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# Work-based learning design for students with disabilities in vocational high schools

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**Abstract:** Education for students with disabilities is urgently needed as part of fulfilling educational equality. This research is motivated by the lack of learning models that focus on students with disabilities, particularly Work-Based Learning for vocational high school students. The purpose of this research is to analyze the needs and develop a design for Work-Based Learning instructional tools for Vocational High School students with special needs. This research method uses the Borg and Gall model combined with the Dick and Carey instructional model, making the stages more contextual and providing a comprehensive overview. The subjects of this research are Vocational High School students from two provinces, namely Central Java and the Special Region of Yogyakarta, specifically students with special needs, including those with disabilities. The trial stages in this research start with evaluations by subject matter experts, media experts, and instructional design experts. The next step involves product testing, which includes individual trials, small-group trials, and large-group trials. The results are then analyzed descriptively and qualitatively to assess the developed model. Thus, based on these results, the model developed is in accordance with needs and has the potential to be implemented at the vocational school level as a means of facilitating WBL-based learning for students with special needs in Indonesia.

***Keywords:*** *Students with disabilities, Vocational high schools, Work based learning.*

## 1. Introduction

Inclusive education is an effort to ensure that every individual, including students with disabilities, has equal opportunities to access and participate in education. At the vocational high school level, students with disabilities face unique challenges, particularly in developing the job skills necessary to succeed in the industrial world [1]. Vocational education aims to prepare students to work in environments that match their expertise and skills. However, the learning system in vocational schools often falls short of being fully accommodating to the needs of students with disabilities, especially in the practical-based development of job skills.

The fundamental issue for individuals with disabilities is the lack of appropriate learning tools in schools, particularly in vocational high schools. Although there are guidelines for educating students with disabilities, their implementation has not yet been optimal [2]. Schools are still seen as being too focused on general education [2][3]. The curriculum and learning tools for students with disabilities also pose urgent issues. Up until now, the curriculum and learning tools have not been inclusive, meaning they are not designed with the learning needs of students with disabilities in mind [4][5].

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This creates barriers to realizing their full potential. Flexible and inclusive curricula and learning tools need to be developed to ensure effective access and learning for all students.

Work-Based Learning (WBL) is an educational approach that focuses on skill development through direct experience in the workplace [6]. This approach is highly relevant for vocational education as it provides students with the opportunity to apply theoretical knowledge in real-world contexts [7]. However, the implementation of WBL for students with disabilities in vocational schools still faces several challenges, such as a lack of support from industry, limited accessibility, and insufficient adaptation of teaching methods to meet individual needs.

Work-based learning (WBL) for individuals with disabilities is an educational approach that enables people with disabilities to acquire the skills, experience, and knowledge needed to enter and succeed in the workforce. This approach encompasses various forms, including internships, on-the-job training, partnerships with companies, and job-oriented projects. In work-based learning (WBL) for individuals with disabilities, the work environment and processes are adapted to support the needs of individuals with disabilities. These adaptations may include physical accessibility, appropriate software or equipment, or task modifications to accommodate individual abilities. Work-based learning is an educational approach that leverages the workplace to structure the experiences gained there [7][8]. It can develop professionalism in the workplace [6]. In vocational education, this approach consistently prepares students for their specific field of work [9].

Work placements can foster self-confidence and soft skills in the industrial sector. A 2017 study [10] found that WBL has the potential to create a higher education experience through the use of consistent and effective pedagogy. It needs to be adapted to the conditions in countries with vocational programs. Another study [11] produced detailed guidelines for those entering advanced apprenticeship programs. Effective management and quality assurance are necessary for the success of educational internships. Further research [12] found that work-based learning at the higher education level offers various developmental approaches for internships. It should not be adopted blindly, as some cases may require adjustments. Follow-up research [13] conducted a preliminary study showing that many universities have yet to conceptualize industry internships properly. Continuous development is still needed, and it should be aligned with the MBKM (Independent Campus Learning) program.

The issue of educational tools for schools with students with disabilities is urgent and requires immediate solutions [14][15]. Vocational high school (SMK) students must also be closely monitored to assess their progress in preparing for the work force [16]. Therefore, this study aims to examine and design an adaptive WBL model for students with disabilities in vocational schools. The results of this research are expected to contribute to improving the quality of inclusive vocational education and help students with disabilities prepare for their future in the workforce.

## 2. Method

This research is educational research and development. This research method uses the Borg and Gall model combined with the Dick and Carey instructional model. Development research is a systematic study to design, develop, and evaluate teaching programs, processes, and products that must meet the criteria of validity, practicality, and effectiveness [17].

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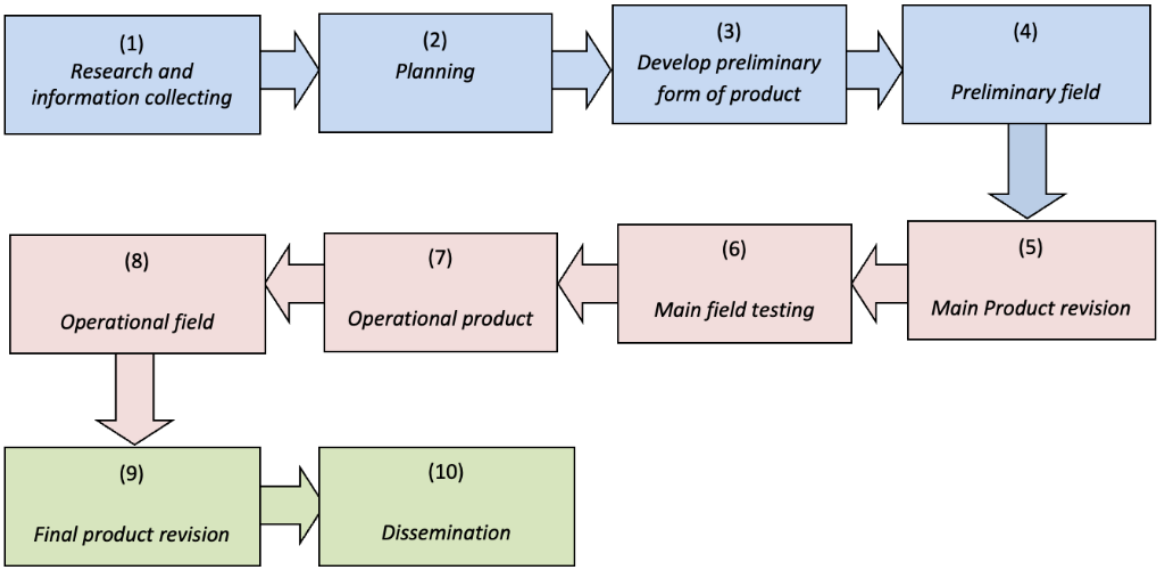


**Figure 1.**
Research stages.

Figure 1. shows that the stages in this research begin with 1) conducting research and collecting information, 2) planning, 3) developing the initial product, 4) conducting initial field trials, 5) revising the main product, 6) conducting the main field test, 7) revising/improving the operational product, 8) conducting operational field trials, 9) revising the final product, and 10) disseminating and implementing the product.

The subjects in this study included: 2 subject matter experts, 2 instructional design experts, 2 media experts, 1 individual for individual trials, 3 individuals for small group trials, and 11 individuals for field trials. Data collection methods included observations, interviews, and questionnaires. The questionnaire method was used to assess the feasibility of the product developed by subject matter experts, instructional design experts, instructional media experts, as well as through individual, small group, and field trials. The instruments used in this study were observation guides, interview guides, and questionnaires. The data collection instrument in this development consisted of an assessment tool to evaluate the developed product. The assessment instrument grid from subject matter experts, instructional design experts, instructional media experts, and product trial subjects is as follows.

**Table 1.**
Instruments from material experts.

| | **Material quality** |
|---|---|
| Material experts | Accuracy/Suitability of learning component choices for the WBL model |

**Table 2.**
Instrument grid from learning design expert.

| | **Learning components** |
|---|---|
| Learning design expert | Learning objectives |
| | Learning design expert learning materials |
| | Learning strategy |
| | Learning evaluation |
| | Learning components |

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**Table 3.**
Instrument grid from learning media expert.

| | **Access** |
|---|---|
| | View |
| Learning media expert | Learning design expert learning components |
| | Accuracy/Suitability of learning component choices for WBL models |
| | Access |

This data was collected through expert validation and questionnaires distributed to students. The research instruments for validators, as well as for individual, small group, and limited field trials, were created in the form of a Likert scale. The data will be analyzed quantitatively in a descriptive manner. This technique is used to process the data from trials conducted with subject matter experts, instructional design experts, instructional media experts, as well as individual, small group, and large group trials at the Vocational High School level.

## 3. Result and Discussion

The research and development process conducted at Vocational High Schools in two provinces, Central Java and Yogyakarta, has produced an instructional design that has received a positive and promising response from SMK students, especially those with disabilities. In this study, the subjects with disabilities were students with hearing and speech impairments.

The WBL-based instructional planning at SMK focuses on basic welding materials using VR-based assistive tools. This customized instructional system allows students to fully visualize the process, making it appear as a simulation of actual welding practice. The advantages of the WBL-based instructional model design developed here provide both teachers and students with an easier way to explain conceptual material and practical skills. The summary of the trial results for developing instructional materials using the WBL-based learning model specifically for SMK students with disabilities is as follows.

**Table 4.**
Media expert recapitulation.

| **No.** | **Component** | **Average rating** |
|---|---|---|
| 1. | Access | 3.16 |
| 2. | View | 3.69 |
| 3. | WBL learning components | 3.50 |
| 4. | Accuracy/Suitability of learning component choices for WBL-based learning models | 3.58 |
| | Average | 3.48 (Good) |

Based on the trial results conducted with media experts, an average score of 3.48 was obtained, which falls under the 'good' category. This indicates that the development of the WBL-based instructional model has been successful and has a potentially positive effect on enhancing the ability of students with disabilities to understand and practice basic welding material. The evaluated components include accessibility, appearance, instructional components, and the appropriateness of instructional component choices for the WBL model, all of which were rated positively, as demonstrated by the validation results conducted in the field.

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**Table 5.**
Recapitulation of material experts

| No. | Component | Average assessment |
|---|---|---|
| 1. | Material quality | 3.71 |
| 2. | Accuracy/Suitability of learning component choices for the WBL model | 3.71 |
| | Average | 3.71 (Good) |

Based on the results of the second stage of trials conducted with material experts, an average score of 3.71 was obtained, falling into the 'good' category. These results indicate that the development of a WBL-based learning model for students with disabilities, aimed at improving their ability to understand welding material, has been successful and meets the 'good' criteria.

**Table 6.**
Recapitulation of learning design experts.

| No. | Component | Average assessment |
|---|---|---|
| 1. | Learning component | 3.39 |
| 2. | Learning objectives | 3.62 |
| 3. | Learning material | 3.91 |
| 4. | Learning strategy | 3.46 |
| 5. | Learning evaluation | 3.42 |
| | Average | 3.56 (Good) |

The trial results conducted with instructional design experts from various universities with expertise in learning model development yielded an average score of 3.56, which falls into the good category. The evaluation by instructional design experts covered components such as Learning Components, Learning Objectives, Learning Materials, Learning Strategies, and Learning Evaluation, all of which were considered satisfactory. This indicates that the development of the WBL-based learning model to improve the understanding of welding materials for vocational school students with disabilities is appropriate and can be recommended for use in vocational schools specifically for students with disabilities.

The results of an individual trial involving a student with hearing and speech impairments were obtained by testing the devices and media separately. The components tested were as follows: (1) material, with an average score of 3.02 (good), (2) verbal, with an average score of 3.11 (good), (3) visual, with an average score of 3.06 (good), (4) video with VR, with an average score of 3.07, and (5) evaluation, with an average score of 3.01 (good). These results show an overall average score of 3.05, which falls into the good category. The individual trial results indicate that the developed product is suitable for progressing to the small group trial stage involving vocational school students in Yogyakarta province.

The small group trial conducted with three students with hearing impairments yielded an average score of 3.18, categorized as good. The components tested in the small group trial were as follows: (1) material, with an average score of 3.15 (good), (2) verbal, with an average score of 3.19 (good), (3) visual, with an average score of 3.10 (good), (4) video with VR, with an average score of 3.14, and (5) evaluation, with an average score of 3.18 (good).

Based on the results of the large group trial conducted with 9 students, an average score of 3.53 was obtained, categorized as good. These results also provide a positive indication that the developed WBL-based instructional model for welding materials is suitable for use with vocational school students with disabilities. The components tested in the large group trial were the same as in the individual and small group trials: material, verbal, visual, video with VR, and evaluation. Based on data analysis, it can be concluded that the WBL-based instructional model design is feasible and highly effective for use in vocational school learning processes. This is attributed to several factors, as outlined below.

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First, the WBL-based instructional model design for welding materials can enhance the knowledge competencies of students with disabilities by fostering independent learning, supported by contextual visualization media [18]. An indicator of student independence is the sense of responsibility toward tasks in learning. This is supported by research indicating that WBL-based learning effectively and efficiently improves target competencies [13][19].

As during the COVID-19 pandemic when vocational school students were given full rights in the classroom under teacher supervision to access all information related to learning via smartphones or laptops to facilitate information retrieval [20][21], the learning concept in the WBL design similarly provides students with full opportunities to learn independently. However, this remains limited by the types of disabilities that may pose challenges in learning. In this study, the disability focus is on students with hearing and speech impairments. The strategy for developing the model involves visualization and interactive media, utilizing visual aids such as images, diagrams, charts, and videos. Technologies like Virtual Reality (VR) or Augmented Reality (AR) can help students understand material more deeply through realistic experiences [22][23]. The second strategy is instruction simplification with sign language, achieved by including sign language or translated text in learning instructions and videos. Teachers proficient in sign language can also be very helpful in explaining concepts and providing guidance.

Second, the WBL-based instructional model design specifically for students with disabilities is developed following a systematic flow, making learning more effective and efficient. This WBL-based instructional model for students with disabilities can be easily used by vocational school students, guided by a straightforward manual that facilitates the balance between theory and practice, supported by VR-based media [24]. The development procedure for this product includes a needs analysis of the welding material learning process at the vocational school level.

The findings in this study support previous research, which states that the implementation of the WBL-based instructional model has a potential effect and improves learning outcomes for vocational school students [25][26][13].

It can be concluded that learning with the WBL model has a potentially positive effect, especially for students with disabilities in vocational schools. Overall, the WBL model design for students with disabilities in vocational schools elicits positive responses regarding understanding and stimulates students with disabilities to engage in learning at the vocational level [27]. This model can be utilized by teachers to facilitate students with disabilities in accordance with the curriculum, as the developed model is more flexible and tailored to individual needs. To enhance the effectiveness of the model, future collaborations with support teachers or special education experts can provide additional assistance for students to participate more effectively in learning.

## 4. Conclusion

Based on the data analysis results, the calculations from instructional media experts showed a score of 3.48 (good), learning material experts indicated a score of 3.70 (good), and instructional design experts reported a score of 3.56 (good). In the individual trial phase, the score was 3.05, in the small group trial it was 3.15, and in the large group trial, it reached 3.53. It can be concluded that the WBL model design for students with disabilities in vocational schools elicits positive responses regarding understanding and stimulates students with disabilities to engage in learning at the vocational level. Therefore, this model can be recommended as a reference for managing learning specifically for students with disabilities in inclusive vocational schools.

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## References
[1] D. Jatmoko, A. Susanto, R. Y. Purwoko, Z. Arifin, and P. Purnawan, "The Implementation of ARCS Learning Model to Improve Students Learning Activities and Outcomes in Vocational High School," *Tarbawi J. Ilmu Pendidik.*, vol. 17, no. 2, pp. 137–144, Dec. 2021, doi: 10.32939/TARBAWI.V17I2.1008.

[2] A. Almutairi, N. Kawai, and A. Alharbi, "Faculty Members' and Administrators' Attitudes on Integrating Students with Intellectual Disability into Postsecondary Education," *Exceptionality*, vol. 29, no. 1, pp. 29–40, 2021, doi: 10.1080/09362835.2020.1727330.

[3] M. Aparicio Puerta and M. T. Polo Sánchez, "Attitudes Toward Disability in Early Childhood Education: A Methodological Review," *Exceptionality*, vol. 31, no. 4, pp. 241–257, 2023, doi: 10.1080/09362835.2022.2130322.

[4] S. Bellman, S. Burgstahler, and R. Ladner, "Work-based learning experiences help students with disabilities transition to careers: a case study of University of Washington projects," *Work*, vol. 48, no. 3, pp. 399–405, 2014, doi: 10.3233/WOR-131780.

[5] O. F. Coleman, J. McDonnell, J. Bowman, C. Eichelberger, J. Ryan, and L. A. Conradi, "Self-Contained Special Educators' Perceptions toward Including Students with Significant Cognitive Disabilities in General Education Classes," *Exceptionality*, vol. 31, no. 4, pp. 291–307, 2023, doi: 10.1080/09362835.2023.2171418.

[6] D. Allan, "Dealing with disaffection: The influence of work-based learning on 14-16-year-old students' attitudes to school," *Empir. Res. Vocat. Educ. Train.*, vol. 6, no. 1, pp. 1–18, Nov. 2014, doi: 10.1186/S40461-014-0010-4/TABLES/6.

[7] L. Fergusson, L. van der Laan, S. Imran, and P. A. Danaher, "Authentic assessment and work-based learning: the case of professional studies in a post-COVID Australia," *High. Educ. Ski. Work. Learn.*, vol. 12, no. 6, pp. 1189–1210, Oct. 2022, doi: 10.1108/HESWBL-03-2022-0074.

[8] J. Garnett, S. Abraham, and P. Abraham, "Using work-based and work-applied learning to enhance the intellectual capital of organisations," *J. Work. Manag.*, vol. 8, no. 1, pp. 56–64, Mar. 2016, doi: 10.1108/JWAM-08-2016-0013/FULL/PDF.

[9] N. F. Amin, A. A. Latif, M. Arsat, N. Suhairom, N. F. Jumaat, and M. E. Ismail, "The Implementation of the Internship as a Coursework in Teaching and Learning Vocational Education," *J. Tech. Educ. Train.*, vol. 12, no. 1, pp. 82–90, Jan. 2020, doi: 10.30880/jtet.2020.12.01.009.

[10] S. D. Baker, N. Peach, and M. Cathcart, "Work-based learning: A learning strategy in support of the Australian Qualifications Framework," *J. Work. Manag.*, vol. 9, no. 1, pp. 70–82, Jun. 2017, doi: 10.1108/JWAM-04-2017-0008/FULL/PDF.

[11] A. Felce, "Managing the quality of higher education in apprenticeships," *High. Educ. Ski. Work. Learn.*, vol. 9, no. 2, pp. 141–148, May 2019, doi: 10.1108/HESWBL-10-2018-0106.

[12] J. Garnett, "Work-based learning tools to inform the implementation of degree apprenticeships for the public sector in England," *High. Educ. Ski. Work. Learn.*, vol. 10, no. 5, pp. 715–725, Nov. 2020, doi: 10.1108/HESWBL-06-2020-0134.

[13] S. Suyitno, Y. Kamin, D. Jatmoko, M. Nurtanto, and E. Sunjayanto, "Industrial Apprenticeship Model Based on Work-Based Learning for Pre-service Teachers in Automotive Engineering," *Front. Educ.*, vol. 7, p. 865064, Jul. 2022, doi: 10.3389/FEDUC.2022.865064/BIBTEX.

[14] M. Chankseliani and A. M. Anuar, "Cross-country comparison of engagement in apprenticeships: A conceptual analysis of incentives for individuals and firms," *Int. J. Res. Vocat. Educ. Train.*, vol. 6, no. 3, pp. 261–283, Dec. 2019, doi: 10.13152/IJRVET.6.3.4.

[15] M. H. Suhaimy, W. A. Sumardi, W. H. Sumardi, and M. Anshari, "An empirical study of training transfer in an apprenticeship programme for conducive workforce," *Int. J. Train. Res.*, vol. 21, no. 2, pp. 134–166, 2023, doi: 10.1080/14480220.2022.2152471.

[16] Suyitno, D. Jatmoko, A. Primartadi, D. Ratnawati, and H. Abizar, "The role of social support on vocational school students' career choices," *Int. J. Eval. Res. Educ.*, vol. 13, no. 1, pp. 271–279, Feb. 2024, doi: 10.11591/IJERE.V13I1.26269.

[17] S. Goundar, "(PDF) Chapter 3 - Research Methodology and Research Method." Accessed: Oct. 27, 2021. [Online]. Available: https://www.researchgate.net/publication/333015026_Chapter_3_-_Research_Methodology_and_Research_Method

[18] S. H. Awan, N. Habib, C. Shoaib Akhtar, and S. Naveed, "Effectiveness of Performance Management System for Employee Performance Through Engagement," *SAGE Open*, vol. 10, no. 4, 2020, doi: 10.1177/2158244020969383.

[19] S. Sugiyarto, P. Negeri Jakarta, J. D. GA Siwabessy, and K. Beji, "The Development of Work Based Learning Kolaboratif (WBL-K) Model to Improve Automotive Maintenance Competence in Community Colleges," *J. Vocat. Career Educ.*, vol. 5, no. 2, pp. 103–116, Dec. 2020, doi: 10.15294/JVCE.V5I2.29291.

[20] D. S. Setiana, B. Kusumaningrum, and R. Y. Purwoko, "The Students' Interest in Online Learning in Higher Education During the Covid-19 Pandemic," *Edumatika J. Ris. Pendidik. Mat.*, vol. 4, no. 2, Nov. 2021, doi: 10.32939/EJRPM.V4I2.932.

[21] Y. Widiyono, I. I. Nugraeni, R. Y. Purwoko, and S. Suyitno, "The Development of E-Learning using Communicative Competence," 2019. doi: 10.4108/eai.21-9-2018.2281189.

[22] S. Suyitno, R. Y. Purwoko, Y. Widiyono, D. Jatmoko, M. Nurtanto, and Z. Hassan, "Development of learning media for automotive charging system based on macromedia flash vocational school," *Univers. J. Educ. Res.*, vol. 8, no. 11 C, pp. 64–71, 2020, doi: 10.13189/ujer.2020.082308.

[23] N. Nuryadi, A. Fitriadhy, N. H. Marhaeni, R. Y. Purwoko, and M. I. Rumasoreng, "The Effects of Puppet Ethnomathematics Applications as Mathematics Teaching Materials for Character Education-Based," *Pegem J. Educ. Instr.*, vol. 13, no. 2, pp. 153–160, Feb. 2023, doi: 10.47750/PEGEGOG.13.02.19.

[24] Y. Dela Carolina, "Augmented Reality sebagai Media Pembelajaran Interaktif 3D untuk Meningkatkan Motivasi Belajar Siswa Digital Native," *Ideguru J. Karya Ilm. Guru*, vol. 8, no. 1, pp. 10–16, 2022, doi: 10.51169/ideguru.v8i1.448.

[25] R. Haruna and Y. bin Kamin, "Application Of Work-Based Learning Model In Technical And Vocational Education: A Systematic Review," *Educ. Sustain. Soc.*, vol. 2, no. 4, pp. 01–04, Jun. 2019, doi: 10.26480/ESS.04.2019.01.04.

[26] G. Dogara, M. S. Bin Saud, and Y. Bin Kamin, "Work-Based Learning Conceptual Framework for Effective Incorporation of Soft Skills among Students of Vocational and Technical Institutions," *IEEE Access*, vol. 8, pp. 211642–211652, 2020, doi: 10.1109/ACCESS.2020.3040043.

[27] J. M. Fernández-Batanero, M. Montenegro-Rueda, J. Fernández-Cerero, and I. García-Martínez, "Assistive technology for the inclusion of students with disabilities: a systematic review," *Educ. Technol. Res. Dev.*, vol. 70, no. 5, pp. 1911–1930, Oct. 2022, doi: 10.1007/S11423-022-10127-7/FIGURES/10.

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