indicating high validity. This finding demonstrates that the assessment instrument employs language that complies with Indonesian linguistic rules and uses clear, specific, and consistent terminology, thereby supporting its appropriateness as an assessment tool.

b. Inter-Rater Reliability Analysis

Inter-rater reliability of the A-line skirt sewing skills assessment was evaluated using the Intraclass Correlation Coefficient (ICC). The ICC reflects the degree of consistency and agreement among raters in the measurement process (Koo & Li, 2016). The results of the inter-rater reliability analysis are presented in Table 2.

Table 2. Inter-rater Reliability Results Based on the Intraclass Correlation Coefficient (ICC)

Variabel	Intraclass Correlation Coefficient (ICC)	Note
Expert	0.848	reliabel

Based on Table 2, the results of the inter-rater reliability analysis using the Intraclass Correlation Coefficient (ICC) calculated with SPSS version 27 yielded a coefficient of 0.848. This value indicates a high level of reliability, reflecting strong consistency and agreement among expert raters. Therefore, the developed A-line skirt

sewing skills assessment instrument can be considered reliable and suitable for use in assessing students' sewing competencies.

c. Performance Test Analysis of A-line Skirt Sewing Skills Assessment

Inter-rater validity analysis was conducted to ensure that the assessment instrument could produce consistent and comparable scores when used by different raters. The results of the inter-rater content validity calculation are presented in Table 3.

Assessment Dimensions	Item	Practitioner (Instrument User)			S			ES	V	Criteria
		1	2	3	S1	S2	S3			
Objectivity	1	5	4	5	4	3	4	11	0.92	Valid
	2	4	4	5	3	3	4	10	0.83	Valid
	3	5	5	5	4	4	4	12	1.00	Valid
Systematicity	4	5	5	4	4	4	3	11	0.92	Valid
	5	5	4	4	4	3	3	10	0.83	Valid
Construction	6	4	4	4	3	3	3	9	0.75	Valid
	7	4	5	5	3	4	4	11	0.92	Valid
Linguistic Aspect	8	5	5	5	4	4	4	12	1.00	Valid
	9	5	4	5	4	3	4	11	0.92	Valid
	10	5	4	5	4	3	4	11	0.92	Valid
		Mean							0.90	Valid

Table 3. Inter-Rater Content Validity Test Results

Based on Table 3, the inter-rater content validity analysis using Aiken's V yielded a value of 0.90, indicating a very high level of agreement among raters. Therefore, the instrument can be considered highly valid and suitable for use in the assessment of A-line skirt sewing skills.

Inter-rater reliability analysis was conducted to determine the level of agreement in the use of the assessment instrument for measuring sewing skills, using the Intraclass Correlation Coefficient (ICC). The results of the reliability analysis are presented in Table 4.

Variabel	Intraclass Correlation Coefficient (ICC)	Note
Instrument User	0.836	reliabel

Based on Table 4, the inter-rater reliability analysis using the Intraclass Correlation Coefficient (ICC) calculated with SPSS version 27 yielded a value of 0.836. This indicates a high level of stability and agreement among raters in using the

assessment instrument for measuring sewing skills.

Discussion

The development of the A-line skirt sewing skills assessment instrument represents an effort to produce a standardized, objective, and measurable evaluation tool within the Basic Fashion Studies curriculum, specifically addressing the elements of basic job skills, occupational health and safety (K3), and work culture in A-line skirt production. The development of the assessment instrument emphasizes the importance of a design that covers the preparation, process, and product stages to accurately measure students' skills (Ramadani et al., 2017).

Based on the content validity test using Aiken's V method, the developed instrument was validated by three experts and one educational practitioner, who provided assessments and recommendations for instrument improvement (Septiana & Hermanto, 2024). The expert validation results presented in Table 1.1 show a content validity value of 0.88. This value falls into the high validity category, indicating that the instrument items are well-aligned with the competencies being measured across objectivity, systematic structure, construction, and language aspects. Therefore, the instrument can be considered appropriate for assessing students' A-line skirt sewing skills.

The inter-rater content validity assessed by three practitioners teaching Basic Fashion Studies using Aiken's V yielded a value of 0.90, indicating a **very high level of agreement among raters**. Therefore, the instrument is considered valid and suitable for use in the assessment of students' skills (Bashooir & Supahar, 2018).

The reliability of the A-line skirt sewing skills assessment instrument was evaluated using the Intraclass Correlation Coefficient (ICC). The reliability analysis

conducted by four experts yielded a coefficient of 0.848, indicating high test reliability. Additionally, inter-rater reliability assessed by three fashion teachers produced an ICC value of 0.836, which signifies a high level of stability among raters. An instrument that meets high standards of validity and reliability is considered appropriate and suitable for use as an assessment tool (Nawawi et al., 2024).

CONCLUSION

The development of the A-line skirt sewing skills assessment instrument involved testing content validity, item validity, and estimating instrument reliability. Content validity was intended to demonstrate that the instrument items adequately represent and are capable of measuring students' A-line skirt sewing skills. The purpose of content validity is to ensure that the items of the instrument are representative and effectively measure students' sewing competencies. Based on the data analysis, a content validity value of 0.88 was obtained. This indicates a high level of agreement among the four experts, confirming that the developed instrument is valid and suitable for assessing students' A-line skirt sewing skills.

The results of the Intraclass Correlation Coefficient (ICC) reliability test yielded a value of 0.848, indicating a high level of stability and demonstrating that the instrument has adequate consistency and agreement among experts. The inter-rater reliability test produced an ICC value of 0.836, which falls into the high reliability category. These findings indicate that the assessment instrument exhibits a high level of consistency among raters. Based on the analyses of content validity, inter-rater reliability, and rater consistency, it can be concluded that the developed A-line skirt sewing skills assessment instrument is both valid and reliable, and therefore suitable for measuring students' A-line skirt sewing skills.

The results of this instrument development are expected to serve as a reference for teachers in conducting

systematic assessments of sewing skills. In addition, it can be used as a guideline for the development of similar skill assessment instruments in the future.

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