Development of a Digital Platform Prototype to Facilitate Inclusive Learning for Children with Special Needs

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Article Info	ABSTRACT
	Persons with disabilities have the same rights and responsibilities as citizens. Based on the 1945 Constitution Republic of Indonesia, article 31 paragraph 1 and Law Number 20 of 2003 concerning the National Education System, it can be concluded that the state provides full guarantees for Children with Special Needs to obtain quality education services. Many of the problems of inclusive learning that occurred during the Covid-19 pandemic, ranging from the unpreparedness of the school to various problems with environmental factors so that innovation was needed to overcome these problems. In this article, the author develops a prototype of a digital-based learning platform as a solution to facilitate inclusive learning for children with special needs.

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1. INTRODUCTION

Persons with disabilities have the same rights and responsibilities as citizens. Based on the 1945 constitution article 31 paragraph 1 and law number 20 of 2003 concerning the National Education System, it can be concluded that the state provides full guarantees for Children with Special Needs to obtain quality education services. According to the Regulation of the Minister of National Education of the Republic of Indonesia Number 70 of 2009 Article 1 explains that inclusive education is an education system that provides opportunities for all students who have disabilities and have the potential for intelligence and/or special talents to attend education or learning in the same educational environment, with students in general.

Inclusive education is an educational service system that requires children with special needs to study in schools with friends of their age. Schools that provide inclusive education must adapt to the abilities and needs of students as well as the support provided by teachers for children to succeed [1]. Schools providing inclusive education must be able to adjust the curriculum, educational infrastructure, and learning systems that are tailored to the individual needs of students [2].

At this time, Indonesia or even the whole world is fighting against the COVID-19 pandemic, where this pandemic has an impact on all fields, one of which is education. Currently, direct learning cannot be carried out due to the COVID-19 pandemic so that the learning process, especially inclusive education, is hampered. Learning that has been obtained for years at school, can be lost if it is not sustainable with learning at home [3-7]. The problems faced at this time are influenced by various factors ranging from:

a. The unpreparedness of the school, especially teachers from children with special needs in implementing online learning,

b. The unpreparedness of parents to guide children with special needs, lack of technical mastery, and various environmental factors [8].

c. Parents of children with special needs must understand the role of parents in guiding children with special needs in learning such as maintaining, assisting, guiding, motivating, and providing education.

d. Parents sometimes do not have the time available to accompany and guide their children in the learning process because they are required to work coupled with online learning which demands that parents continue to accompany their children [9].

Based on the background and formulation of the problem above, the author tries to develop a prototype digital platform to facilitate inclusive learning for children with special needs. In the prototype development process, the Research Team researches platform users to explore the problems/needs faced by the target users so that they can determine the best solution to be able to solve them.

2. METHOD

The research method used to develop a prototype platform in this research is the Design Thinking method [10]. Design thinking is a design methodology that provides a solution-based approach to solving problems. Design Thinking is carried out to explore the problems/needs faced by the target user so that they can determine the best solution to solve them. Design thinking is very useful in overcoming complex problems with a structured way of thinking [11][12]:

a. Understanding the needs of the people involved
b. Reframe the problem,
c. Human-centered,
d. Generating lots of ideas in a brainstorming session, and
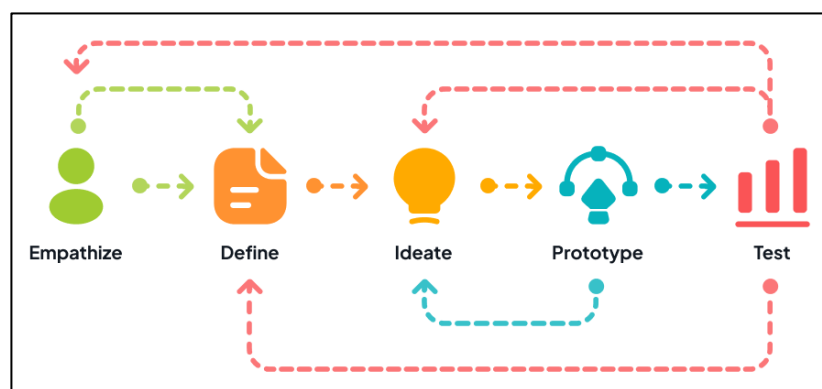e. Adopt a hands-on approach in prototyping and testing ideas.

Figure 1. Design Thinking Roadmap

Design thinking has 5 stages, that is [11]:

a. Empathize

At this stage, an approach to the target user is carried out. This stage is also the stage to understand user needs, business objectives, and technological capacity/capabilities. What users say is not necessarily what they do, so in this process, we have to find out:

1) What do users think and feel?
2) What do users usually do?
3) What kind of anxiety do they feel?
4) Anything that can make them happy.

b. Define

The information that has been collected during the Empathize stage is analyzed and synthesized to determine the core problems to be identified. This stage is the stage in defining what problems are experienced by users when interacting with a product or process. The final result at this stage is:

1) What problems will be solved?
2) Who are we solving this problem for?
3) What is another way to solve this problem?

c. Ideation

This stage is the stage for generating ideas. All ideas will be accommodated for solving the problems that have been defined at the defined stage. It is important to get as many ideas or problem solutions as possible at the beginning of the idea phase and then choose the best way to solve the problem or provide the elements needed to avoid problems that later occur.

d. Prototyping

At this stage, several low-cost and scaled-down versions of the product are produced, or special features are found in the product. This prototype can be tested on multiple target users in the next phase.

e. Testing

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Testing and evaluation of the product to users and the results will be made changes and improvements to eliminate problem solutions and gain a deep understanding of the product and its users.

3. RESULTS AND DISCUSSION

Here are the results of user research using the design thinking method that has been carried out by the research team:

3.1. Empathize

At this stage, the approach to our target users is carried out. What exactly do they want. The target users of this research are divided into 2 target, that is [13][14]:

   a. Special school teacher as a teacher of children with special needs
   b. Children with special needs who are accompanied by their parents.

The results from the empathize process carried out by the research team with the target respondents being Special School Teachers in down below:

Table 1. Research Special School Teacher Result

Research Questions	Answer
What challenges do teachers face when carrying out the process of teaching children with special needs during the pandemic?	a. Lack of teacher ability in developing teaching materials (concrete material and language of instruction) used through the online systems b. Lack of parental support in helping children with special needs in conducting online learning c. Lack of student interest in online learning d. Lack of support for facilities and infrastructure
The problems/challenges faced by the teacher occurred because of?	a. Lack of parental support in helping children with special needs in conducting online learning b. Lack of student interest in online learning c. Due to restrictive government policies, before PPKM teachers can go home and now can't d. Difficulty visualizing and need a material that can be visualized (Real/Concrete)
What do teachers need to be able to help the children with special needs teaching during a pandemic?	An interactive learning platform that aims in addition to improving students' abilities/understanding but also aims to increase students' enthusiasm to be able to learn with the contents of teaching aids (video tutorials), worksheets, media assistance (images, videos, concrete material) subtitles in the form of sign language
Activities favored by children with special needs in the learning process	1. There is interaction with the teacher, for example using video calls 2. In accordance with his hobby, Generating needs, Rewards, 3. Live practice
Applications that are often used to support the process of teaching and learning activities?	1. Zoom: 2 teachers 2. Google Classroom: 1 teacher 3. Whatsapp: 6 teachers 4. Editor apps: 3 teachers 5. Power Point: 1 teacher

The following are the results of the empathize process carried out by the research team with the target respondents being parents of children with special needs:

Table 2. Research Children With Special Needs Parent Result

During the teaching and learning process, what do parents do?	Assist children during the learning process.
What are the challenges faced by children with special needs during the learning process during	a. Children are less able to absorb learning because of the limitations of the learning media used and the lack of ability of parents to convey the material provided by the teacher's b. Lazy to learn because children do not interact with other children

the pandemic?	c.	Children's moods when learning often change and their concentration is divided.
	d.	Constrained by the time when learning
	e.	The body is difficult to move and the child cannot yet be independent.
	f.	Time in the teaching and learning process is irregular
	g.	Children are easily distracted by their environment
What things can make children with special needs lazy to study	a.	Tired of learning and want to play
	b.	Lack of interaction with other friends
	c.	Children's wishes have not been fulfilled
	d.	Sleepy
	e.	There is interference from the environment
What things make children with special needs excited to learn?	a.	Children are afraid of not going to class if they do not study, being scolded, and being rewarded when they have finished studying.
	b.	Depends on the subjects studied such as sports subjects (related to practice) and religion
	c.	Doing activities that they enjoy before studying to lift the child's mood, such as helping with cooking and learning technology
	d.	Motor-based learning such as sports
	e.	Learning media in the form of print, video, visual, singing, coloring.
What can help with children with special needs learning activities during home learning?	a.	The existence of concrete learning or meaningful learning that can be felt directly benefits such as the ability to survive and something that children enjoy.
	b.	When children are studying, there should be something they enjoy, such as listening to music or *murottal*.
	c.	Facilities to support learning.
If there is a special learning platform/application for children with special needs, what features do parents think are important to have?	a.	Majoring in children's interests such as painting, computers, makeup
	b.	Audio-based learning (like podcasts)
	c.	There are game features that are interesting and increase children's curiosity and are displayed with interesting audio-visuals.
	d.	An integrated application, making it easier for users to perform various tasks in one application
	e.	Learnings support videos for parents and children.

3.2. Define Problem (analysis based on observation of the problem, problem statement)

The information that has been collected during the Empathize stage is analyzed and synthesized to determine the core problems to be identified. The following problems have been defined for each research object:

Table 3. Defining Problem

User		Problem
Parents	a.	The limitations of the learning media used
	b.	Lack of ability of parents in conveying the material provided by the teacher
	c.	Children's moods when learning often change and their concentration is divided.
	d.	Lack of student interest in online learning
Teachers	a.	Lack of teacher ability in developing teaching materials (concrete material and language of instruction) used through the online systems
	b.	Lack of parental support in helping children with special needs in conducting online learning
	c.	Lack of student interest in online learning

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3.3. Ideate (the proposed solution, describe the run and its features)

Here are the solution ideas that the research team succeeded in defining to answer the problems above:

Table 4. Ideation Solution

User	Problem	Solution
Parents	The limitations of the learning media used.	a. Provide interactive learning modules b. Provide learning videos where there is sign language and subtitles c. Provides interactive games features to increase students' interest in learning
	Lack of ability of parents in conveying the material provided by the teacher.	Provides parent consultation features regarding problems encountered.
	Children's moods when learning often change and their concentration is divided.	Provides interactive games features to increase students' interest in learning.
	Lack of student interest in online learning.	Providing interactive learning media selection features between students and teachers according to the needs of children with special needs.
Teachers	Lack of teacher ability in developing teaching materials (concrete material and language of instruction) used through the online systems.	a. Provide online course features to improve teacher skills. b. Provide teaching materials in the form of modules and can turn an abstract lesson into a concrete one automatically and interactively.
	Lack of parental support in helping children with special needs in conducting online learning.	a. Provides parent consultation features regarding problems encountered. b. Provide a feature to bring teachers home (teachers must comply with health protocols and show vaccine certificates).
	Lack of student interest in online learning.	a. Providing interactive learning media selection features according to the needs and types of children with disabilities. b. Provides interactive games features to increase students' interest in learning.

3.4. Prototype (product design, main display, sub-main view)

The following is a high fidelity prototype that has been developed to facilitate inclusive learning for children with special needs:
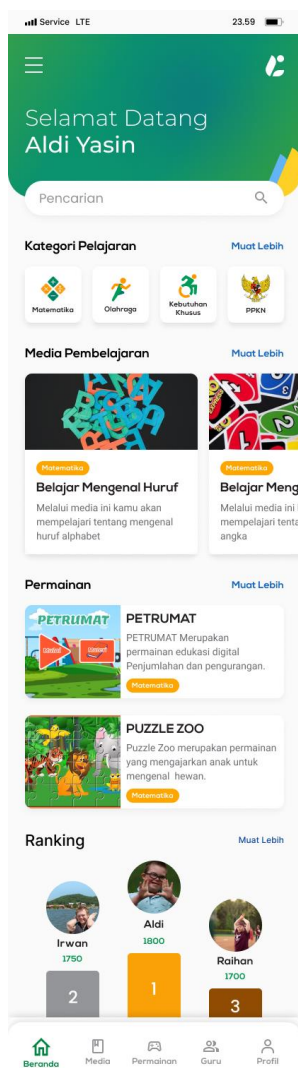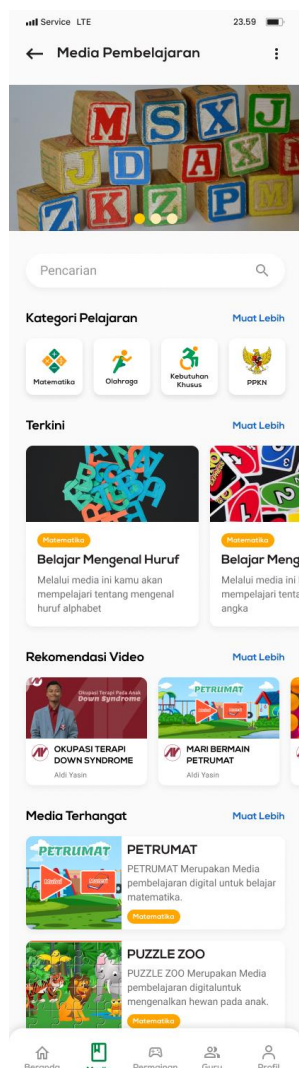
Figure 2. Home Screen
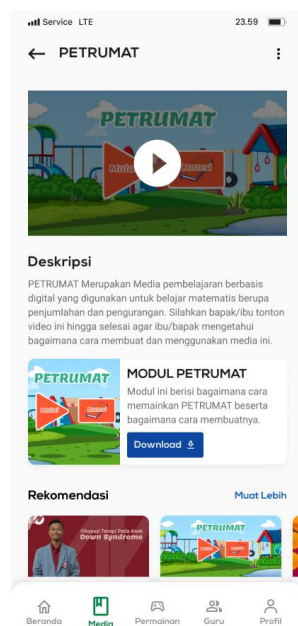

Figure 3. Learning Media Screen

Figure 4. Learning Media Details

3.5. Test

The prototype that has been developed by the research team is then validated against users (Special School Teacher and children with special needs) by using usability testing methods. This stage will be carried out in further research.

4. CONCLUSION

Inclusive education is an educational service system that requires children with special needs to study in schools with friends of their age. Schools that provide inclusive education must adapt to the abilities and needs of students as well as the support provided by teachers for children to succeed [4]. Many of the problems of inclusive learning that occurred during the Covid-19 pandemic, ranging from the unpreparedness of the school to various problems with environmental factors so that innovation was needed to overcome these problems. This study provides recommendations for inclusive learning solutions for children with special needs by developing a prototype digital learning platform to facilitate inclusive learning for children with special needs. Here are some suggestions that can be followed up in further research: (1) in further research, the problems that have been defined need to be studied more deeply. What are the root problems faced by both teachers, special needs, and parents in carrying out the inclusive learning process? So that the solutions developed can be more sustainable than just answering the problems that are on the surface; (2) solution validation by conducting usability testing needs to be done to ensure whether the solution with the developed

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prototype is sufficient; (3) in developing the prototype, it is better to involve the community or volunteer aspects who can become content contributors on the platform that will be developed; (4) implementation prototypes of both mobile apps and web admins that have been validated and have gone through improvements so that they can be used to facilitate inclusive learning for children with special needs.

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