

The Interactive Web-Based Learning in Online Learning for Blind Students and Deaf Students in Higher Education

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Abstract: Online learning has been running in Indonesian universities due to the COVID-19 outbreak. Online learning has become a challenge to both parties, lecturers, and students with special needs. The use of several online platforms for learning has not provided accessibility for students who are blind and deaf. To pursue friendly learning in inclusive classrooms for blind and deaf students, then we need a facility that supports learning for blind and deaf students. The purpose of the study is to develop a learning model that can be used for online learning using an interactive website. The interactive Web-Based Learning Model is an innovative learning model which is designed for special needs students to access online learning more effectively. The procedure used in this interactive web-based learning model is that every blind and deaf student can access learning through various devices connected to their cell phone or laptop to make the learning process two-way and effective. The research was conducted using the research & development method which consists of the stages of producing a model product and then validating and testing the model. The result of this study is an online learning model using a website that can present learning material from lecturers in the form of pages that all the menus can be read directly by blind students through a screen reader on their devices (user friendly) and they can send assignments via voice note options. The website is equipped with videos accompanied by subtitles so that it has accessibility to deaf students. This model consists of the following stages: 1) Planning which includes needs analysis and content analysis, 2) The learning process through an interactive website containing structured learning material, interactive learning through video and discussion features, 3) Evaluation includes test and non-test in the form of process and result in analysis.

Keywords: inclusive education, web-based learning, blind students, deaf students

INTRODUCTION

The implementation of Inclusive Education in Higher Education faced some challenges. Universities are expected to be responsible for and respond to the diverse learning needs of students in their institutions (Moriña, 2017). To fulfill the needs of students, it is necessary to have academic services which include planning, appropriate organizational schemes, expert resources, technological support, and efforts in implementing learning and evaluation (Kouroupetroglou et al., 2011). Online platform is used during the teaching-learning process during pandemic situation (Ediyanto & Efendi, 2021; Peni, 2022; Said, et al., 2022).

The Covid-19 pandemic has brought changes in the world of education, including in Higher Education. During the pandemic, the face-to-face learning system has switched to an online system (in the network) or online. The current learning scenario uses digital technology. Teachers and students are connected virtually. The use of computers, laptops, smartphones and the internet are the main components of this learning method (Radha et al., 2020). The use of computers, laptops, smartphones and the internet are the main components of this learning method. E-learning is learning covers a wide scope which includes technology-based learning through websites, learning portals, video conferences, Youtube, mobile applications, and thousands of free webs available. The change from a face-to-face

system to an online system that occurred unexpectedly due to the pandemic situation resulted in several difficulties for both lecturers and students. Some countries experience significant problems with technological infrastructure in remote areas in addition to other problems that are also the focus of attention, namely the standard of implementing online learning (Shahzad et al., 2020)

This situation has an impact on all students and especially students with special needs. In face-to-face learning, there is still many lacks of accessibility for students with special needs. There are obstacles and challenges that they have to overcome, including a rigid curriculum, resistance to the adjustments they need, and materials that are difficult to access. Especially in the learning system in the network. Various unpreparedness, both in terms of methods and other resources in dealing with this situation, have had an impact on the effectiveness of learning for students, including students with visual impairments and the deaf. Several information and communication technology tools have been used by blind students such as JAWS, Eye Window, Braille Notes, and Note Taking (Perera-Rodríguez & Moraña Díez, 2019).

These tools are also used to access online learning platforms. All parties are still in the learning stage to be able to properly access the online learning platform, including the teaching staff (Shahzad et al., 2020). Especially for blind and deaf students. Some online platforms have menus that require downloading and uploading documents which are not easy to do independently. And video conferencing platforms are also difficult for deaf students to follow. Therefore, in changing the learning situation to online, there are problems with the quality standards of education that can be achieved (Sahu, 2020).

Educational institutions must carefully pay attention to the condition of students and design technology that can help to learn to take place more effectively. Given the importance of learning tools in the process of teaching and learning activities, a learning model is designed that can be used for online learning using interactive websites. The procedure used in this interactive web-based learning is that each blind and deaf student can access learning through various devices connected to their cell phone or laptop so that the learning process becomes two-way and effective. The interactive web-based learning model is expected to be one of the innovative learning models designed for students with special needs who are blind and deaf to access online learning more adaptively and effectively.

METHOD

Research in developing this learning model uses research and development (R & D) research methods. Research and Development is a study to produce a product and at the same time test the effectiveness of the product through steps or stages of improvement. In research and development research several stages must be passed, namely (1) Preliminary studies carried out, (2) preliminary trials, (3) Main Product Revisions, (4) Product Operational Revisions, (5) Field Tests, (6) Final Product Revision, (7) Dissemination and Implementation (Mufadhhol et al., 2017).

The subjects of this study were students with visual impairment (7 people) and hearing impairment (3 people) at a private university in Bandung. Content analysis at the preliminary study stage is very important in this research because it will determine how the specifications of the website will be made to suit the needs of the research subject. This study uses three instruments, namely (1) an instrument to determine the characteristics of the website, (2) an instrument for expert validation, and (3) an instrument to see the readability of this website by blind students and deaf students.

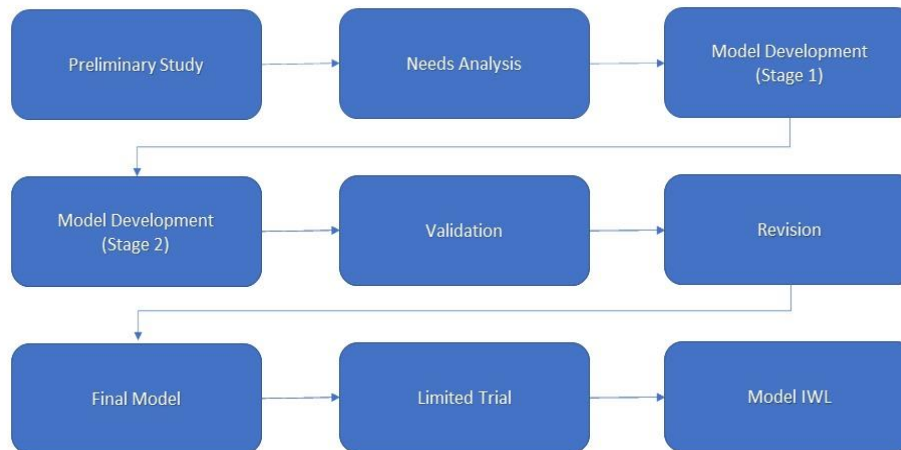


Figure1. Research Stages

RESULT AND DISCUSSION

Result(s)

In the preliminary study, the analysis stages carried out were: (1) analysis of learning problems faced by blind and deaf students, (2) conformity between the learning needs of blind and deaf students with website media, and (3) appropriate software as a suitable learning medium needed.

In the analysis of learning problems, the data was obtained from students and lectures. We grouped data from deaf students and visually impaired students. Deaf students reported difficulties more in a virtual meetings to do lip reading and limited visual resources. Blind students reported difficulties accessing many menus on the online platform, especially in many scroll-down actions. Their screen reader can't access the text. From lectures we get the data that (1) they do not have a guide on how to implement inclusive online learning for deaf students and blind students; (2) some lecturers do not know how the visually impaired students learn in online learning; (3) lectures didn't realize the obstacles faced by students when the learning method is equated with other

Based on the analysis of existing data in the field, a learning model called Interactive Web-Based Learning was developed. This online learning model uses a specially designed website that has menus that are easily read by screen readers of blind students. This website contains lecture material presented in the form of text and video. In the video, the lecture material is delivered by the lecturer. Both in the form of sound for blind students and with subtitles for deaf students. This website is also designed to make it easier for blind students to interact during learning, namely by being equipped with a voice recording feature in the discussion menu, assignment collection, and exams so that blind students can interact easily during learning activities.

The Interactive Web-Based Learning model includes three main points in its implementation. Planning that accommodates needs analysis. This is very important because this model is available to answer the problems experienced by students with special needs in online learning. Furthermore, in planning the lecturer will compile website material content taken from the syllabus and teaching materials which will then be made in the form of material on websites and video shows. In planning the website design is also carried out together with other parties who participate in this case are web developers so that it can be by the objectives to be achieved from the development of this model. Implementation starts from the process of socializing the use of the website and manual instructions that can be accessed easily.

The content on the website is arranged based on the structure of the material in the syllabus so that students can explore the material by browsing all content. The material menu also provides a discussion feature that will discuss experiences and best practices related to the material discussed so that interaction between lecturers and students occurs and the discussion runs asynchronously so that the data is recorded and can be accessed at any time. The final stage is Assessment. The assessment form in the form of a test can be directly accessed on the website and can be filled in in the form of writing, files, or voice notes. In the aspect of assessment, all interactions of students with special needs on this website become a point in the assessment as a form of participation (process) in learning because activities can be recorded and used as the basis for assessment.

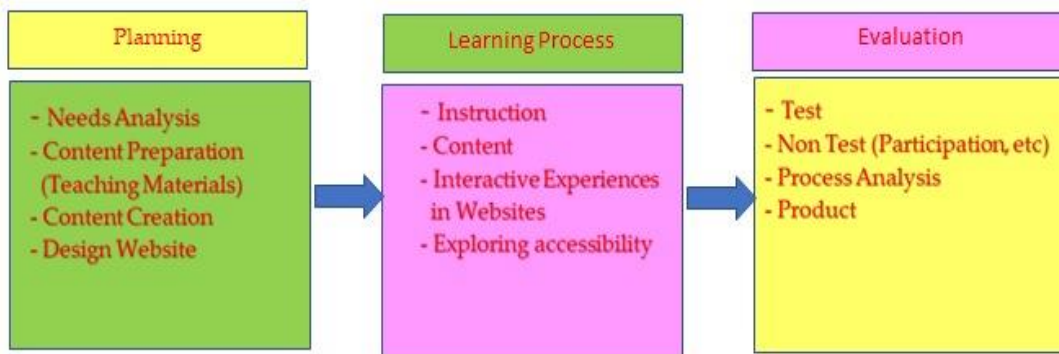


Figure 2. Interactive Web-Based Learning Model

Table 1. Validation result

Aspect	Indicator	Checklist		
		Rejected	Revised	Accepted
Suitability of media with purpose	Learning objectives are clear and significant		1	5
	Content according to learning objective accessibility for blind students and deaf students			6
Relevance of media to material	Content web design (balance, harmony),		1	5
	The combination of aspects (description, pictures, and videos),		1	5
	Relevance among items, Images and videos relevant to the topic		1	5
Suitability of content with purpose	The topic's delivery (clear)		1	5
	Following the rules of scientific writing		2	4
Readability by subject	Clear web navigation for the blind students			6
	Clear web navigation for deaf students		1	5
	Hyperlinks/buttons run smoothly		1	5
	The web has good-quality interface features to help users		1	5
Website Design	Ability to motivate and attract users			6
	Attractive visual design for users		1	5
	Proportional display		1	5
Word and sentence arrangement	The choice of verbs, nouns, and adverbs is appropriate		1	5
	The order of words and sentences is appropriate		1	5
	Questions and responses are appropriate		1	5

The next stage of developing this model is validation from experts. The expert who becomes the validator is a lecturer and chairman of the association of the special education profession of west java province. The purpose of the validation is to see the suitability and clarity of learning materials in the media and their accessibility for blind and deaf students. The aspects that are validated are (1) suitability of media with purpose; (2) relevance of media to the material; (3) suitability of content with purpose; (3) readability by subject; (4) website design and (5) word and sentence arrangement. The checklist for validation of website can be seen in the Table 1.

Discussion(s)

Inclusive education is defined as a new perspective in education that places diverse learners in the same environment where all students can receive educational services that accommodate their abilities and interests (Anastasiou et al., 2015). Inclusive education also introduces the perspective that students with disabilities can also participate in the same environment (Haug, 2017). In this new paradigm, universities have been required to be able to provide services that can meet the needs of their students (Lopez-Gavira et al., 2019). The university took an approach to put inclusive education into the mainstream of curriculum formation and requires teaching staff to adapt curriculum and learning processes and assessments that can realize inclusive education services (Nunan et al., 2000). And appropriate support is essential in ensuring equal access to learning for students with special needs (Rofiah, 2022; Shevlin et al., 2004). Therefore, support for blind and deaf students is very appropriate and necessary.

Obstacles in vision affect blind students in doing various academic tasks (Atowa et al., 2019). Related to the presence of students with disabilities, be they blind, deaf, or other barriers, universities need to develop technology as a learning tool. Currently, a new educational model is being built by many universities awareness to invest in technology and knowledge development and implement measures to facilitate inclusive education (Perera-Rodríguez & Moriña Díez, 2019). In designing an online learning model for the blind and deaf in this research, a preliminary study was conducted in the form of an analysis of learning problems and an analysis of learning needs. An understanding of the problems faced by the visually impaired in interacting with e-learning media is very important because without it it is difficult to create e-learning that can be properly accessed by blind students (Kharade & Peese, 2012). This is because the problems faced by the blind are certainly different from those faced by other students (Permvattana, 2013).

Learning through the web can create curiosity and interest in learning which can improve the academic abilities of students who have learning disabilities (Kumar & Dharma Raja, 2010). Multimedia animation videos is effective to increase their participation in online learning (Astuti, Pertiwi, & Santoso, 2022). Online learning is potential to improve learning outcomes student with attention-deficit hyperactivity disorder (Andajani & Pamuji, 2021). Web-based learning has dimensions that are not limited by distance and thus support students to access various types of information and sources of knowledge. The framework in the web-based learning model is a design that contains the following aspects: (a) pedagogical aspects (a learning environment that adheres to constructivism, social support, and scaffolding systems), (b) cognitive aspects in web design using messages and symbols, (c) contextual principles, taking into account the learner's character and how the learner's mastery and experience in using the internet, (d) technology in web-based learning, includes multi-media support and integrated information technology (Deejring, 2014).

The Accessibility Service Model for students with disabilities in Higher Education requires the following basic requirements, namely having (a) access to interpersonal communication with members of the academic community, (b) access to the environment

within the university organizational structure, and (3) access to educational materials. whether it is in print or electronic form, (4) access to make presentations in class, (5) access to take exams or tests, and (6) access to get information and content on websites that are within the academic scope of the university(Kouroupetroglou et al., 2011).

CONCLUSION

The accessibility service delivery model used uses a student-oriented approach and is based on the results of an analysis of the needs of students with disabilities during their study period. And this model will influence the academic environment and policies regarding their accessibility both inside and outside educational institutions.

In online learning, web-based learning is very interesting and widely applied in education systems in various countries. Website usage occupies the most significant place used (Din, 2017). Web-Based Learning Models can be used to improve the ability of students in higher education by paying attention to the characteristics of their students and using design and content to increase the participation of students with special characteristics. The characteristics referred to in this case are students who have a visual impairment (blindness) and hearing impairment (deaf). As a whole, the website fulfills the purpose of the research and has become a user-friendly website.

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