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Grading adaptation for students with hearing impairments in WBL (Workbased learning) subjects: A preliminary study

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Abstract: The implementation of adaptive assessment models for students with hearing impairments in work-based learning (WBL) courses is essential to fostering an inclusive educational environment that accommodates diverse learning needs. This study purposes to identify and describe the adaptive assessment requirements for deaf students in inclusive schools, providing valuable insights for teachers in creating fair and accommodating assessment methods. The study method used a qualitative descriptive research design with observation, interviews and documentation techniques. Data analysis was carried out using the Miles and Huberman model including data collection, data reduction, data display and drawing conclusion or verification. The finding shows that the teachers at SMK Muhammadiyah 3 Yogyakarta and Pondok Pesantren Tuna Rungu emphasize the importance of adaptation in the assessment and learning system for students with hearing impairments, especially in the field of welding skills. Teachers express the necessity of an assessment approach that is not only fair but also allows students to showcase their competencies effectively despite their hearing limitations. The conclusion is a more effective and inclusive learning environment for people with hearing impairments can develop students' skills and make them feel valued in their learning process. The practical implications are designing and developing assessment models with inclusive standards to ensure effective learning outcomes for students with hearing impairments in vocational education environments.

Keywords: Grading adaptation, Hearing impairment, Vocational education, Work-based learning.

1. Introduction

The implementation of adaptive assessment models for students with hearing impairments in workbased learning (WBL) courses is essential to fostering an inclusive educational environment that accommodates diverse learning needs [1]. Students with disabilities often struggle to complete tasks that demonstrate their knowledge, which can lead to low and inaccurate grades [2]. Adaptive assessments are designed to adjust the difficulty of questions based on student performance, providing a more personalized assessment of their skills and knowledge. This model is especially beneficial for Deaf students, who may face unique challenges in traditional assessment formats. Adjustments can be made to assessment tools, materials, and procedures to help individuals with hearing impairments fully participate [3], [4]. One of the primary benefits of adaptive assessments is their ability to provide customized accommodations that increase accessibility.

Deaf students often require special accommodations, such as extended time, separate testing environments, and signed instructions, to effectively engage with assessment materials [5],[6]. By utilizing adaptive assessment models, educators can dynamically adjust these accommodations based on each student's needs, ensuring that all students have equitable access to assessment opportunities. This approach aligns with the principles of Universal Design for Learning (UDL), which emphasizes the importance of flexible learning environments that meet the diverse needs of all learners [7].

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Adaptive assessments can leverage technology to enhance the assessment experience for Deaf students [8]. For example, the integration of visual aids and multimedia elements can enhance comprehension and engagement. Research has shown that Deaf students often perform better on nonverbal assessments, highlighting the importance of incorporating visual learning strategies into the assessment process [9]. By utilizing adaptive assessments that include visual components, educators can create more engaging and effective assessment experiences for Deaf students. In addition to increasing accessibility and engagement, adaptive assessments can also provide valuable insights into Deaf students' learning progress. The ongoing feedback mechanisms inherent in adaptive assessments allow educators to monitor student performance in real-time, allowing for timely intervention and support [10]. This is especially important for Deaf students, who may need additional assistance in understanding complex concepts due to language barriers and limited vocabulary [11]. By using adaptive assessments, educators can identify areas where Deaf students may struggle and provide targeted support to overcome these challenges.

Additionally, adaptive assessments implemented into professional development and training programs for individuals with hearing loss have many benefits [12]. Not only does it ensure that individuals are able to fully participate and demonstrate their abilities, but it also promotes inclusivity and diversity in the workplace [13]. By providing accommodations for individuals with hearing loss, organizations can leverage their talents and create a more equitable and supportive work environment. The long-term impact of providing adaptive assessments is that it supports the career advancement and success of workers with hearing loss, so that they are not undervalued and are able to have an equal opportunity with others. Other research has shown that individuals who receive accommodations in the workplace are more likely to persist in their jobs, achieve career success, and experience greater job satisfaction [14].

Adaptive assessment for individuals with hearing loss, institutions not only support their success but also benefit from their unique perspectives and contributions. The challenge is that educators must be able to create a supportive learning environment to encourage Deaf students to express their opinions and seek help when needed. Successful implementation of adaptive assessment for Deaf students requires ongoing professional development for educators. Training programs should focus on equipping teachers with the skills necessary to design and implement adaptive assessment effectively, as well as to understand the unique needs of Deaf learners [15]. By fostering a culture of continuous learning among educators, schools can ensure that they are prepared to support Deaf students in their work-based learning experiences. Teachers often struggle to provide fair and meaningful assessments to students with disabilities, especially those in mainstream education settings. Many do not have specific policies or guidelines, leading to adaptive assessments [16]. This study aims to describe the adaptive assessment needs of deaf students in inclusive schools that can be useful for classroom teachers in developing assessment adjustments to assess fairly and accommodate students' diverse learning needs.

2. Literature Review

2.1. Grading Adaptation for Student with Hearing Impairments

Grading adaptation for students with hearing impairments is one of the assessment methods for inclusive education [17]. The method aims to provide an equal and fair assessment method by considering the needs of each student, including students with hearing impairments. Students with hearing impairments have challenges in traditional educational environments such as oral instruction, auditory cues and classroom discussions [18]. Therefore, there needs to be grading adaptation for students with hearing impairments so that they can follow the learning well. Grading adaptation can be applied using various methods such as modifying assessment methods [19], using visual aids and sign language [20], or compiling flexible grading criteria [21] for students with hearing impairments. The implementation of grading adaptation for students with hearing impairments can ensure that these students are assessed fairly and have an equal opportunity to succeed academically.

2.2. Work-based Learning

Work-Based Learning (WBL) is an educational approach that integrates both explicit and implicit knowledge along with theoretical and practical models of learning at both individual and collective levels $\lfloor 22 \rfloor$. This combination enables students to gain knowledge and skills not just from formal instruction (explicit knowledge), but also from hands-on experience and social interactions in the workplace (implicit knowledge). Higher education is beginning to engage in work-based learning which has been shown to be effective in creating directly valuable development and contributing to self-management and personal development $\lfloor 23 \rfloor$. Even in its development, WBL has been applied in work preparation for vocational high schools $\lfloor 24 \rfloor, \lfloor 25 \rfloor$. It shows that WBL has contributed to preparing students who are ready to work.

The impact of implementing WBL on vocational high school students that has been carried out includes improving learning outcomes and student motivation [26], [27], [28]. Engaging students in a real work environment allows them to apply theoretical knowledge in a practical environment, thereby providing a deeper understanding of their field and increasing their confidence in performing tasks. Such hands-on experience can provide technical skills that help improve non-technical skills such as problem solving, communication, and collaboration to achieve their professionalism.

3. Methods

3.1. Setting and Participants

This research was conducted at SMK Muhammadiyah 3 Yogyakarta and Pondok Pesantren Tuna Rungu (The Deaf Islamic Boarding School) in September 2024. Participants in the study included teachers, foundation administrators and students.

3.2. Design of Study

The study used a qualitative descriptive research design to analyze how work-based learning assessments for students with hearing impairments and the needs of teachers in adapting assessments. This preliminary study was conducted using observation and interview techniques as well as Focus Group Discussions to plan the design of the assessment model development. Observations were made during learning activities to observe the use of learning media for students with hearing impairments. Interviews were conducted with teachers and foundation administrators to reveal the challenges faced in teaching students with hearing impairments.

3.3. Data Analysis

Data analysis was carried out using the Miles and Huberman model [29], including data collection, data reduction, data display and drawing conclusions or verification. Data collection is obtained through observation, interviews and relevant documents. Data reduction is done after the data is collected to focus on important aspects and clarify the direction of data analysis. After data reduction, the next stage is to present the data to make it easier to understand. The last stage is drawing conclusions or verification. It aims to ensure that the conclusions drawn are in accordance with the data and research objectives.

4. Results

4.1. Observation Result

Observations were conducted at SMK Muhammadiyah 3 Yogyakarta and Pondok Pesantren Tuna Rungu (The Deaf Islamic Boarding School) in September 2024. In its implementation, this observation focused on observing the teaching and learning process, especially in the context of students with hearing impairments. The focus of the observation was to understand how learning activities were carried out, as well as to see the use of learning media used to facilitate the understanding of students with special needs.

During the observation activities, researchers paid attention to various aspects, such as the teaching methods applied by the teacher, the interaction between the teacher and students, and the effectiveness of the learning media used in helping students access the learning materials. The use of sign language,

visual aids, and special technology that can support the learning process for students with hearing impairments was also a major concern. The purpose of this observation was to identify the special needs of teachers in teaching students with hearing impairments, as well as the needs of students to be able to follow the learning optimally.

7828

These observations indicate that despite significant efforts by schools and teachers to support students with hearing impairments, there are still needs that need to be addressed. Additional support is needed in the form of training for teachers in sign language and educational technology, as well as the provision of more adaptive learning media for students with hearing impairments. The results of these observations are expected to be the basis for the development of teacher training programs and the provision of more inclusive learning media for students with special needs.

4.2. In-depth Interview

In-depth interviews were conducted with teachers of SMK Muhammadiyah 3 Yogyakarta and the Management of Pondok Pesantren Tuna Rungu (The Deaf Islamic Boarding School). In the in-depth interviews conducted by teachers of SMK Muhammadiyah 3 Yogyakarta and the management of the Islamic boarding school revealed several challenges faced in teaching welding techniques to students with hearing impairments, namely the difficulty in delivering learning and measuring assessment results for students.

According to the management of the foundation, the understanding of students with hearing impairments is different from that of normal students in general, students with hearing impairments have a weaker understanding because students with hearing impairments focus more on visuals or what is seen. It makes students with hearing impairments less able to understand vocabulary, so they need to visualize the learning provided.

In the context of welding learning that relies on communication for instructions and directions, this limitation is a serious obstacle. According to teachers of SMK Muhammadiyah 3 Yogyakarta, teachers find it difficult to provide evaluations and assessments because the assessment system at SMK Muhammadiyah 3 Yogyakarta has not yet adapted to students with hearing impairments, and there is no special guide for teachers to measure practical and theoretical skills for students with hearing impairments. The results obtained were that teachers had difficulty in providing teaching and assessment regarding welding techniques due to the lack of visual media regarding welding techniques for students with special needs or students with hearing impairments, as well as the absence of a guidebook for teachers who teach to provide structured learning and assessment.

4.3. Focus Group Discussion

The discussion results showed an urgent need for teachers to have an assessment system that is appropriate for students with hearing impairments, especially in practical skills such as welding. Teachers expressed that assessments need to be designed to be more adaptive, allowing students to demonstrate their understanding and competence despite their hearing impairments. This adjustment will help students feel more engaged and able to express their learning outcomes in a way that is appropriate to their condition.

In addition to the assessment system, teachers also highlighted the importance of a more inclusive and adaptive Work-Based Learning (WBL) design. WBL programs that are designed with the needs of students with hearing impairments in mind will allow them to practice welding skills while still meeting applicable industry standards. This work-based learning experience must be designed to ensure that students can practice skills directly with methods that are easy to understand.

Teachers also emphasized the importance of effective learning media, especially in the form of video tutorials equipped with clear text and visuals, as well as sign language guidance. This media is very helpful for students in understanding welding instructions and procedures better, so that they can follow the learning more independently. Videos accompanied by high-quality text and visuals allow students to pay attention to each welding step in detail and reduce reliance on verbal instructions.

In terms of assessment, the criteria used should include an approach that considers the specific needs and abilities of students, including practical observation and evaluation of more easily understood visual

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aspects. This practical observation-based assessment allows students with hearing impairments to be assessed based on the actual skills they demonstrate in welding practice. It helps to create an inclusive learning environment, where every student can express their skills and be seen as an equal based on fair assessment criteria. This approach aims to ensure that the welding learning process can be carried out effectively and inclusively, so that students with hearing impairments can gain the skills they need to succeed in the field, while feeling valued and supported in their learning process.

5. Discussion

Improving accessibility and effectiveness in work-based learning for students with hearing impairments requires a multifaceted approach [30] that incorporates tailored educational strategies, teacher training, and the use of technology. Research shows that Deaf students often face unique challenges in traditional educational settings, which can be exacerbated in work-based learning environments [31]. Therefore, it is critical to implement strategies that not only accommodate their learning needs but also enhance their overall educational experience.

One important factor in improving accessibility is prioritizing sign language as the primary mode of communication in educational settings [32]. Teachers of the Deaf (ToD) who emphasize sign language education can significantly increase Deaf students' access to learning opportunities, especially in foreign language acquisition [33]. This approach aligns with the understanding that accessing education in one's primary language is critical to academic success, as it fosters greater understanding and engagement. Additionally, incorporating Deaf culture and community perspectives into the curriculum can create a more inclusive learning environment that is congruent with Deaf students' identities and experiences [34].

In addition to language considerations, the effectiveness of work-based learning can be enhanced through the integration of technology in industry 4.0 [35],[36]. For example, the use of interactive media and assistive technology has been shown to facilitate learning for Deaf students by providing visual aids that complement traditional teaching methods [37]. The development of Massive Open Online Courses (MOOCs) designed specifically for Deaf learners has also shown promise in increasing accessibility and engagement through tailored content delivery [38]. These platforms can incorporate speech-to-visual approaches that cater to Deaf students' unique learning preferences, thereby enhancing their comprehension and retention of the material. In addition, teacher preparation and ongoing professional development are critical components in enhancing the effectiveness of work-based learning for Deaf students.

Research highlights the need for comprehensive training programs that equip educators with the skills necessary to meet the diverse needs of Deaf learners [39]. This includes understanding Deaf students' specific learning styles and using teaching strategies that align with these preferences, such as peer tutoring and collaborative learning [40]. By fostering an environment where teachers are well-prepared and supported, educational institutions can significantly improve learning outcomes for Deaf students. Finally, creating an inclusive physical and social environment is essential to promoting effective work-based learning experiences. The concept of "Deaf Spaces," which involves designing classrooms and learning environments that consider the unique communication needs of Deaf students, has been shown to increase motivation and engagement [41]. Such spaces can facilitate better interactions among students and between students and instructors, thereby fostering a more collaborative learning environment.

6. Conclusion

The conclusion of this preliminary study is the results of discussions with teachers at SMK Muhammadiyah 3 Yogyakarta and Pondok Pesantren Tuna Rungu (The Deaf Islamic Boarding School) emphasizing the importance of adaptation in the assessment and learning system for students with hearing impairments, especially in the field of welding skills. Teachers need an assessment system that is not only fair, but also allows students to demonstrate their competence even with hearing impairments. In addition, an inclusive Work-Based Learning (WBL) design and video tutorial-based learning media equipped with text and sign language guidance are needed. This is expected to create a more effective

and inclusive learning environment, so that students with hearing impairments can achieve the necessary skills and feel valued in their learning process.

7. Recommendations

The recommendations provided include teachers need to design and develop assessment models that meet standards for students with hearing impairments. The assessment design designed must consider learning objectives, student characteristics, and teacher guidelines in providing assessments. The development of assessment model designs needs to include adaptive components such as the use of instructional visualizations, media that support non-verbal communication, and relevant Sign Language visual aids to reduce communication barriers.

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