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Developing a Task Analysis-Based E-Book for Barista Vocational Training among Individuals with Intellectual Disabilities

Tirza Dian[1], Asri Wijiastuti[2], Sujarwanto[3]
[1,2,3]Surabaya State University, Indonesia

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ABSTRACT

The participation of individuals with intellectual disabilities in the workforce remains relatively low due to limited access to adaptive vocational education and training programs. This study aimed to develop and evaluate a Task Analysis-based E-Book for barista vocational training designed to support vocational skill development among individuals with mild intellectual disabilities. The study employed a mixed-methods approach within the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development framework. Participants were seven individuals with mild intellectual disabilities aged 17–30 years enrolled at Destiny Learning Center Surabaya, selected through purposive sampling. Data were collected through expert validation sheets, practitioner practicality questionnaires, and a one-group pretest–posttest design. The results indicated that the developed E-Book achieved a high level of validity, receiving scores of 100% from the subject-matter expert, 94% from the media expert, and 92% from the special education expert. Practicality evaluation yielded a score of 84%, indicating that the E-Book was practical with minor revisions. Participants demonstrated consistent improvements in barista vocational skills, with an average N-Gain score of 0.622 (moderate category). Paired-samples t-test results showed a significant difference between pretest and posttest scores ($p < 0.05$). The findings suggest that the Task Analysis-based Barista Vocational E-Book is valid, practical, and has the potential to improve vocational skill performance among individuals with mild intellectual disabilities.

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Corresponding Author:

Tirza Dian
Affiliation: Surabaya State University
Email: tirzadianoctivia@gmail.com

1. INTRODUCTION

Individuals with intellectual disabilities constitute a group characterized by significant limitations in intellectual functioning and adaptive behavior, which ultimately

affect their ability to learn, communicate, and participate independently in everyday life [1]. These limitations directly impact their opportunities to obtain equitable education and employment compared to individuals without disabilities.

In many developing countries, including Indonesia, individuals with intellectual disabilities often have limited access to educational and training services relevant to preparing them for employment [2]. According to Wehman [3], participation in employment not only improves economic well-being among individuals with disabilities but also contributes to broader social benefits, including enhanced self-confidence, self-esteem, and self-acceptance. Therefore, specialized programs are needed to bridge the gap between education and employment, including adaptive vocational training designed to meet learners' needs. National employment data indicate that workforce participation among individuals with disabilities remains relatively low. In 2022, the number of workers with disabilities in Indonesia was approximately 720,748 individuals, representing only about ±0.53% of the total national workforce.

Vocational training plays a strategic role in equipping learners with functional, technical, and social competencies relevant to industry demands [4], [5]. It is reported that structured vocational programs for individuals with intellectual disabilities can significantly improve work skills, job readiness, and personal independence, particularly when learning is delivered through hands-on practice and job coaching. Previous studies also suggest that vocational training improves human resource quality by strengthening competencies aligned with industrial needs and technological development [6]. Similarly, a study conducted by Mudde and Hole [7] in Canada found that participants in community-based vocational programs demonstrated significant improvements in work experience and social participation compared to their pre-training conditions. Consequently, vocational training contributes not only to enhancing individual work competencies but also to broader social and economic development [8].

The discrepancy between expectations and existing realities motivated this study to develop a vocational training program integrating technical competencies (*hard skills*), such as equipment operation, customer service, and task-specific abilities, with non-technical competencies (*soft skills*), including discipline, communication, responsibility, and teamwork [9]. Practice-based training approaches, internships (*on-the-job training*), and mentoring have been shown to be more effective than theoretical instruction in improving employment readiness among individuals with intellectual disabilities [10].

In this study, barista training was selected as the vocational field of focus. This selection was based on the substantial growth potential of the coffee industry in Indonesia. Anshool Deshmukh [11] reported that Indonesia ranks fourth among the world's coffee-producing countries and possesses numerous high-quality coffee varieties. Furthermore, the *Indonesian Coffee Annual* report published by the United States Department of Agriculture (USDA) projected that Indonesian coffee consumption during the 2024–2025 period would increase by 10,000 bags to reach 4.8 million bags, with one bag equivalent to 60 kilograms of coffee. The rising demand for coffee has also led to rapid growth in coffee shops, making the barista profession increasingly important and relevant in the labor market.

Barista skills represent vocational competencies that involve multiple work procedures and require individuals to understand instructions, follow sequences, and execute tasks systematically with a certain level of precision. This complexity indicates that barista training should be structured systematically. Therefore, a *task analysis* approach can facilitate individuals with intellectual disabilities in understanding the sequential processes involved in barista work. Task analysis is a systematic procedure for breaking complex skills or tasks into smaller, specific, and sequential steps, making them easier for individuals with intellectual disabilities to understand and learn [12].

In line with these findings, the novelty of this study lies in developing an E-Book as a learning medium to optimize the implementation of task analysis within barista vocational training. An E-book (*electronic book*) is a digital learning resource accessible through electronic devices such as computers, tablets, and smartphones [13]. The use of E-books in education offers numerous advantages, particularly in improving accessibility, flexibility, and learning effectiveness. E-books enable learners to access educational materials anytime, anywhere on digital devices, making learning more practical and efficient. Additionally, features such as keyword search, interactive multimedia, images, videos, and hyperlinks can enhance learners' understanding and engagement. E-books also support self-directed learning, allowing learners to adjust their pace according to individual needs. Previous studies have demonstrated that E-books can improve learning outcomes, instructional effectiveness, and critical thinking skills [14].

Individuals with mild intellectual disabilities are generally characterized by intellectual functioning below the population average (IQ approximately 50–70) and limitations in adaptive behavior, including conceptual, social, and practical skills. These individuals often acquire academic and vocational competencies when instruction is concrete, structured, repetitive, and visually supported. However, they frequently experience difficulties in processing abstract information, retaining complex instructions, generalizing skills across different contexts, and independently completing multistep tasks. These learning characteristics create significant challenges in vocational education settings, particularly in occupations that require procedural accuracy and sequential task performance. Consequently, vocational training programs for individuals with mild intellectual disabilities should incorporate instructional strategies that simplify complex skills into manageable learning units and provide systematic guidance throughout the learning process.

Although previous studies have demonstrated the effectiveness of vocational training, task analysis, and digital learning media for individuals with intellectual disabilities, limited research has examined their integration within a single instructional framework. Existing studies have primarily focused on the use of task analysis to teach functional or vocational skills, while others have investigated the benefits of digital learning media, such as e-books, in improving accessibility and learning engagement. However, empirical evidence regarding the development of a task analysis-based digital e-book specifically designed for barista vocational training remains scarce [15]. Furthermore, few studies have examined how digital learning resources can support the acquisition of vocational competencies involving complex procedural sequences in the rapidly growing

coffee service industry. Therefore, this study addresses an important research gap by developing and evaluating a task analysis-based e-book that combines structured vocational instruction with accessible digital learning media to support employment preparation among individuals with mild intellectual disabilities.

To address these issues, this study developed a digital E-Book based on a task analysis approach for barista vocational training. The E-Book provides knowledge of barista skills and coffee-making procedures, using specific recipes and a task-analysis approach that breaks complex tasks into smaller, more manageable steps. The developed E-Book is expected to enhance vocational skills among individuals with intellectual disabilities while fostering independent learning and mastery of barista-related responsibilities and tasks. This study addressed the following research questions: (1) How can a task analysis E-Book for barista vocational training prepare individuals with intellectual disabilities for employment. (2) How valid is the task analysis E-Book for barista vocational training in preparing individuals with intellectual disabilities for employment. (3) How practical is the task analysis E-Book for barista vocational training in preparing individuals with intellectual disabilities for employment. (4) How effective is the task analysis E-Book for barista vocational training in preparing individuals with intellectual disabilities for employment [16].

This study is expected to make theoretical contributions by integrating vocational training concepts and task analysis approaches into an E-Book learning medium for individuals with intellectual disabilities. Such integration contributes to the field of special education, particularly by tailoring vocational skill training to the learning characteristics of individuals with intellectual disabilities. The task analysis approach, which decomposes complex skills into systematic, manageable steps, can be integrated into vocational training to create more structured and accessible learning experiences. Furthermore, the use of E-books as digital learning media contributes theoretical insights regarding the use of technology in supporting accessibility and effectiveness in vocational education. Therefore, this study may enrich the theoretical foundation for developing technology-based learning models accommodating the needs of individuals with intellectual disabilities and serve as a reference for future research in special and vocational education.

2. METHOD

This study employed a mixed-methods approach [17], integrating qualitative and quantitative methods, as research and development studies require not only numerical data but also an in-depth understanding of user needs and product development processes. Mixed-method research enables the integration of qualitative and quantitative data, thereby providing a more comprehensive understanding of research problems and strengthening the interpretation of findings [18].

The qualitative approach was used to identify the needs, characteristics, and challenges experienced by individuals with intellectual disabilities in barista vocational training through observations, interviews, and feedback from teachers, experts, and stakeholders. Meanwhile, the quantitative approach was employed to evaluate product quality in terms of validity, practicality, and effectiveness of the developed E-Book. The

use of a mixed-methods approach aimed to generate comprehensive data to develop a systematic, user-centered task analysis E-Book for barista vocational training.

Within the ADDIE development framework, qualitative methods were primarily applied during the Analysis phase to identify users' needs and instructional problems. In contrast, quantitative methods were emphasized during the Evaluation phase through expert validation and product trials to assess the quality of the developed E-Book. The ADDIE model emphasizes a systematic process consisting of Analysis, Design, Development, Implementation, and Evaluation to produce effective instructional products [19].

Participants

The participants were seven individuals with intellectual disabilities enrolled at Learning Center D in Surabaya. Participants were selected through purposive sampling based on specific criteria: (1) diagnosed with mild intellectual disability, (2) aged between 17 and 30 years, (3) currently participating in vocational learning programs at Learning Center D for adolescents and adults with disabilities, and (4) able to follow simple instructions during the intervention process.

The exclusion criteria included: (1) severe cognitive impairments that hindered participation, (2) uncorrected sensory impairments, and (3) irregular attendance during the intervention period.

The relatively small sample size (n = 7) reflects the limited number of participants who met the inclusion criteria for the targeted population within the selected institution. In special education research, limited, relatively homogeneous samples are common because the target population has specific characteristics and eligibility requirements. Therefore, this study emphasized the depth of intervention, detailed observations, and a comprehensive understanding of participants' characteristics and responses rather than broad statistical generalization. Consequently, the findings are expected to provide preliminary insights, practical contributions, and implementation recommendations for individuals with similar characteristics, while acknowledging limitations in generalizability.

Data Collection Procedures

Data collection was conducted in three main stages. First, expert validation was conducted by subject matter, media, and special education experts. Subject matter experts evaluated the content validity of the E-Book materials, media experts assessed design quality, and special education experts examined language appropriateness and visual presentation in line with the characteristics of individuals with intellectual disabilities. Expert validation is an important stage in research and development, ensuring that products meet theoretical and practical standards [20].

Second, practicality questionnaires were administered to special education practitioners to evaluate usability, clarity, and accessibility of the E-Book. Usability evaluation is considered essential in digital learning development because it directly affects user engagement and instructional effectiveness.

Third, effectiveness was examined using a one-group pretest–posttest design. This design is commonly used in educational intervention research to observe changes within the same group. However, this design has limitations in establishing causal relationships due to the absence of a control group.

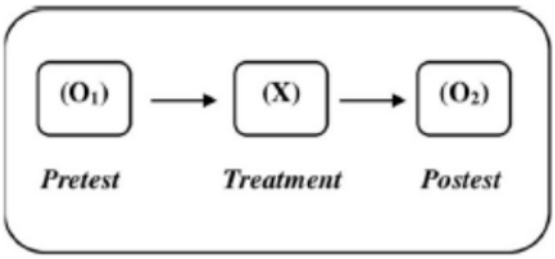

Figure 1. One-Group Pretest Posttest Design (Creswell & Creswell, 2018)

Product Development Procedure

The development of the task analysis E-Book for barista vocational training was designed as part of a Research and Development process integrated with the ADDIE model. Product implementation involved limited-scale testing, positioned as a formative evaluation to obtain preliminary evidence of product functionality and potential effectiveness. The testing process was not intended to establish definitive causal relationships but rather to provide a basis for continuous product refinement. This approach aligns with development and design-based research principles, in which small-scale trials are conducted to evaluate product quality, applicability, and preliminary impact before broader implementation.

Within special education contexts, particularly involving individuals with intellectual disabilities, experimental designs with control groups frequently encounter ethical and practical constraints. Therefore, this study adopted an initial trial approach, emphasizing the evaluation of product usefulness in authentic learning settings. Although research design has limitations in terms of internal validity, the findings provide important preliminary evidence regarding the potential use of the task analysis E-Book as a learning medium supporting vocational skill development among individuals with intellectual disabilities. Consequently, the findings should be interpreted as indicative and serve as a foundation for future studies involving broader populations and more rigorous experimental designs.

The trial component was fully integrated into the Implementation and Evaluation phases of the ADDIE model. The Analysis, Design, and Development phases were used to establish content structure, task analysis sequences, and E-Book design based on the learning characteristics of individuals with intellectual disabilities. Subsequently, the Implementation and Evaluation phases served as mechanisms for obtaining empirical feedback on product quality and usability. Therefore, product development and effectiveness testing were not viewed as separate approaches but as components of a systematic, iterative, and continuous development cycle.

Instruments

The instruments included subject matter validation sheets, media validation sheets, practicality questionnaires, and barista vocational skill assessment instruments. Validation sheets were designed to assess the feasibility of the content, the quality of the presentation, and the suitability of the developed E-Book for individuals with intellectual disabilities. Validation criteria for instructional materials were developed based on performance indicators derived from the Indonesian National Work Competency Standards (Standar Kompetensi Kerja Nasional Indonesia; SKKNI) for vocational education in 2024, specifically competencies related to fundamental barista skills. The use of these standards aims to ensure alignment between instructional materials and vocational competency requirements.

Instrument development was conducted systematically through indicator construction, adaptation according to participant characteristics, and expert review. Content validity was evaluated by special education, vocational, and instructional media experts to ensure the appropriateness of the content, the suitability of the language, and readability. Adjustments included simplifying language, making instructional modifications, and adapting visuals based on participants' cognitive characteristics and learning needs. Pilot testing was also conducted to obtain feedback regarding content clarity, usability, and product functionality.

Although this study focused primarily on product development and preliminary evaluation rather than large-scale instrument testing, expert validation and pilot findings indicated that the instruments were sufficiently feasible to support product evaluation processes. Therefore, the instruments were considered sufficiently representative for obtaining information regarding product quality, practicality, and potential implementation.

Theoretical Framework

Conceptually, this study was grounded in task analysis and vocational learning theories emphasizing the importance of breaking complex skills into smaller, specific, and systematic steps to facilitate learning among students with special needs. Task analysis is widely applied in special education because it enables functional and vocational skills to be segmented into manageable sequential components. Among individuals with intellectual disabilities, this approach is particularly relevant because their characteristics often include limitations in abstract thinking, adaptive functioning, working memory, and information processing speed. Therefore, structured, concrete, and sequential instructional approaches are considered more appropriate.

Vocational education literature highlights that employment preparation programs for individuals with special needs should be contextualized, adaptive, and oriented toward authentic workplace readiness. Vocational education should not only emphasize skill acquisition but also promote independence, adaptive behavior, and consistent work performance [21].

Furthermore, this study incorporated digital learning principles emphasizing accessibility, visualization, and flexibility. E-books offer opportunities for multimedia learning experiences by integrating text and visual elements that facilitate learners'

understanding and knowledge acquisition. Therefore, integrating E-Books with task analysis was expected to create a more structured learning experience aligned with the needs of individuals with intellectual disabilities.

Data Analysis

Data analysis employed descriptive and inferential statistical techniques in line with the research objectives. Descriptive analysis was used to determine the validity, practicality, and feasibility levels of the developed E-Book. Validation results, media assessments, and user responses were analyzed using percentage-based categorization to evaluate product quality against predetermined criteria and to provide systematic information prior to implementation.

Inferential analysis was employed to examine the preliminary effectiveness of the task analysis E-Book in improving vocational skills among individuals with intellectual disabilities. A paired-samples t-test was conducted to compare participants' performance before (pretest) and after (posttest) the intervention. This statistical procedure is appropriate for comparing two related conditions within the same group in preliminary experimental and quasi-experimental educational research.

Additionally, effect size (Cohen's d) was calculated to determine the magnitude of intervention effects. Effect size analysis is important because it provides information not only about statistical significance but also about the practical magnitude and strength of intervention outcomes. Previous methodological studies suggest that parametric testing can remain robust in small-scale educational research when statistical assumptions are satisfied.

Summary of Findings

The findings indicated that the developed task analysis-based vocational E-Book demonstrated a very high level of validity, achieving scores of 92% from special education experts, 94% from media experts, and 100% from subject matter experts. Practicality testing further indicated that the developed media was categorized as practical with minor revisions, based on practitioner evaluations of 85%, 80%, and 87%, respectively.

The E-Book also demonstrated effectiveness in improving participants' abilities, as reflected in increased scores between pretest and posttest across all participants. N-Gain analysis yielded an average score of 0.622, categorized as moderate improvement. Furthermore, the paired-samples t-test revealed a p-value of 0.000 ($p < 0.05$), indicating significant differences in participants' abilities before and after the intervention. Therefore, the developed task analysis-based vocational E-Book was considered valid, practical, and effective in improving vocational abilities among individuals with intellectual disabilities.

3. RESULTS AND DISCUSSION

This study evaluated the developed task analysis E-Book for barista vocational training through three main indicators: validity, practicality, and effectiveness. These indicators are essential in development research because they determine the quality and feasibility of instructional products before broader implementation. This section presents

the findings from the development and evaluation of a task-analysis-based E-Book for barista vocational training among individuals with mild intellectual disabilities. The results include participant characteristics, product validity, practicality evaluation, effectiveness testing through pretest-posttest comparisons, N-Gain analysis, and hypothesis testing.

The study involved seven individuals with mild intellectual disabilities enrolled in a vocational learning program at Destiny Learning Center Surabaya. Participants were selected using purposive sampling based on predetermined inclusion criteria, including a diagnosis of mild intellectual disability, an age range between 17 and 30 years, participation in vocational training programs, and the ability to follow simple instructions during intervention activities.

Product Validity

The validation results demonstrated that the task analysis E-Book for barista vocational training achieved a high validity rating across all assessment components, including content, media, and special education. Content expert validation achieved 100%, media expert validation reached 94%, and special education expert validation reached 92%, indicating that the developed product was suitable for implementation.

Table 1. Content Expert Validation Results

Aspect	Percentage
Content	100%
Learning	100%
Material presentation	100%
Contextual relevance	100%
Evaluation	100%
Average	100%

Table 2. Media Expert Validation Results

Aspect	Percentage
Interface Design	85%
Visual quality and aesthetics	100%
Readability and information clarity	93%
Consistency and suitability of the Canva format	100%
Integration between media and barista content	100%
User friendliness	86%
Average	100%

Table 3. Special Education Expert Validation Results

Aspect	Percentage
Suitability with learner characteristics	93%
Adaptation of learning materials and methods	90%
Character building and independence	100%
Learning evaluation	80%
Average	92%

Based on the validation findings, the task analysis-based vocational E-Book demonstrated a very high level of validity across all evaluation dimensions. Content validation reached 100%, indicating that the instructional content met the requirements for

content quality, instructional aspects, contextual relevance, presentation, and evaluation. Media validation achieved 94%, demonstrating excellent visual quality, readability, and usability. Furthermore, special education validation reached 92%, indicating that the E-Book aligned with the characteristics and learning needs of individuals with intellectual disabilities. Overall, these findings indicate that the developed media was highly valid and suitable for implementation.

The high validation scores indicate that the developed E-Book successfully fulfilled content quality standards and aligned with the learning characteristics of individuals with intellectual disabilities. Content validity indicated that the instructional materials were systematically organized around vocational learning objectives. Similarly, the high media validation score demonstrated that the E-Book possessed strong visual quality, readability, and usability.

Furthermore, the special education validation confirmed that the instructional content and presentation had been adapted to learners with intellectual disabilities' cognitive and learning characteristics. This finding supports the argument of Ridwan et al. [16], who emphasized that structured learning materials using task analysis can facilitate skill acquisition among learners with special needs by simplifying complex tasks into manageable steps.

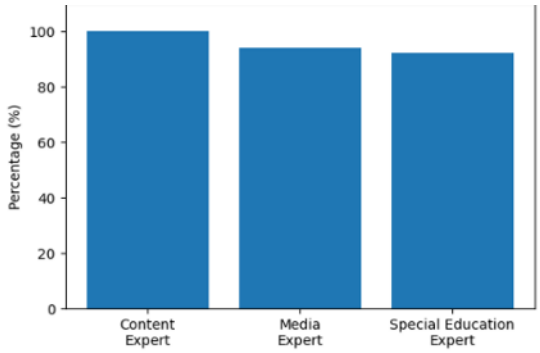

Figure 2. Expert Validation Result

Product Practicality

The practicality test conducted by special education practitioners yielded a score of 84%, categorized as "very practical with minor revision". This indicates that the application is usable, flexible, and can be effectively integrated into learning and intervention settings.

Table 4. Practical Test Result

Aspect	Percentage
Practicalilty	84%
Category	Very practical with minor revision

However, practicality should be interpreted beyond mere usability aspects. A high level of practicality may also reflect the compatibility between participants' characteristics and the instructional methods implemented, the amount and duration of training received,

and the acceptance of teachers and supporting professionals, all of which are important factors influencing the success of implementation in authentic educational settings.

Product Effectiveness

Pretest and Posttest Results

The pretest and posttest results demonstrated improvements in participants' abilities following the implementation of the developed training media. Participants' scores increased from a pretest range of 2.00–2.25 to a posttest range of 3.67–4.25, with all participants showing consistent progress. These findings suggest that task-analysis-based training media had a positive impact on participants' skills after the learning process.

Table 5. Pretest and Posttest Scores

No	Subject	Pretest	Category	Posttest	N-Gain	Category
1	AC	2.25	Low	3.75	0.545	Medium
2	HW	2.17	Low	3.67	0.530	Medium
3	NH	2.00	Low	3.83	0.610	Medium
4	BN	2.08	Low	4.00	0.658	Good
5	MA	2.08	Low	3.67	0.545	Medium
6	GR	2.08	Low	4.25	0.743	Good
7	JW	2.00	Low	4.17	0.743	Good

The average N-Gain score was 0.622, indicating a moderate category and suggesting that the developed media demonstrated adequate effectiveness in improving participants' abilities after the learning intervention. Although all participants showed improvement, the level of gain had not yet reached the high category, which may be attributed to the gradual nature of vocational skill acquisition among individuals with intellectual disabilities that requires repeated practice, habituation, and consistent support. Furthermore, N-Gain scores ranged from 0.530 to 0.743, with most participants classified in the moderate category and several in the high category. This variation suggests differences in individual responses to the learning process, potentially influenced by factors such as initial ability, individual characteristics, level of understanding, learning motivation, ability to follow instructions, and varying support needs. These findings highlight the importance of individualized approaches in special education to accommodate each participant's unique characteristics.

The observed improvement in participants' abilities may not be solely attributed to the use of the task analysis-based e-book, as external factors such as teacher assistance, professional support, a conducive learning environment, and family involvement likely contributed to the learning process. At the individual level, all participants consistently demonstrated increased posttest scores, with scores improving from a pretest range of 2.00–2.25 to a posttest range of 3.67–4.25. These findings indicate that the developed media have the potential to support the improvement of vocational skills. However, they also suggest that learners with intellectual disabilities require continuous practice, more intensive repetition, and extended learning periods to achieve more optimal skill development.

Hypothesis Testing (Paired Samples t-test)

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest - Poestes	-1,81143	0,29220	0,11044	-2,08167	-1,54119	-16,402	6	0,000

Figure 3. Paired Samples Test

Based on the hypothesis testing using the Paired Sample t-Test, the significance value (Sig. 2-tailed) was 0.000, which was lower than the predetermined significance level of 0.05 ($p < 0.05$). Therefore, H_0 was rejected, and H_1 was accepted. These findings indicate a statistically significant difference between pretest and posttest scores following the implementation of the developed training media. Furthermore, the t-value of -16.402 and a mean difference of -1.81143 suggest a relatively consistent improvement in participants' scores after the intervention. Thus, it can be concluded that the task-analysis-based vocational training media in the form of an e-book was effective in improving participants' abilities during the learning process.

Discussion

The findings indicated that the developed barista vocational task analysis e-book met three primary quality indicators: validity, practicality, and effectiveness. These aspects are essential in development research as they determine the feasibility of learning media, particularly for individuals with intellectual disabilities. The developed media demonstrated a very high level of validity, practical usability, and effectiveness in improving participants' vocational skills.

Validity of the Barista Vocational Task Analysis E-book

The validation results categorized the e-book as "highly valid" based on assessments by content, media, and special education experts. Content validation achieved a score of 100%, indicating appropriateness in terms of content, instructional aspects, presentation, contextual relevance, and evaluation. Media validation obtained an average score of 94%, reflecting strong visual quality, readability, design consistency, and ease of use. The integration of text, images, and structured procedural steps contributed to a more engaging learning experience and facilitated concrete understanding among learners with intellectual disabilities. Furthermore, validation by special education experts reached 92%, indicating compatibility with learner characteristics, including instructional adaptation, independence development, and evaluation processes.

The high validation outcomes suggest that the task analysis approach effectively organized barista skills into smaller, systematic steps, making complex vocational skills easier to understand and learn, in line with previous research [22] that provides initial

empirical insights to inform future design and development stages, as well as teacher training programs aimed at improving the use of technology in special education settings.

Practicality of the Barista Vocational Task Analysis E-book

The practicality test yielded a score of 84%, categorized as "practical with minor revisions." This finding suggests that the media can be effectively implemented in learning and training activities, though minor improvements remain needed. Practicality reflects not only ease of use but also user acceptance and compatibility with real learning situations. In addition, successful implementation was supported by the involvement of professionals such as teachers, therapists, and special education assistants, whose roles are essential in adapting learning processes to individual participant needs. This also aligns with previous research, which found that the Smart Box Edu for students with intellectual disabilities achieved a practicality rate of 89% (according to teachers). The media was considered helpful for students' motivation and learning focus [23]. The development of pop-up books for children with special needs also shows 80–90% practicality from teachers and students, so the media is worth using in real learning [24].

Effectiveness of the Barista Vocational Task Analysis E-book

The findings demonstrated that the e-book had a positive effect on participants' skill development. Pretest scores ranged from 2.00 to 2.25 and increased to 3.67–4.25 in the posttest, indicating consistent progress among all participants. The average N-Gain score was 0.622, classified as moderate, suggesting adequate effectiveness despite not reaching a high category. Individual N-Gain scores ranged from 0.530 to 0.743, indicating variability in responses that may be influenced by initial abilities, comprehension levels, motivation, ability to follow instructions, and individual characteristics. External factors such as the learning environment, teacher involvement, family support, and mentoring processes may also have contributed to these improvements. This also supports existing research that explains how to create meaningful learning experiences and significantly develop critical reasoning abilities through a structured process of exploration, discussion, and reflection [25].

The Paired Sample t-Test further supported these findings. The significance value (Sig. 2-tailed) was 0.000 ($p < 0.05$), resulting in the rejection of H_0 and acceptance of H_1. Additionally, the t-value (-16.402) and mean difference (-1.81143) indicated significant improvements following the intervention. Overall, these findings suggest that the task analysis-based barista vocational e-book effectively improved vocational skills among individuals with intellectual disabilities and demonstrated the potential of adaptive, structured learning approaches in supporting skill acquisition.

Implications for Vocational Preparation

The findings suggest that integrating task analysis with digital learning media can support the acquisition of vocational competencies relevant to barista training. However, caution should be exercised when interpreting these findings as evidence of complete workforce readiness. Employment readiness encompasses a broader set of competencies beyond technical barista skills. Successful employment requires punctuality, workplace

discipline, social communication, customer service skills, workplace behavior, emotional regulation, stamina, teamwork, adaptability, and the ability to meet employer expectations in real work environments. Therefore, the present findings should be interpreted as evidence of improvement in vocational skills rather than as direct proof of employment readiness. Future vocational programs should integrate technical training with soft-skill development, workplace simulations, internships, supported employment experiences, and social communication training to better prepare individuals with intellectual disabilities for competitive employment settings.

Study Limitations

Several limitations should be acknowledged when interpreting the findings. First, the study involved only 7 participants from a single institution, limiting the generalizability of the results to broader populations of individuals with intellectual disabilities. Second, the use of a one-group pretest-posttest design without a control group limits the strength of causal conclusions about the intervention's effectiveness. External factors beyond the E-Book itself may have influenced improvements observed during the study. Third, the intervention period was relatively short, which may have constrained the extent of skill development observed. Vocational competencies often require prolonged practice before achieving stable mastery. Fourth, facilitator involvement may have influenced participant performance. Teacher assistance, professional support, instructional prompting, and family encouragement likely contributed to learning outcomes, making it difficult to isolate the specific effects of the E-Book. Fifth, because the study was conducted within a single educational setting, contextual factors unique to the institution may have affected implementation outcomes. Finally, the study did not include long-term retention assessments; therefore, it remains unclear whether participants maintained their acquired skills over time or were able to transfer them to authentic workplace environments. Future research should address these limitations by involving larger and more diverse samples, employing control-group or quasi-experimental designs, extending intervention duration, examining long-term retention, and evaluating actual workplace performance outcomes. Such studies would provide stronger evidence on the effectiveness and sustainability of task-analysis-based digital vocational learning for individuals with intellectual disabilities.

4. CONCLUSION

Based on the results of the development and evaluation process using the ADDIE model, the task analysis-based barista vocational e-book demonstrated a high level of validity, practicality, and potential effectiveness for supporting vocational learning among individuals with mild intellectual disabilities. Expert validation indicated that the product achieved a "highly valid" category, with scores of 100% from subject-matter experts, 94% from media experts, and 92% from special education experts. The practicality evaluation yielded a score of 84%, indicating that the e-book is practical for use in vocational learning settings with only minor revisions required. The findings also showed consistent improvements in participants' vocational skills following the intervention, as reflected in an average N-Gain score of 0.622 (moderate category) and significant differences between

pretest and posttest scores. However, because the study employed a one-group pretest–posttest design without a control group and involved a limited number of participants, the findings should be interpreted cautiously. Therefore, the results suggest that the task analysis-based barista vocational e-book is valid, practical, and has the potential to improve vocational skill performance among individuals with mild intellectual disabilities. From a practical perspective, the e-book is recommended for implementation alongside guided practice sessions, repeated skill rehearsal, and direct supervision from teachers, trainers, or job coaches. Future versions of the product may be enhanced by integrating instructional videos, QR code-based demonstrations, and interactive multimedia features to support learning further. In addition, implementation within authentic coffee shop simulations or workplace-based training environments is recommended to strengthen vocational readiness and skill transfer. Future research should involve larger and more diverse samples, employ control-group or quasi-experimental designs, extend the duration of implementation, incorporate retention assessments, and evaluate actual workplace readiness and employment outcomes. Such studies would provide stronger evidence regarding the effectiveness and long-term impact of task analysis-based digital vocational learning media for individuals with intellectual disabilities.

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