

Adopting Mobile Assisted Language Learning to Improve Digital Literacy in the Era of Society 5.0

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Abstract. The industrial and social development from Industry 4.0 to Society 5.0 has brought many challenges, especially regarding the low quality of human resources, which can be overcome by increasing digital literacy. In order to support the programs conducted by the Indonesian government in increasing digital literacy, this study aims to propose the concept of digital literacy learning, especially in digital consumption through portable devices, by adopting the concept of mobile assisted language learning (MALL). The focus of this study is on increasing digital literacy among higher education students as digital literacy is crucial in supporting their learning process and future self-development. The design process of MALL is carried out using the Design Thinking approach. The research respondents were Business and IT students from BINUS Semarang. The research resulted in the concept of a mobile device-based pocket dictionary application for digital literacy learning. Furthermore, the prototype can be developed into a mobile app on the Android platform and web pages that can be accessed anytime and anywhere. Further research can be conducted to provide alternative solutions related to the same issue by using other methods such as Design Sprint and Agile development.

1 Introduction

The use of ICT in social and economic activities has brought drastic changes toward society and industry. The society of the modern world is closely linked to digital forms, digital contexts and utility functions. Digitalization occurs in various sectors of life, transforming the world permanently online. However, not all of the world's population is ready for this change, giving rise to a digital divide. This digital divide shows the uneven diffusion of skills needed for the benefit from the use of digital tools [1]. To deal with this trend, the Japanese government promised "Society 5.0" as a concept for Japan's growth strategy in the 5th century. Society 5.0 focuses on positioning humans as the center of technology modification and innovation for humanity, with the main goal of Society 5.0 is to improve people's welfare by utilizing the potential obtained by Industry 4.0 [2]. This is in line with many researches that Society 5.0 is the development of the Industry 4.0 concept

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with the consideration of social and humanities that go beyond technological boundaries [3]. In short, Industry 4.0, which is faced by all countries around the world, has encouraged the formation of Society 5.0.

In daily applications, Society 5.0 has caused exponential social transformation. The implementation of Society 5.0 requires three major changes: technological, economic and geopolitical, and the mind of its citizens [4]. This raises several potential obstacles including socio-political barriers, obstacles in the legal system, social resistance, technological constraints and a lack of quality human resources [5]. The barriers regarding the lack of quality human resources can be overcome by increasing digital literacy in society because in the process of forming Society 5.0 as a digital society, digital literacy is crucial to engagement and stimulate social equity [6], [7].

Digital literacy is a set of perspectives that are activated when we expose ourselves to media for interpreting the meaning of the message found. We build our perspectives from knowledge structures. To build our knowledge structure, we need tools (expertise) and materials (information from the media and the real world). Active use means we know those messages and consciously interact with them [8]. Digital literacy is crucial and has become a necessity for every citizen around the world to communicate, find a job, receive a comprehensive education, and socialize. Therefore, acquiring the right set of digital skills will be very useful for learning and workforce readiness, fostering openness, inclusiveness, and security.

According to the 2021 data from Statista, Indonesia's digital literacy index score had increased from 3.46 in 2020 to 3.49 in 2021 [9]. The increase was triggered by the acceleration of technology adoption in various industrial fields due to the COVID-19 pandemic. This score is still not optimal and must continue to be improved. Effective strategies to increase digital literacy is to engage public and private investment in digital infrastructure, framework policy and governance, as well as the training in the use of digital technology. The Indonesian government is trying to increase digital literacy by holding digital literacy trainings through the Ministry of Communication and Information Technology [10].

Digital literacy consists of three components: digital consumption (the use of online services for daily activities such as for government service activities, health services, educational activities and professional activity), digital competence (the effective use of digital technology in everyday life) and digital security (cyberspace security) [11]. One of the things that is often encountered in digital consumption is the use of various terms. A correct understanding of the various new terms that have emerged, especially related to the business context of digital economy, will help improve the community's standard of living because the use of the term is related to broader social and economic activity. In order to increase the digital literacy of Indonesia's society and support the government's efforts, it is necessary to have tools for understanding various terms in the business context of digital economy as part of digital literacy.

The purpose of this study is to propose the concept of digital literacy learning, especially digital consumption through portable devices. This research will adopt the concept of Mobile Assisted Language Learning (MALL). The use of MALL is considered appropriate because MALL adopts personal mobile-portable-based learning processes that enables new ways of learning, emphasizing continuity or the spontaneity of access and interaction across different contexts of use [12]. This learning style is in accordance with a lifestyle that needs to be developed in the era of Society 5.0 where someone can learn anything, anywhere and anytime without restrictions.

This research is carried out in order to increase digital literacy among higher education students. The development of digital literacy competencies is needed by higher education students because digital literacy effectively contributes to the choice of sources for the

information obtained [13]. In addition, at the higher education level, students are exposed to technology and digital media so it is important for them to be able to effectively manage the use of technology personally and in academic activities. Technological progress must also be obtained through structured learning experiences [14].

2 Methodology

The development process of Mobile Assisted Language Learning (MALL) in this research is carried out using a design thinking approach. The design thinking approach was chosen because it is able to help map out a comprehensive thinking process that focuses on problem solving. Design thinking begins with an empathetic process to map human-centered needs to design sustainable innovations based on the human needs itself [14]. The following describes the design thinking process carried out through five stages:

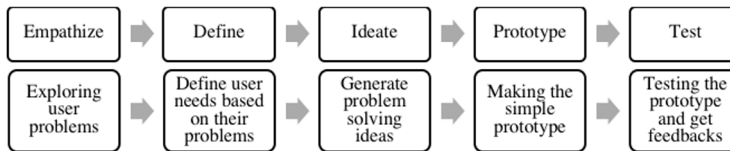


Fig. 1. Design Thinking Process

Stage 1 is 'Empathize', this method is used to explore user needs in the context of the product designed, by conducting observations, interviews, or a combination of observations and interviews with the prioritization itself be given a scenario. In this research we use empathy maps. An Empathy map is a user-concentrated approach, with a focus on individual understanding [16]. The empathy map in design thinking approach is an extremely helpful tool for user-centric design [Bittner]. Stage 2 is 'Define', this stage is an advanced stage of the process of understanding user problems in the empathize stage where at this stage it can determine the problem that will be the focus resolved. At this stage all the insights obtained from the empathize stage are analysed in depth to decide the focus of the problem to be solved. Stage 3 is 'Ideate', this stage is the stage that processes the formulation of the problem towards the process problem solving so that in this stage the researcher seeks to become a problem solver for formulating ideas using the Mobile Assisted Language Learning (MALL) concept. Stage 4 is the 'Prototype', this stage is the process of making prototype products at an early stage so it allows the product to get new adjustments and allows detecting errors since beginning. At this stage, a simple prototype will be made and then carried out trials to get direct responses and feedback from users which are useful for improving product design so that the product can work according to the achieved targets. Stage 5 is the 'Test', at this stage the testing process is carried out by collecting user feedback based on several simple prototypes that have been made in the prototype stage. Feedback will be collected through surveys from higher education students and interviews with academics. The test in the design thinking approach is a life cycle which will continue to repeat and return to the previous stage if there is an error and it requires adjustment [17]. Therefore, if the test results of the prototype created do not get a good response from users, the process will return to the first stage, namely the empathy stage. In the data collection process that was carried out with primary data through surveys and direct interviews with the target users (higher education students in Business and IT major from BINUS University Semarang to understand user

needs and provide solutions that meet these user needs to increase digital literacy among tertiary students. Apart from that, there is also secondary data through literature studies sourced from books and journal articles.

3 Results

This section will explain in detail the design thinking process carried out to solve problems based on user needs. Starting from the process of exploring problems, defining problems clearly and specifically, exploring possible solutions, compiling prototype designs and testing prototype usability.

3.1 Empathize Phase

The empathy phase will use an empathy map approach. Empathy maps explain known information to individuals through the visualization of what a person says, does, sees and hears. The next section focuses on individual worries, fears and frustrations, wants and needs and what makes them happy [18]. This tool is excellent for understanding other people's perspectives. At this stage the researcher tries to explore the problems faced by students in majors related to Business and IT regarding the process of learning in order to understand business terms in the digital era. The empathy map that we have created comes from 10 users, which we summarize as follows:

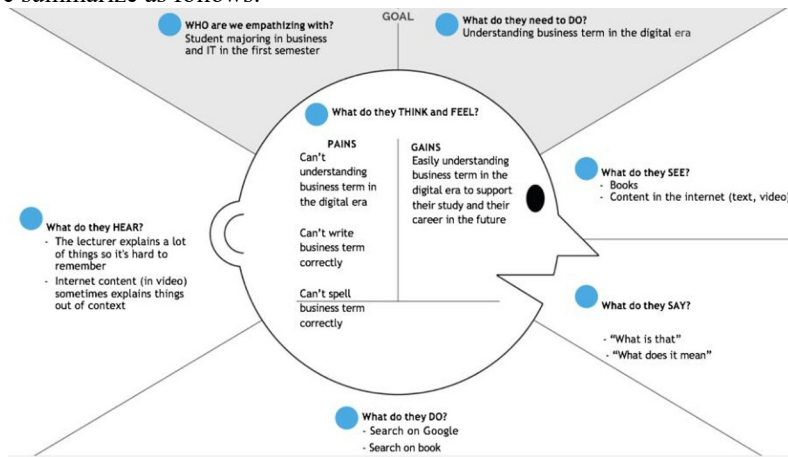


Fig. 2. Empathy Map

3.2 Define Phase

Based on the results of the empathy map summary in the previous empathize phase, it can be concluded that the problems experienced by the users were that 8 users had difficulty in understanding the meaning of digital economy era terms, 1 user had difficulty writing digital economy era terms, and 1 user had difficulty pronouncing digital economy era terms. The main target users were students in majors related to Business and IT. The solutions must also be used anywhere and anytime. In the define phase, the following conclusions were obtained. :

Table 1. Problem Statement in the Define Phase

I am	Business and IT Major Students
I'm trying to	Understanding the meaning of terms, writing terms and pronouncing terms in the digital economy era
But	Difficulty to understand, remember, pronounce, write
Because	This is the first time reading / listening, rarely use it in conversation / writing
Which makes me feel	Distress, pessimistic about future career

3.3 Ideate Phase

In the ideation phase, ideas are collected that can solve problems that have been clearly identified in the define phase. We conducted idea generation and found 3 ideas that might be implemented. Then we asked respondents which ideas resonated the most with them. Here were our findings on each idea.

Table 2. Ideas Generation

Idea / Solution	Chosen by
Online classes/seminars to teach digital era business terms	2 persons
Chatbots to teach digital era business terms	1 person
Web / mobile application for searching digital era business terms	7 persons

Based on the consideration on the greatest problem solving impact and its users, we decided to choose an idea, namely a pocket dictionary application on the web and Android platform. The consideration of choosing a web / mobile application that summarizes the digital era business terms because it fits the target user profile (young people, internet literate, owns a smartphone), can be accessed anytime and anywhere, can accommodate many terms without limits and makes it possible to add and edit terms that would be published in the future.

3.4 Prototype Phase

At the prototype stage, a prototype of the product is made at an early stage, thereby allowing the product to receive new adjustments and allowing improvements if there are discrepancies. The prototype phase is done by creating a simple functional prototype to visualize the idea so analysis and testing can be executed, which can reflect whether conceptual ideas are feasible and can get feedback as soon as possible to create product improvement. The software used for the prototyping process is Figma. The prototype must meet user needs, i.e providing an explanation of terms in the digital economy, providing the correct way of writing and providing the correct way of pronouncing it. These needs are answered with the following features:



Fig. 3. Android app prototype

3.5 Test Phase

In the test phase, trials were carried out using the prototype that had been made. Testing is related to the accuracy of the solution answering the problem and ease of use. Testing is carried out on groups of users and experts.

Table 3. User Testing Questions

Q1-Q5	Question
Q1	Believes that the pocket dictionary application on the web and Android platform will be able to improve the understanding of the digital era business terms
Q2	Believes that the pocket dictionary application on the web and Android platform will be able to improve the ability to write digital era business terms
Q3	Believes that the pocket dictionary application on the web and Android platform will be able to improve the ability to spell digital era business terms
Q4	Do you think that the pocket dictionary application on the web and Android platform can be used to improve your digital literacy skills?
Q5	Do you think that the pocket dictionary application on the web and Android platform can be used in your everyday life?

Based on the results of a survey of 35 respondents who used the pocket dictionary application on the web and Android platform, it was known that in the first question (Q1), 85% of respondents believed that the pocket dictionary application on the web and Android platform would be able to improve the understanding of digital era business terms and 15% felt would not be able to improve the understanding of digital era business terms In the second question (Q2), 73% of respondents believed that the pocket dictionary application on the web and Android platform would be able to improve the ability to write digital era business terms and 27% felt it would not be able to improve the ability to write digital era business terms.

In the third question (Q3), 68% of respondents believed that the pocket dictionary application on the web and Android platform would be able to improve the ability to spell digital era business terms and 32% felt that they would not be able to improve the ability to spell digital era business terms., In the fourth question (Q4) it was stated that 94% of respondents think that the pocket dictionary application on the web and Android platform could be used to improve their digital literacy skills and 6% of respondents think that the pocket dictionary application on the web and Android platform can't be used to improve their digital literacy skills. The fifth question (Q5) stated that 87% of respondents think that the pocket dictionary application on the web and Android platform can be used in their everyday life and 13% of respondents think that the pocket dictionary application on the web and Android platform can't be used in their everyday life.

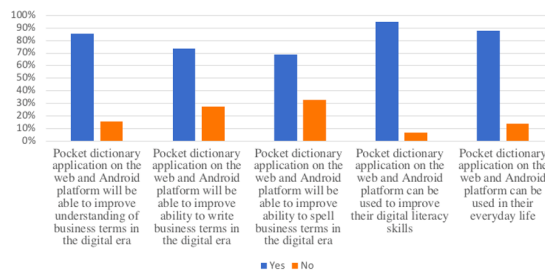


Fig. 5. Users Testing Result

The important points that were concluded from the user testing results were that respondents believed that the pocket dictionary application on the web and Android platforms would be able to increase the understanding of terms, improve writing skills, improve the ability to spell terms within business in the digital era. Respondents also felt that the pocket dictionary application on the web and Android platform could improve their digital literacy skills and respondents could use the dictionary in everyday life.

Trials and assessments were also carried out by 5 experts. Expert assessment is a validation of the level of acceptance on the idea of a solution. There were several things that became the indicators of the assessment by the experts: the ability to solve problems, ease of use, efficiency, solution sustainability and innovativeness. In this study, the level of all indicators must be known to the score. There were 3 score level groups: Low level (the score between 0% to 49%) indicated that the pocket dictionary application prototype on the web and Android platform had little impact on users. Medium level (the score between 50% to 79%) indicated that the pocket dictionary application prototype on the web and Android platform had a moderate impact on users. High level (the score between 80% to 100%) indicated that the prototype had a great impact on users and was suitable for implementation. To get the total score, the score from the 5 acceptance indicators was added together and divided by the number of criteria's, thus it was obtained the determined acceptance levels (low, medium and high), these levels are shown in Table 4.

Table 4. Level of Acceptance

Acceptance Levels	Low	Medium	High
Score	0% to 49%	50% to 79%	80% to 100%

Based on the assessment of the experts, the following results were obtained :

Table 5. Assessment of the Experts Result

Expert	Ability to solve problems (I1)	Ease of use (I2)	Efficiency (I3)	Solution sustainability (I4)	Total Score from Each Expert (I5)	Level of Acceptance from Each Expert (I6)
E1	80%	90%	85%	91%	86.5%	High
E2	75%	95%	90%	90%	87.5%	High
E3	90%	90%	80%	92%	88%	High
E4	86%	93%	89%	90%	89.5%	High
E5	92%	89%	93%	98%	93%	High
Average from Each Indicator	84.6%	91.4%	87.4%	92.2%	88.9%	
Level of Acceptance from each indicator	High	High	High	High	High	

Based on the results above, according to all experts (E1-E5) the developed prototype had met a high level of acceptance. Meanwhile for the level of acceptance for each indicator (I1-I4) also showed a high level of acceptance. Conceptually, this application is able to solve problems in increasing digital literacy for Business and IT class students and its use feels easy and efficient. Apart from that, the solution offered is also considered possible for further development. Several expert statements support these results:

“..... looks easy to use and can help learning because all the frequently encountered terms are collected into one [...] - (Expert 2)

“I hope the development can continue to include more terms.” (Expert 4)

“.....After the prototype phase, it can be introduced to the wider community.” (Expert 1)

From these results it can be said that conceptually, the prototype has been able to answer the problem. Furthermore, prototypes can be developed into applications on the Android platform and web pages.

4 Conclusion

This research was carried out by creating a pocket dictionary application prototype by adopting the concept of Mobile Assisted Language Learning (MALL) to increase digital literacy among higher education students. This can be seen through empirical research conducted to develop solutions that can help facilitate digital consumption to increase digital literacy in higher education students. The increasing use of mobile technology has created an increase in interest in learning languages through mobile technology where students can learn a second language independently at any time or anywhere [19]. This is in accordance with the choice of using mobile technology as a medium to help students understand various digital business terms.

In general, design thinking is an adaptive engineering design method and tool for solving various complex problems in life. The research shows that design thinking is a form of experimental thinking that focuses on solutions and can be implemented to generate creative solutions to complex problems. The biggest limitation in this research is that there is no product being developed because the methodology used is focused on mobile application prototype design. Further research can be conducted to provide other alternative solutions related to the same problem regarding the increase of digital literacy. The research can use other problem-solving methods such as Design Sprint and Agile development [20].

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