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Development of Smartphone-Based Learning Media on Computer and Basic Network Subjects at SMK Negeri 1 Gunung Sindur, Bogor Regency

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Abstract: An obstacle in the process of practical learning is the unavailability of sufficient means. One side of the use of *smartphone* devices owned by students has not been utilized to the fullest. The purpose of this study is to develop smartphone-based learning media for class X basic computer and network subjects at SMKN 1 Gunung Sindur, Bogor Regency, and test the feasibility and effectiveness of the application of this smartphone-based learning media. The research method is research and *development* with a combined model of Borg & Gall and Dick and Carey. The material test results obtained a percentage of 92%, by assessing 4 aspects, namely material, language, presentation, and appearance. The test results by media experts and learning design experts obtained a percentage value of 80% which assessed aspects of media development and learning design. 3.Test the effectiveness of model development based on the results of N-Gain calculation obtained a value of 0.71 or 71%.

Keywords: Learning media; *smartphone-based*; computer and netn basic.

Introduction

The development of technology in the 4.0 era is even close to 5.0, which is becoming more rapid. Technological advances are impossible to avoid. This happens because technological advances always go hand in hand with the development of science. Such rapid progress also presents new problems that must also be addressed with the latest resources and also actual methods.

One of the impacts of the development of information technology is the emergence of various media that can guide the process in various aspects of life, including one of them in the learning process. Media is a means or tool that helps to convey information from the communicator to the communicant. This can be interpreted to mean that the existence of this learning media can change the learning paradigm from teacher-centered to student-centered learning.

After making observations in January 2022 at SMK Negeri 1 Gunung Sindur, Bogor Regency, it is known that for the learning process, the school has provided several learning support devices, such as projectors, and computers that are used for practice, especially in the competence of Computer and Network Engineering expertise. However, the use of computers directly in learning practical learning is still lacking. This is due to the lack of infrastructure and the very far comparison between the willingness of the device and the number of existing students, as well as limitations in the use of laboratories or special practice ruin for the competence of computer and network engineering expertise.

Theoretical learning that occurs is the teacher explaining the material with conventional methods. The use of computers as learning media is still lacking, because there is no learning media installed in the laboratory computer. The use of computers is still one-way, namely to help teachers display presentation *slides* through a projector.

The lack of facilities for practicum learning activities is an obstacle to increasing student competence, especially in basic subjects which are important things to be mastered by students. This is in line with the results of an interview conducted in January 2022 to teachers of Basic Computer and Network subjects, Bapak Rayuli, S.T., it can be identified that the implementation of practicum learning does tend to be monotonous, students only pay attention to the delivery of simulations from the devices that have been provided, there are many subject matter

but teachers feel that learning hours are still lacking. . The teacher added that this is not in accordance with the 2013 Curriculum, which requires more student-centered, and more interactive learning, one of which is with learning media. The teacher explained that some students asked to repeat the teacher's explanation but in the end the students still felt that they lacked mastery of computer maintenance and repair materials.

In addition, the subject teacher also said that due to the inadequate and ineffective learning process, the value of the results of the evaluation of Basic Computer and Network subjects was still below the minimum criteria. On the other hand, the results of a survey (January 2022) ownership of smartphone devices or gadgets from 3 class X Computer and Network Engineering (108 students) showed that 92% of students have an android-based smartphone, 5% have an iOS-based smartphone, and 3% do not have a *smartphone*. Only occasionally does the teacher give orders so that students are more active in looking for references or tutorials through their smartphones, but they have not been able to help to achieve the desired learning goals.

From the problems raised above, researchers are trying to develop learning media that can be used through smartphones for Basic Computer and Network subject matter kelas X competence of Computer and Network Engineering expertise at SMK Negeri 1 Gunung Sindur. With the hope that the existence of more interactive learning media can help increase student motivation in learning and can improve students' competence, especially in Computer and Basic Network subjects by utilizing the *smartphones* they have.

Based on the identification of the background of the problem, the focus of the problem from this research is the Development of Smartphone-Based Learning Media in Basic Computer and Network subjects Class X Competence of Computer and Network Engineering Expertise at SMK Negeri 1 Gunung Sindur, Bogor Regency by utilizing *smartphones* owned by students or parents as media for learning learning that can facilitate students in the learning process, especially the subject of Computer and Basic Network Class X and can improve competence and learning outcomes.

The formulations in this study are: 1) What is the procedure for developing Basic Computer and Network learning media using *Smartphones* in Class X of SMK Negeri 1 Gunung Sindur, Bogor Regency, 2) What is the feasibility level of Computer learning media and Basic Networks by using *smartphones* in Class X of SMK Negeri 1 Gunung Sindur, Bogor Regency, and 3) How is the effectiveness of using Computer learning media and Basic Networks using *smartphones* in Class X SMK Negeri 1 Gunung Sindur, Bogor Regency.

Reviewing Theory

One of the most commonly used operating systems in *Smartphones* today is *android*. The operating system can be illustrated as a bridge between the *device* and its use, so that the user can interact with his device and run the applications available on the *device*. Android is a new generation of Linux-based mobile platform that includes operating systems, *middleware*, and applications (Kuswanto & Radiansah, 2018).

According to (Fauzi et al., 2021), *android* is an operating system for *smartphones* and tablets. The operating system can be illustrated as a 'bridge' between the device and its user, so that the user can interact with the device and run the applications available on the *device*. While according to (Rahmat et al., 2019) android is an operating system for linux-based mobile devices that includes operating systems, *middleware*, and applications. Android is an oper system for mobile phones based on *Linux*. Android provides an open platform for developers to create their own apps. Furthermore, (Jannatan & Madjid, 2018) android is an operating system for linux-based mobile devices that includes operating systems, *middleware* and applications.

The development of science and technology leads to increasingly significant changes and towards a practical era. In sector education, the development of information technology penetrates the management system and also the learning system in the classroom. The increasingly varied use of media is a challenge for teachers in carrying out their duties as teachers in schools in order to achieve learning goals (Rahmat et al., 2019).

The use of *smartphones* that are fairly easy to carry, easily accessible and affordable as a medium in learning will greatly impact students (Amirullah & Susilo, 2018). In addition to relatively new facilities, students will be more interested in using facilities that are “contemporary" and ordinary to the student's situation in everyday life.

In addition, *Smartphones* are mobile phone devices developed by implementing a computer-based operating system. The operating system used in smartphones is generally the android operating system developed by

Google™ and iOS which was initiated by the computer company Apple™. The development of smartphones to date is not only limited to being a communication tool, but nowadays *smartphones* are widelyused as a learning medium. Given the high use of smartphones by students, teachers should facilitate students to use *smartphones*. As a medium to support learning. As stated by (Clark, 2019) that today's students have grown up using devices such as computers, mobile phones, and video consoles for almost every activity; from studying, working, or just limited entertainment.

Nurhidayat argues that the use of *smartphones* in educational programs makes this device a form of device that can be used as an alternative in media development. The use of *smartphones* in education is known as *mobile learning* technology (*m-Learning*) (Nurhidayat et al., 2020). The use of *m-Learning* stated by (Efgivia, 2019) can make a positive contribution to the peserta to access learning materials or as a learning medium. In addition, (Nurhidayat et al., 2020) argue that by using *smartphones* in education, making this technology has a central role to be used as a means of conveying information to students through *mobile* device technology.

The use of smartphones as learning media is supported by (Clark, 2019) which states that using smartphones as a learning medium provides in-depth learning opportunities for students because by using *smartphones* students can develop learning through searching for information from the internet, as well as training their skills in carrying out practicums because of the principles of Mobility owned by *SMARTPHONE*. It further said that by using *smartphones* students are able to build their competencies in a dynamic way.

Research Methodology

This study aims to develop Smartphone-based computer maintenance and repair Learning Media for computer and Network Engineering expertise competencies. Therefore, this research uses a research and development model with a *Research and Development* (R&D) approach. The R&D design model used by the research and development model in the world of education, because what was developed was an instructional design component of various existing approaches, the R&D model compiled by Walter R Borg and Meredith D. Gall was chosen in his book "*Educational Research: An Introduction*". This systems approach is known as the "Borg & Gall Development Model". As for the learning media development procedure, it uses a systems approach by Walter Dick, Lou Carey and James Carey in his book "T*he Systematic Design of Instruction*" known as the "Dick & Carey Instructional Design Development Model".

The selection of a Learning Media development model approach with Dick & Carey is also based on academic practical considerations in the development of interactive learning. The results of research conducted by Mujahideen Thohir detail these various considerations, including:

a. The Dick & Carey model has stages of development suitable for instructional design of learning
b. The Dick & Carey model specifically for learning design contains learning components that will be developed clearly step by step. This means that the Dick & Carey procedural stage is a componential procedural stage so that it is easy to do for teachers, and
c. The Dick & Carey model is used as a reference as an independent theoretical model in the realm of learning design disciplines and is one of the development models in R&D (Thohir, 2013).

The researcher determined the research method to be used. The Borg & Gall model with these various considerations. As for the procedural method for the development of learning media using the Dick & Carey model, so it can be said to be a combined development model with the research and development (R&D) design of the Borg & Gall model and the development of learning media with the Dick & Carey model system approach. Broadly speaking, researchers modified both models. Here are the stages of media development with a combined Borg & Gall and Dick & Carey model.

Research Results

A. Material Expert Test

Before conducting trials on students, researchers conducted Expert Judgment (expert test) of interactive media product design. Validation is carried out by two validators consisting of (1) material experts, 2) media experts, and (3) linguists. Data is obtained from the assessment questionnaire given to validators, and validators are welcome to provide comments and suggestions for product improvement. The expert in the development of interactive media is a person who has competence in the field of computer and network science, namely Mr. Syaiful Amri, S.T, M.M. as the Head of Multimedia Expertise Competencies of SMKN 1 Gunung Sindur.

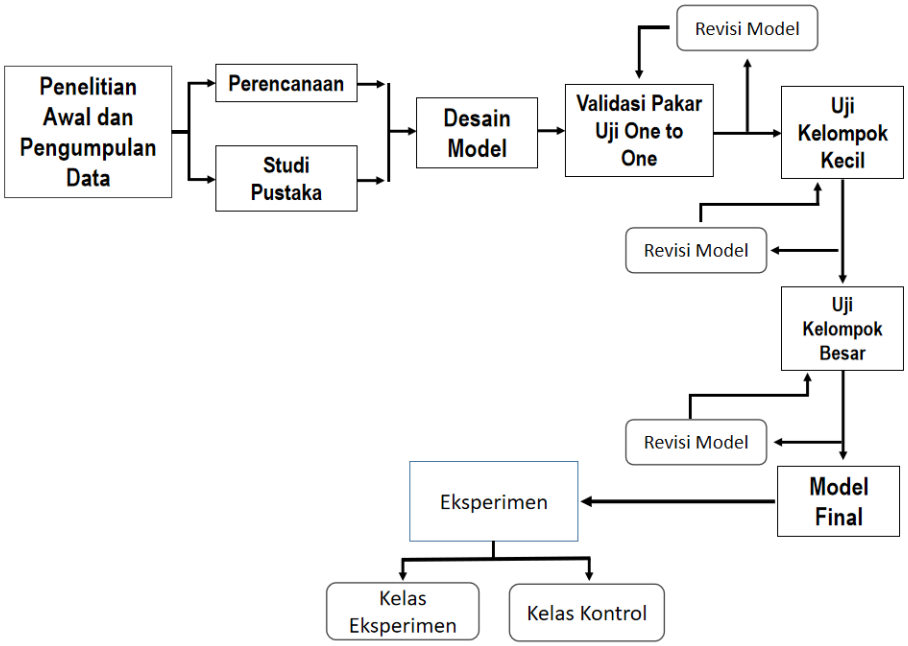

Figure 1. Development Model of Borg & Gall and Dick & Carey

Table 1. Mater Expert Validation Results Recap

No.	Aspects	Score	Maximum score	Percentage of fatigue
1	Material	23	25	92%
2	Language	38	40	95%
3	Serving	52	60	87%
4	Display	23	25	92%
Sum		136	150	

Based on the results of the assessment from material experts on the development of android-based interactive media, a percentage of results were obtained, namely:

$$presentase = \frac{Skor\ yang\ diperoleh}{Skor\ maksimum}\ x\ 100\%$$

$$presentase = \frac{138}{150}\ x\ 100\% = 91\%$$

The 91% result when interpreted using the interpretation of the validity of android-based interactive media is said to be feasible if the final value of the validation sheet is ≥61% and is included in the very feasible category when the final value reaches >81% (Arikunto, 2004). Interactive media products are based on "very decent" qualifications.

B. Media Expert Test and Instructional Design

To ensure the feasibility of the media being developed, further testing was carried out by media experts and instructional design, in this case it was tested by an expert in the learning media, Mr. Dr. Rudi Hartono, M.Pd, Lecturer and Secretary of the Postgraduate Education Technology Study Program at Ibn Khaldun University Bogor. The test results can be seen in the table below:

Table 2. Recapitulation of Scores from Media and Village Experts in Instructional

No	Aspects	Score	Maximum score	Percentage of fatigue
1.	Linguistic Structure	17	20	85%
2.	Media Display	21	25	84%
3	Software Engineering	20	25	80%
4	Deliverability	9	10	90%
5	Learning	53	70	76%

Based on the results of research from media experts and instructional design on the development of interactive learning media for the maintenance and repair of android-based computers, the following percentage values were obtained:

$$presentase = \frac{Skor\ yang\ diperoleh}{Skor\ maksimum} x\ 100\%$$

$$presentase = \frac{120}{150} x\ 100\% = 80\%$$

The 80% result when interpreted using the interpretation of the validity of android-based learning media is said to be feasible if the final score is ≥61% and if it is said to be very feasible if the final score reaches ≥81%. (Arikunto, 2004). Android-based learning media products are on the qualification of "feasible" this is in accordance with the conclusions given by media experts and instructional design that these learning media are worth testing.

The feasibility of the android-based Computer Maintenance and Repair (ADKK) interactive media model development product is obtained from the validation sheets given to validators namely one material expert, one instructional design and media expert and one learning practitioner.

Table 3. Interactive Media Development Product Validation Data

	Material Expert	Media and Instructional Design Expert	Average
Percentage Score	91%	80%	86%
Category	Very Decent	Proper	Very Decent

Based on Table 4.5 above, the average product validation by the three validators is 86% and falls into the category of highly decent. So the computer maintenance and repair learning media (ADKK) products that have been developed by researchers are of great value according to experts, so that they can be used in the learning process.

C. Effectiveness Test

After the validation of the android-based media development product is very feasible, the product will be tested on students to see the application, students consisting of 3 people for individual trials, 10 people for trials to small groups and large groups of class V for trials totaling 36 people.

In the development of this learning media product, it can be said to be very feasible with an average calculation result of 4.4 out of 5 maximum scales with good categories, while with a percent value scale, a score of 88% with a very decent category was obtained.

Testing the effectiveness of developing learning media for computer maintenance and repair in Basic Computer and Network subjects in class X Computer and Network Engineering by comparing the results of pretests, teachers before carrying out the learning process and conducting posttests after using and implementing the learning process. This test was conducted on 36 learners, with a comparison of the average values of pretest dan posttest in the table below:

Table 3. Pretest and Posttest Values

No.	Test	Experimental Class	Control Class
1	*Pretest*	64,7	63,4
2	*Posttest*	89,8	73,5

From the calculation above, $N - Gain$ the average student is 0.71. Based on these data, it can be concluded that the learning media for computer maintenance and repair in Computer and Basic Network subjects class X SMKN 1 Gunung Sindur using ADKK application media has a $N - Gain$ High interpretation. Based on the table of interpretation of $N - Gain$ computer maintenance and repair learning activities in the subject of Computer and Basic Network class X SMKN 1 Gunung Sindur using the ADKK application, this is included in the effective category.

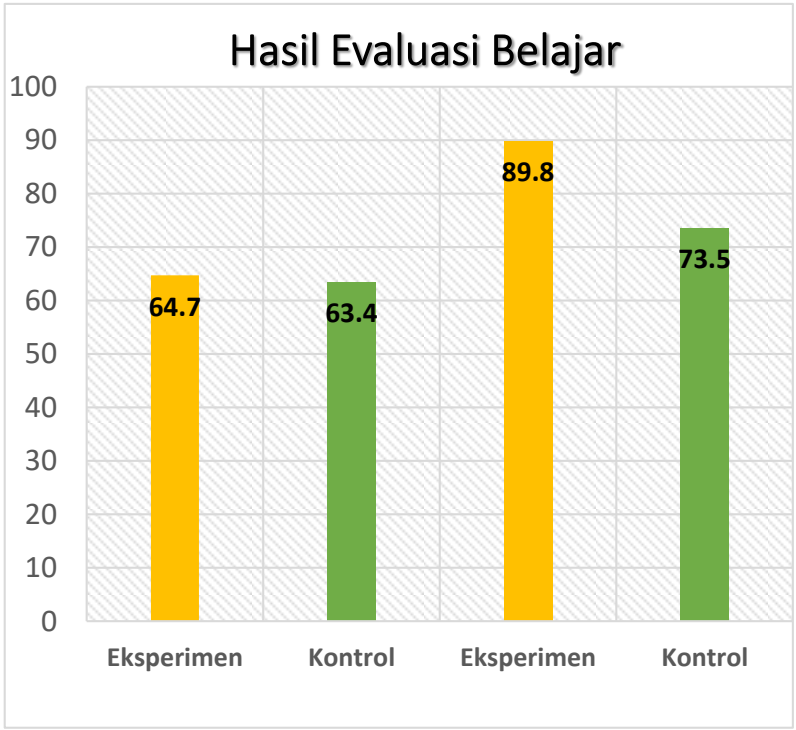

Figure 2. Pretest and Posttest Results Graph

Based on the data above, an analysis of the N-Gain *Score* was carried out (Arikunto, 2004):

$$N - Gain = \frac{Nilai\ Posttest - Nilai\ Pretest}{Nilai\ Maksimal - Nilai\ Pretest}$$

$$N - Gain = \frac{89{,}8 - 64{,}7}{100 - 64{,}7}$$

$$N - Gain = \frac{25{,}1}{28{,}9}$$

$$N - Gain = 0{,}71$$

Conclusions and Suggestions

A. Conclusion

The development model used is the Borg & Gall model integrated with the Dick & Carey model. The selection of this model is based on the product development procedure (learning media), which is detailed with the Dick & Carey model for the instructional design of learning development of computer maintenance and repair.

The results of the feasibility test analysis of teaching labeling media are determined based on the results of the assessment of material experts and media experts and learning design experts. The material test results obtained a percentage of 91%, by assessing 4 aspects, namely material, language, presentation, and appearance. The test results by media experts and learning design experts obtained a percentage value of 80% which assessed aspects of media development and learning design. Based on these tests, the development model of basic computer and network learning media on computer maintenance and repair materials through computer damage detection applications (ADKK) is categorized as good and feasible for use in the learning process of class X competence of Computer and Network Engineering expertise of SMK Negeri 1 Gunung Sindur, Bogor Regency.

The effectiveness test of thegan model based on the results of the N-Gain calculation obtained a value of 0.71 or 71%. Based on these calculations, the development of computer learning media and basic networks at SMKN 1 Gunung Sindur, Bogor Regency, is included in the effective category.

B. Suggestion

In this media development, researchers still have many shortcomings and limitations that must be corrected and further developed. For this reason, the researcher would like to convey the following suggestions:

1. For Teachers

Teachers can maximize and optimize the facilities owned by students to help the learning process as a solution to overcome the limitations of learning held in schools.

2. For Students

Students to increase motivation and independence in carrying out learning outside of face-to-face learning with teachers by utilizing technology owned by each student or facilities provided by parents at home.

3. For Schools

Schools can facilitate the development of web-based and *smartphone-based* learning media as designs in the learning process to improve school performance in providing learning services to students.

4. For General Users

General users outside of school can use this application as a source of reference or knowledge, while still paying attention to how to use this application in order to provide more benefits.

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Development of Problem-Based Learning (PBL) Based Flipbook Media on Science Learning Atsdit Ar-Rohmaniyah, Bogor City

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Abstract: This study aims to develop and test the effectiveness of *problem-based* learning (PBL) flipbook learning media in class V science learning at SDIT Ar-Rohmaniyah, Bogor City. This study used the development model of Borg and Gall and Assure. To test this feasibility using the assessment of 3 experts, namely media experts, design experts and material experts. The media feasibility assessment by material experts obtained a score of 94% with the category "Very Decent". The assessment by media and instructional design experts obtained a score of 75% with the category of "worthy". The average rating by experts is 85% with the category "very worthy". To determine the effectiveness of *problem-based learning-based* flipbooks , an N-Gain test analysis was carried out. The calculation result of the N-Gain test was obtained by 0.82 or 82%. Where such results fall into the category of high N-Gain. Based on the results of expert feasibility tests and N-Gain calculations, problem-based learning-based flipbook media is feasible and effective for use in class V science subjects in SDIT Ar-Rohmaniyah Bogor City.

Keywords: Flipbook, IPA, Media.

Introduction

The existence of the 21st century is marked by the era of the industrial revolution 4.0, where this century makes the century of openness or the century of globalization. 21st century learning applies more creativity, critical thinking, cooperation, problem solving, communication skills, sociability and character skills (Mardhiyah et al., 2021). . Therefore, the future educational process must be able to develop character and skills, both related to the pillars of education and skills needed in the 21st Century, including improving the profession and competence of teachers, learning characteristics, and characteristics of students, as well as life skills in a career.

With the development of increasingly sophisticated technology, there are many applications or websites that can be developed and used as a medium in helping teachers to carry out learning activities for students. The existence of learning media can help teachers to deliver difficult material to be easier for students to understand. In addition to teachers, distance learning activities (PJJ) using learning media in the process can make it easier for students to interact with teachers. The interaction process that was previously face-to-face can be done using several applications such as classroom, video conference, telephony or with live chat on Zoom, Google Meet, or WhatsApp Group. However, in schools where researchers conducted research, it was found that related to the use of technology-based learning media in this school, teachers have not used varied learning media. The use of *media conferencing* in learning is already applicable, but in the process of delivering the material is still in the form of lectures.

For this reason, it is necessary to develop interesting and effective learning media in improving student learning outcomes. With this, researchers are trying to develop interactive learning media with *Flipbook* to make learning more student-centered and more interactive. To meet the expectations of learning media developers, researchers chose interactive learning multimedia that includes text, images, audio, animation and video in one container. The existence of existing learning support facilities, interactive learning multimedia developed, is expected to be applied to learning by teachers. Based on the results of the needs analysis and other complementary data, research is needed on the development of interactive learning multimedia, in this case it is a *problem-based* learning (PBL) Flipbook in the 2013 Curriculum in science learning at SDIT Ar-Rohmaniyah Bogor City

Natural Sciences

Natural Science (IPA) is an important subject and is the foundation for technological development. The daily activities of human beings deal with science, from the simplest to those that require complex thinking, therefore science is taught from the elementary school level. Natural Science plays an important role in public education both as a direct object (facts, skills, concepts, principles) and an indirect object (being critical, logical, diligent, able to solve problems, and others (Sadiah, 2018). Natural Science is a learning based on principles, a process that can foster students' scientific attitudes towards science concepts through simple observation, discussion, and investigation (Giartama et al., 2018). According to (Dewi et al., 2021). To improve the quality of elementary school teachers, teachers are required not only to understand theory but also to understand the concept of attitudes and skills in subjects.

Science taught to children in elementary schools (SD) aims to explore children's ability to be able to explore and understand the surrounding nature literally, while its function is so that children master the concepts and benefits of science in everyday life and become a focus for learning subject matter at an even higher school level (Prastika, 2017). Classroom teachers in elementary schools who teach natural sciences (science) subjects must be able to provide concepts and benefits of science in everyday life to their students. In addition, Natural Science is a basic science that plays an important role in the development of science and technology (Yuliati & Lestari, 2019). Thus, through learning students are expected to have various skills such as creative and innovation skills, critical thinking and problem solving, communication, and cooperation.

Problem Based Learning

The Problem Based Learning (PBL) learning model is a learning approach that uses real-world problems as a context for students to learn (Nismaya, 2020). Furthermore, Nur (Suarsani, 2019) defines the PBL model as a learning model that is able to facilitate students in thinking about real life problems around students. Lalu (Kiranadewi & Hardini, 2021) explained that this PBL model has advantages to train students in improving their ability to think creatively, imaginatively, reflectively, about models and theories, and introduce and try new ideas, as well as encourage students to gain confidence. In achieving its goals, PBL has tricks/ways. One of these tricks lies in the problems both given by the teacher and those found and solved by the students themselves. This problem is certainly a problem in the real context.

Learning Using *Problem Based Learning* Flipbook Media

Basically, every learning process carried out is directed towards achieving predetermined goals. Learning is a process of behavior change through the interaction between the individual and the environment. Learning is a learning word given by pe and an, which means learning is an increase in knowledge, the process of remembering, and the process of obtaining facts or skills that can be mastered and used as needed (Fatimah & Kartikasari, 2018). There are two concepts that cannot be separated in learning activities, namely learning and teaching. Learning refers to what students do, while teaching refers to what the teacher does. According to Komalasari (Faizah, 2017) learning can be viewed from two angles; First, learning is seen as a system, learning consists of a number of organized components including learning objectives, learning media, classroom organizing, learning evaluation, and learning follow-up (remedial and enrichment). Second, learning is seen as a process that includes activities carried out by teachers ranging from planning, implementing activities to evaluation and follow-up programs that take place in educational situations to achieve predetermined learning goals.

Problem-based learning is learning that focuses on problem-solving activities, and the problems that must be solved are problems that are not finished or not well structured, so this can challenge students to think and have discussions in groups (Ismaimuza, 2020). Problem-based learning is a learning method that aims to prepare students to be skilled in real life (Cahdriyana, 2016). One of the problem-based learning methods is Problem Based Learning (PBL).

Improving student learning outcomes can be pursued with learning methods, strategies, or models and is supported by learning media. Learning media can also be used for student interaction media in improving learning outcomes. Through supporting learning methods and media, it can make it easier for teachers to achieve learning goals, improve students' abilities, and students' enthusiasm for learning in achieving learning outcomes. In order to improve learning outcomes, this research focuses on the development of learning media in learning strategies in the form of learning media in the form of flipbooks on science subjects in elementary schools.

Method

The type of research carried out is the type of research and development Research and *Development* (RnD) using the Borg and Gall and ASSURE models. The stages of development are; 1) preliminary studies in which in this stage there are steps of student analysis, material analysis, determining learning standards and objectives, choosing methods and media; 2) model design; 3) one to one test; 4) small group test; 5) Large Group Test; 6) the final model; 7) Effectiveness test.

The instruments used in this study were wawaacara, expert validation instruments, user response instruments, and written test instruments. Data analysis techniques for interview results using qualitative data analysis, the data obtained are data from observations with teachers and students. The results of the analysis of expert validation instruments, student responses and science test results use quantitative analysis whose results will be explained in sentence form or qualitative. For testing the effectiveness of the media will be tested using the N-Gain test.

Results and Discussion

Need Assesment

The development of learning using Flipbooks in science subjects class V semester I at SDIT Ar-Rohmaniyah Bogor is based on the results of field observations. Based on the results of observations, it was found that there was no material that could be accessed anywhere and anytime using flipbook media. The availability of internet networks in schools and the support of the foundation, devices owned by students at home and students have become accustomed to using teaching materials through gadgets that support the implementation of flipbook learning.

Results of the Initial Needs Analysis of Research

The first step taken by researchers is to develop flipbook-based teaching materials, namely by analyzing needs and goals with field observations and through interviews with teachers and distributing questionnaires to class V students, along with the results of interviews and questionnaire responses and the results of the analysis carried out.

A. Interview results

Interviews were conducted with class V teachers at SDIT Ar-Rohmaniyah Bogor which aimed to obtain data from teachers. Before the interview, the researcher compiles the interview grid and arranges the question instrument. The interview was conducted on May 04, 2022 with the following results:

1) The difficulties faced by subject teachers when conducting learning are that students are constrained by devices, unstable signals and do not have internet quota.
2) The purpose of learning is to equip students with teaching materials before doing online learning through flipbooks.
3) With the disturbance, students have difficulty in understanding the learning meter delivered by the teacher.
4) The availability of facilities and infrastructure in schools is quite good in schools.
5) Teachers try to create a fun and easy-to-understand learning process by associating learning with daily activities.

B. Questionnaire results

Researchers distributed questionnaires to class V students of SDIT Ar-Rohmaniyah Bogor to obtain data from students. Learners about learning. This data collection is carried out through a questionnaire on June 27-28, 2022.

Material Expert Validation Test Results

Before conducting trials on students, researchers conducted an Expert Judgment (expert test) of flipbook media product design. Validation is performed by two validators consisting of (1) material experts, 2) media experts and instructional design. Data is obtained from the assessment questionnaire given to validators, and validators are welcome to provide comments and suggestions for product improvement.

No.	Aspects	Score	Maximum score	Percentage of fatigue
1	Material	23	25	92%
2	Language	39	40	98%
3	Serving	54	60	90%
4	Display	25	25	100%

Based on the results of the assessment from material experts on the development of Problem-based Learning (PBL) Flipbook media, a percentage of results were obtained, namely:

$$presentase = \frac{Skor\ yang\ diperoleh}{Skor\ maksimum} x\ 100\%$$

The result of 94% when interpreted using the interpretation of the validity of problem-based learning (PBL)-based Flipbook media is said to be feasible if the final value of the validation sheet is ≥61% and is included in the very feasible category if the final score reaches >81% (Arikunto, 2009: 35). Interactive media products are on the "very decent" qualification.

Media and Design Validation Test Results

No.	Aspects	Score	Maximum score	Percentage of fatigue
1.	Linguistic Structure	15	20	75%
2.	Media Display	18	25	72%
3	Software Engineering	19	25	76%
4	Deliverability	8	10	80%
5	Learning	52	70	75%

The result of 75% when interpreted using the interpretation of the validity of PBL-based flipbook learning media is said to be feasible if the final score is ≥61% and if it is said to be very feasible if the final score reaches ≥81%. (Arikunto, 2009:35). PBL-based flipbook learning media products are on the "feasible" qualification of this in accordance with the conclusions given by media experts and instructional design that these learning media are worth testing.

Product Effectiveness Test Results

Testing the effectiveness of developing problem-based learning media based on science learning by comparing the results of the pretest, teachers before carrying out the learning process and conducting posttests after using and implementing the learning process. This test was conducted on 30 learners, with a comparison of the average scores of pretest and posttest in the table below:

No.	Test	Average
1	*Pretest*	71,1
2	*Posttest*	94,8

From the calculation above, the average N-Gain of learners is 0.82. Based on this data, it can be concluded that the science flipbook learning of class V students of SDIT Ar-Rohmaniyah Bogor is included in the High N-Gain category. Based on the N-Gain interpretation table, the PBL-based Flipbook science learning activities for grade V students of SDIT Ar-Rohmaniyah Bogor are effective.

Conclusion

The learning media development model used in this study is a combination of the Borg and Gall model and the ASSURE model which consists of 10 stages, namely: 1) analyzing students, 2) determining standards and goals, 3) choosing methods, media and teaching materials, 4) product development, 5) field tests, 6) product revisions 7) operational field trials, 8) large-scale trials, 9) final revision, 10) implementation. The results of the analysis of needs in the field that there is no PBL-based flipbook learning media available.

The feasibility of learning media products developed is based on the results of validation tests from material experts, media experts and instructional design, individual trials, small group trials and field trials. So it can be concluded that the PBL-based science learning flipbook learning media development product can be well received by users and experts who are targeted in the development, such as students and full support from science teachers at SDIT Ar-Rohmaniyah Bogor.

Based on the results of the trial, science learning development products in the form of flipbooks with *a problem based learning* (PBL), obtained scores from material experts of 94%, values from media experts and instructional design of 75%, then the average value of experts is 85%, then the products developed are included in the very feasible criteria. This assessment shows that this PBL-based flipbook learning media development product is very feasible for use by integrated Islamic elementary school students, where in learning to apply Natural Sciences. This PBL-based flipbook learning media is worthy of being produced by user institutions with the permission of science learning media developers. Then, the pretest and posttest results of class V students of SDIT Ar-Rohmaniyah Bogor were declared effective in the learning process. Judging from the calculations, the average N-Gain of students is 0.82 which is a High category.

Recommendations

The development of flipbook media is only limited to one science material, it is hoped that in the future it can be facilitated the development of flipbook media for science materials for one semester. So that it can make it easier for students

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Development of Learning Using Flipped Classroom Models in Basic Web Programming Subjects at SMK Al Hafidz Leuwiliang

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Abstract: The purpose of this study is the development of basic learning of web programming class XI RPL based on Microsoft teams using the flipped classroom model at SMK Al Hafidz Leuwiliang and to find out its feasibility and effectiveness. The research method used is Research and Development (R&D). The learning development model used is the ASSURE learning system design model which is integrated with the PEDATI learning model at the Model Design stage. The subjects of this study were students of class XI RPL. The results of this study based on the results of the feasibility test include (1) the results of testing learning materials obtained a percentage of 78% and are categorized as good; (2) the test results of learning media were 79% and were in the good category; and (3) learning design test results of 83% and categorized as good. One to One test results obtained a percentage of 88% and were classified in the good category, small group test results were categorized as good (85%) and field test results were also in the good category (87%). To determine the effectiveness of learning, it is carried out through testing the N-Gain value from the results of the pre-test and posttest. The result obtained was 0.75 (75%). Based on these values, and the paired test results are $T_{count} > T_{table}$ or 13.72 > 2.06866 so that through flipped classroom learning can improve the learning outcomes of basic subjects of web programming, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Keywords: learning development, web programming, flipped classroom

Introduction

Since the COVID-19 pandemic in Indonesia, the education system has been running uncharacteristically. So that the Minister of Education and Culture issued circular number 4 of 2020 concerning the implementation of education policies in the emergency period of the spread of corona virus diseases (covid-19). In various studies, it is stated that the ineffectiveness of distance learning results in various problems, especially psychosocial problems of students (Kompas, 2021). The negative impact is that students lose their enthusiasm for learning (learning *loss)* lack of discipline and responsibility for schoolwork so that it is difficult to measure learning outcomes (Wahyuni, 2021).

In today's world of education, teachers and students are forced to explore using various technological media such as computers, laptops and *smartphones* to channel their creativity, interact with friends or teachers, and find various learning references through the internet. The positive impact of this technological growth has influenced the acceleration of the development of teaching technology in the world of education. So that the existence of the internet today is an infinite source of learning.

From the observations made at SMK Al Hafidz Leuwiliang, most students are more frequent and prefer to access information through their cellphones or smartphones rather than using laptops or computers. The learning media used during distance learning at SMK Al Hafidz Leuwiliang is using WhatsApp, the Office 365 package, namely Microsoft Teams. However, the use of Microsoft Teams is only limited to *video conferencing*, not as a *Learning Management System*. The challenge faced by teachers during the pandemic, especially at SMK Al Hafidz Leuwiliang, is how to optimize the learning process in online media, teachers still deliver material according to the essence of face-to-face learning, and make or deliver material that is interesting to students, so that learning objectives even in remote conditions are still well achieved.

Based on the results of surveys and interviews with several students and teachers at SMK Al Hafidz Leuwiliang in April - May 2022, 100 students found several obstacles faced, namely as follows: (1) as many as 59% of students are constrained by signals (2) as many as 23.4% of students do not have internet packages (3) there can be many 12% of students have cellphones that do not support online learning (4) as many as 3% of students feel lazy (5) as much as 2.6% Learners don't know how to use the app. However, in addition to the aforementioned obstacles, students convey some of the benefits they feel during online learning. One of them is that they have more free time at home with their families, can access many learning resources on the internet. In addition, based on the results of a survey of students, 83.1% of students felt comfortable using the Microsoft Teams application, and as many as 16.9% of students chose the Zoom meeting application. This is because the Microsoft Teams application saves more quota compared to other applications.

This can be seen in the results of the field survey, the duration of *conference* is 20 minutes using the Zoom Meeting application and 30 minutes using the Microsoft Teams application. *Conference* activities consist of: displaying material and playing videos through *share screens*, are as follows:

Table 1. Comparison of Quota Usage in the Conference of Zoom Meeting and Microsoft Teams Applications

Application / **Operator**	**Zoom Meeting (20 minutes)**	**Microsoft Teams (30 minutes)**
Telkomsel	20 MB	19 MB
Indosat	240 MB	210 MB
Smartfren	100 MB	92.2 MB

The average score of class XI students in the Basic Web Programming subject at SMK Al Hafidz Leuwiliang in the initial observation has not shown any significant improvement. The observations also show that the use of Microsoft Teams as a learning medium, especially in basic web programming subjects, is not optimal. The learning outcomes of learners over the past 3 years for the basic subjects of web programming class XI SMK Al Hafidz Leuwiliang, are presented through a graph of average score data as follows.

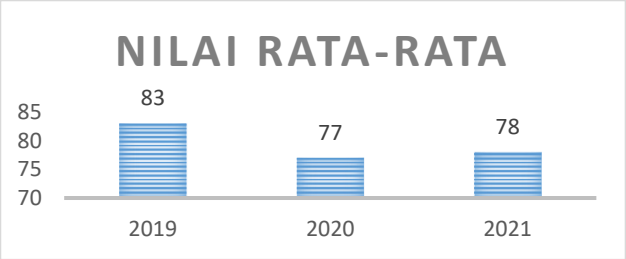


Figure 1. Average Score of Basic Web Programming Subjects

The subject of web programming is a C3 Competency expertise subject where all students in the Software Engineering Department must be competent in this subject. So that every meeting or learning module because it is interrelated and continuous, it is necessary to have media to store the module or it neatly, and can be accessed anytime and anywhere. So that students can repeat it or learn it first before face-to-face in class.

The learning process should be able to run effectively, efficiently and innovatively where this learning process is centered on students (Wayan Ilia Yuda Sukmana & Kadek Suartama, 2018). Especially at a time when face-to-face learning is limited, which is very minimal learning time. This is in line with a learning model where between giving material and assignments it is given in reverse or referred to as *flipped classroom* (Indrajit, 2020).

Based on the background description and considerations that have been presented above, the author is interested in developing online learning by conducting a research entitled "Development of Based Learning Using the Flipped Classroom Model in Basic Web Programming Subjects at SMK Al Hafidz Leuwiliang".

Model Development Concept

It was a person's efforts to fulfill the impulse of curiosity towards the world around him that gave birth to a study. Such efforts can be pursued by following formal and systematic methods to meet the impulse of curiosity or get an answer or solution to a problem (Malik et al., 2020).

With this formal and systematic method one then finds an answer that holds scientific value and can be accounted for. Because methods are the main pillar in a study, the role of a person as a user of the method becomes very

important. Research is a well-planned investigation in search of truth or facts in determining something. The word research comes from English, namely from the word *research*, which consists of two words, *namely re* meaning back and to search meaning *to search*. It can be concluded that the notion of research is to re-seek a knowledge with the aim of changing conclusions in general or changing opinions with the birth of new applications in that opinion (Zakariah et al., 2020).

Research and Development if translated means research and development. Whereas in the Big Indonesian Dictionary, 'research' means to investigate or research a problem systematically, critically, and scientifically to increase knowledge, analyze new facts, or make better interpretations. While 'development' means the process, the way of developing actions, for example language development, which is an effort to improve the quality of language so that it can be used for various purposes in the life of modern society, (kbbi.web.id). So it can be synthesized that research and development in education is research that has the aim of developing or improving the quality of education.

R&D (*Research and Development*) or in Indonesian is a development research method is a process of developing and testing the effectiveness of educational products produced and can be useful in the wider community. This research is longitudinal (gradual and *multi-year*) in the form of a cycle with stages of finding problems, pre-existing products are evaluated and improved, then the effectiveness of the developed products is tested (Ardiansyah et al., n.d.).

The definition of development research according to Borg and Gall is a research design that has the objective that educational products need to be developed and validated (Gall et al., 1996). The use of educational products is very wide, including the development of teaching materials such as textbooks, learning videos, development of learning methods and processes. Development research is research that aims to improve pre-existing products and develop new products in various fields then tested and validated (Arief, 2012).

According to L.R. Gay in (Ibrahim, 2018) stated that development research is an effort made to develop a good product for school use, not used to test a theory. So, development research is defined as a systematic assessment of the design, development, and evaluation stages of the program. The product and learning process must meet the criteria of validity, practicality, and effectiveness.

According to Sujadi in (Husein et al., 2021), development research is defined as a process or steps to develop a new product or perfect an existing product that can be accounted for.

So, research and development can be interpreted as a process of research and development of a product that is carried out gradually, critically, and scientifically to create a new product or perfect an existing product or be used to do a better interpretation instead of testing a theory.

Theoretical Studies Related to the Variables studied

Online Learning

The rapid development of technology today, one of the efforts to improve the quality of learning is online *learning.* Initially, online learning was known for the impact and influence of the development of electronic-based learning (e-learning) published by Illionis University through a computer-based learning system (Hardiyanto, 2020).

Online learning is a system that makes it easier for students to learn more broadly, abundantly, and variously. In addition, learners can learn anytime and anywhere without being limited by distance, space and time. The form of learning material varies such as visual, audio, motion or video.

Online learning is learning that is presented electronically using computers and computer-based media. The teaching materials can be accessed through a network. The source comes from websites, the internet, intranets, CD-ROMs, and DVDs. With *E-Learning* we can provide instructions, monitor student performance, and report on student progress, so that we can still guide learners to achieve their learning outcomes.

So online learning is learning using electronic media with various forms of learning materials connected to the internet network, so that students can learn anytime and anywhere without being limited by distance, time and space. In addition, it makes it easier for teachers to be able to guide and control student learning outcomes online.

Flipped Classroom

Flipped classroom is a learning strategy and method that reverses the conditions of teaching in conventional classrooms. If in a conventional class the teacher gives lessons in the classroom, then followed by assignments at home, then in flipped classrooms, the teacher gives assignments to students to learn the material to be studied. Teachers provide learning videos, teaching materials, references, and others that can support students' understanding to gain knowledge and initial capital before normal learning in face-to-face classes (Patandean, 2021).

Flipped Classroom is defined simply as "homework and homework at school". *Flipped Classroom* is a pedagogical approach in which hands-on instruction moves from a group study room to an individual learning space, and the resulting group space is transformed into a dynamic interactive learning environment where educators guide learners as they apply concepts and engage creatively in the subject matter (Basyah, 2018)**.**

The four pillars in *Flipped Classroom* are:
(1) *Flexible* environment allows for a variety of learning models;
(2) *Learning culture* deliberately shifts instruction to a learner-centered approach;
(3) *Intentional content* thinks about how *Flipped Learning* helps learners develop conceptual understanding as well as procedural fluency; and
(4) *Professional Educator* where the role of the teacher is required to be more in observing learners, giving feedback, and assessing their work. The effect of implementing *Flipped Classroom* is an increase in achievement and lower levels of student stress.

The implementation of *Flipped Classroom* learning is inseparable from the tools that must be owned. Tools in this study are:
(1) Instructional video, with program bumper composition, apperception, material, confirmation, rep/summary, and cover;
(2) Practicum Handbook in the form of steps to carry out practice in schools; and
(3) Learning Material Book to strengthen the theory on the topic of Project Work.

These tools are packaged in a file format named *Flipped Classroom Material* or *FCM. Flipped Classroom* Project Work subjects are contained in the RPP with the aim of creating a dynamic website.

Basic Web Programming Subjects

Based on the presentation (Setiawan, 2017) in the Web Programming textbook that web programming is taken from 2 syllables, namely programming and the web. Programming in *English* is programming and is defined as the process, method, deed of the program. A Web definition is a computer network consisting of a collection of internet sites that offer text and graphics and sound and animation resources via a hypertext transfer protocol.

Many people know the web with the term *WWW (world wide web), World Wide Web* is the most popular internet service today the internet began to be known and widely used after the existence of WWW services. *WWW* is website pages that can be connected to each other (*hyperlinks*) that form a wilderness of information. *WWW* runs with the *Hypertext Transfer Protocol (HTTP) protocol.* A Web page is a plain *text* file that contains *HTML* syntax that can be opened/viewed/translated with an Internet Browser. HTML syntax is capable of loading text content, images, audio, video and animation. Now the internet is synonymous with the web, because of the popularity of the *web* as a standard interface on the services on the internet, from its beginnings as an information provider, this was also used for communication from email to chat, to conducting business transactions (*commerce*) (Setiawan, 2017). There are many advantages provided by *Web-based* applications over *desktop* based applications, so web-based applications have been adopted by the company as part of its information technology strategy.

The Basic Subject of *Web* programming is one of the basic compulsory subjects on the basis of the Computer Engineering and Informatics (TKI) expertise program. Based on the curriculum structure of the subject Web programming is delivered in class XI semester 2 which is delivered within 4 hours of lessons per week.

The basic material of web programming is emphasized on advanced commands in HTML for page creation and commands using *JavaScript*. The HTML commands taught in web programming include creating form components and styling a web page.

For java script material includes *web* page programming techniques, user input processing. In web page programming techniques, more details will be explained about the anatomy and workings of JavaScript code, the basics of client programming (variables, data types, and operators), 1-dimensional and multidimensional arrays, and branching control structures in client programs, looping control structures in client programs, built-in functions and user functions in client programs.

Method

Research Objectives

The research objectives of learning development with the *Flipped Classroom* model of this basic web programming subject are: (1) To develop Microsoft Teams-based learning procedures using the *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang. (2) To analyze the feasibility of developing Microsoft Teams-based learning using a *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang based on the *ASSURE* model integrated with the PEDATI model. *(3)* To analyze the effectiveness of Microsoft Teams-based learning development using a *flipped classroom* model in web programming subjects at SMK Al Hafidz Leuwiliang based on the *ASSURE* model integrated with the PEDATI model.

Place and time of research

This research was conducted at SMK Al Hafidz Leuwiliang which is located at Jl. Moh Noh Noor Km 8 Kp. Hegarsari RT.04/01 Karyasari Village, Leuwiliang District, Bogor 16640, West Java Province. The subjects in this study were students of class XI RPL. This research was carried out for four months, starting from March – September 2022.

The R&D research method was chosen in this study because it is in accordance with the research objectives, namely to create a model for the development of online learning *web programming* in the second semester for XI RPL students and to test its effectiveness. The theory behind model development is the concept of instructional model development as described by the Association for Educational Communications & Technology (AECT) the notion of instructional development a systematic approach to the design, production, evaluation, and use of comprehensive instructional systems, including all relevant components from system to management model to use them (Agustian in (Suliarso et al., 2021).

The following is a process of stages carried out including:

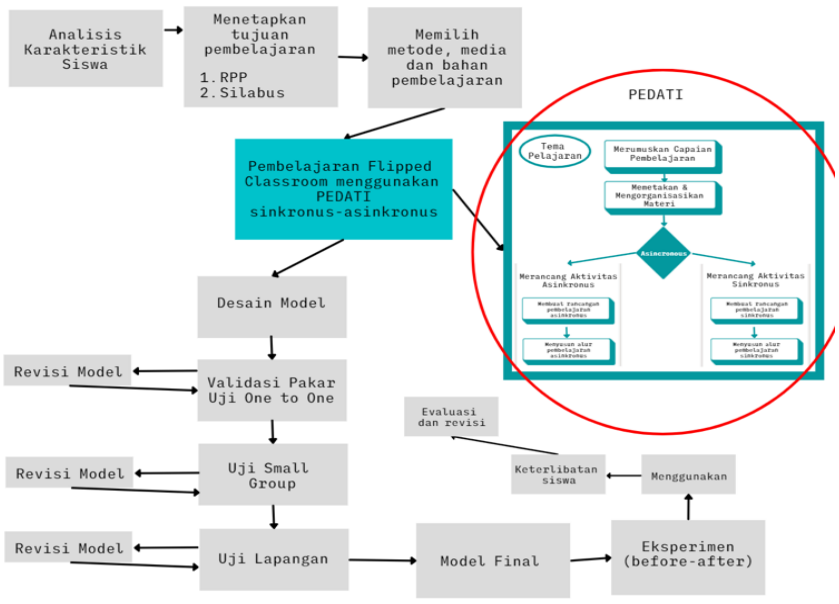


Figure 1. ASSURE Learning Design Model integrated with PEDATI Model conducted by Researchers

Results and Discussion

Analysis of Student Characteristics

The development of learning using the *flipped classroom* model in the Web Programming class XI semester II subject at SMK Al Hafidz Bogor is based on the results of observations in the field. Based on the results of observations, it was found that there is no material that can be accessed anytime and anywhere (*online*) specifically that can be used to complete learning materials using the *flipped classroom* method. The availability of internet networks in schools, there is positive support from the foundation for learning through Microsoft teams, devices and internet networks owned by students at home, besides that students are accustomed to accessing learning materials through their gadgets is very supportive of the implementation of *flipped classroom* learning.

The first step taken by researchers to develop *flipped classroom-based* learning is to analyze needs and goals. In this case, the researcher tried to find out: (1) The position of online learning in the Distance Learning curriculum in class XI of SMK Al Hafidz Leuwiliang. (2) The purpose of distance learning in class XI of SMK Al Hafidz Leuwiliang. (3) What materials are taught in distance learning. (4) The initial conditions of learning in distance learning. (5) Facilities and infrastructure available in schools. (6) Existing problems and constraints. (7) Efforts made to overcome these problems and constraints. (8) Expectations for distance learning.

Based on the observation of the learning process, by interviewing and distributing questionnaires to students of SMK Al Hafidz Leuwiliang Bogor, the following data were obtained:

Table 2. Characteristics of Online Learning Participants

No	Aspects analyzed	Analysis Results
1	The main group of learners of class XI RPL 1	Students of SMK Al Hafidz Bogor competence of RPL expertise
2	general characteristics	• Age: 16 - 17 years old • Gender distribution: 19 male learners and 5 female learners • Language: Indonesian
3	Number of learners	24 people
4	Experience level	• The ability to operate the Microsoft teams app is relatively good • Synchronous and asynchronous learning using Microsoft teams
5	Attitude of learners	• Based on the results of interviews enthusiastic learners in pleasant learning situations and conditions • Many distractions cause students to be disturbed in learning activities

Setting Learning Objectives

The learning formulations for each subject are outlined in the table below:

Table 3. Learning Objectives

No	Subject Matter	Learning Objectives
1	Framework	Students can get to know and install *the codeigniter (CI) framework*
2	Model View Controller and Bootstrap	Students are able to create a website by applying the model-view-controller technique using bootstrap
3	Database	Students can display data on website pages
4	CRUD	Students can apply CRUD on the student registration website

Choosing Strategy, Technology, Media, and Materials

Determining Achievements, Descriptions and Learning Abilities

Table 4. Achievements, Description and Learning Abilities

1	Learning Outcomes	Create a web app using *Model View Controller (MVC)* by using *framework* technology
2	Description	Web programming equips students with the ability to create and develop web-based applications through an understanding of network technology, the internet, programming languages, and how various technologies work together, so that students are able to create / create and develop web-based applications with the latest technology that is useful in various fields.
3	Definition	MVC is a technique or concept that separates the main components in creating a website into three components, namely: 1. MODEL: The part of the processing that deals with the processing or manipulation of the database. Just like getting data from a database or entering another database and processing it. All statements related to database processing are placed in the model. 2. VIEW: The section that handles the user interface page or the page that is displayed to the user. Views from the user interface are aggregated into views and separated from controllers and models. This allows web designers to easily develop the look of a website's pages. 3. CONTROLLER: is a collection of action instructions that connect models and views, so the user will not be associated with the model directly, essentially from the view then the controller that handles the instructions. 4. Ad framework is a framework used to build and develop websites. The framework was created to assist web developers in writing lines of code. By using a program code writing framework, it becomes easier, faster, and neatly structured.
4	Expected capabilities	Students are able to create web applications using *the Model View Controller (MVC*) by using *codeigniter (CI) framework* technology for CRUD functions

Model Design

After obtaining the learning mapping, the process of designing synchronous and asynchronous learning activities is obtained. The asynchronous learning process is presented as follows:

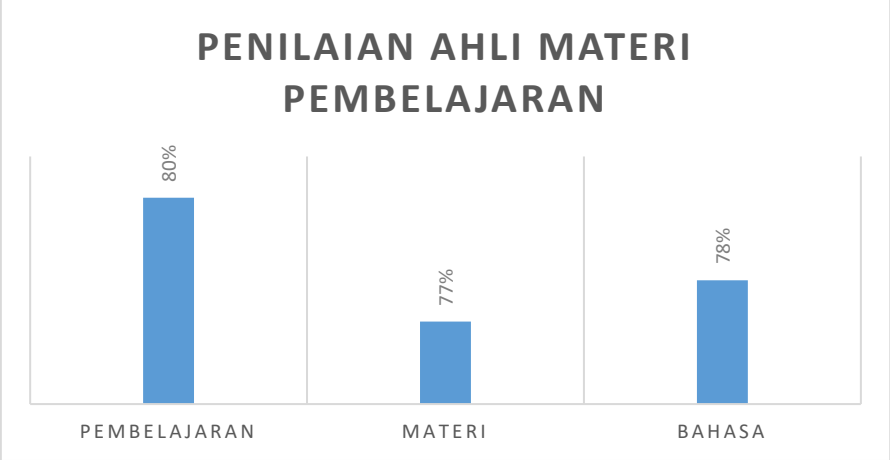
Table 5. Synchronous and Asynchronous Learning Mappings

No	Learning Objectives	Subject Matter	Subject Matter	Learning Activities	
				Synchronous	Asynchronous
1	Students can use *the codeigniter framework* in building a website	Framework	*Codeigniter Framework* Explained		V
			Understand the use of a local web server and install XAMPP	V	
			Download and install the *Codeigniter Framework*	V	
2	Students can apply the concept of MVC in the *codeigniter framework* to build a website	Model View Controller and Bootstrap	Understanding *MVC* concepts		V
			Using *bootstrap*	V	
			Using *the code editor from visual studio code*	V	
			Create a student registration website	V	
3	Learners can use the database to build a website	Database	Describe the database		V
			Create a database	V	
			Create a database connection	V	
			Displaying data from the database to the website	V	
4	Learners can use CRUD on the database to build a website	CRUD	Explaining CRUD		V
			Implementing CRUD on a built website	V	

Expert Validation

Results of Expert Review of Learning Materials

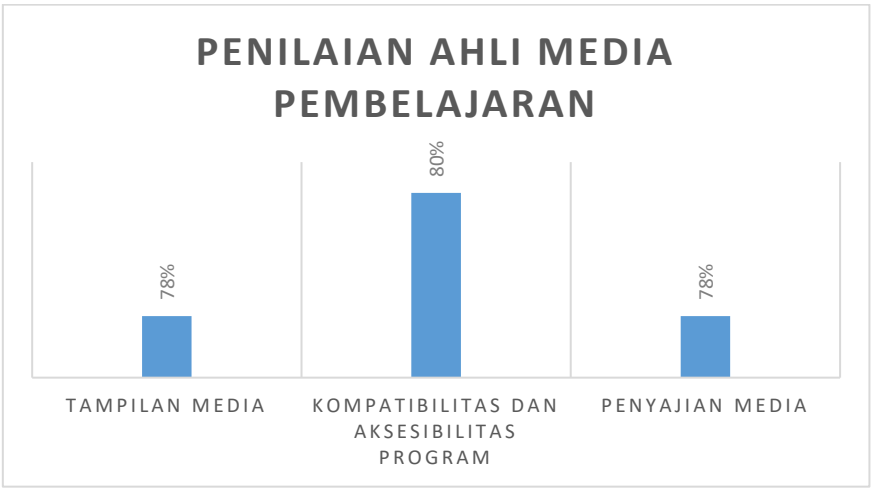
Based on the results of the expert recapitulation of learning materials on a 2 m graph, the results of the material expert assessment calculations obtained an average value of 78% which means "Good". This means that the learning materials developed are suitable for use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 1. Recapitulation of Expert Assessment of Learning Materials

Learning Media - Expert Review Results

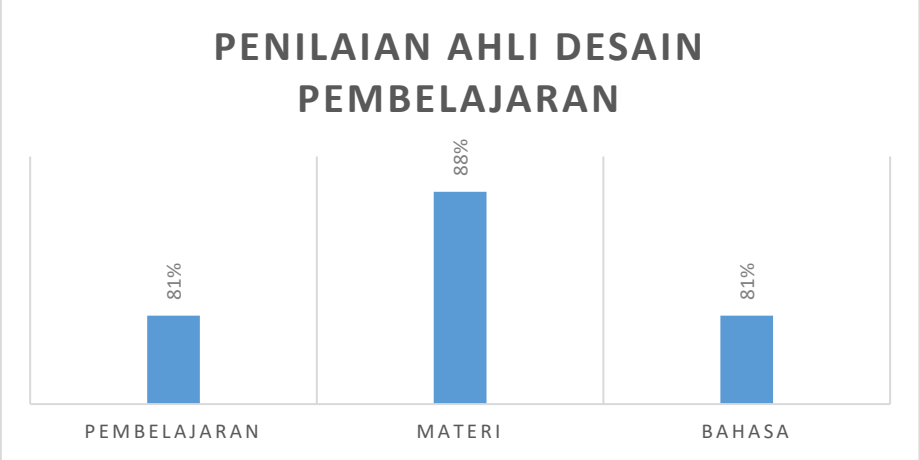
Based on the results of the recapitulation of learning media experts on a 3 m graph, the results of the calculation of the material expert assessment obtained an average value of 79% which means "Good". This means that the learning media developed is suitable for use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 2. Recapitulation of Learning Media Expert Assessment

Learning Design - Expert Review Results

Based on the results of the recapitulation of learning design experts on a 3 m graph, the results of the material expert assessment calculations obtained an average value of 83% which means "Good". This means that the learning design developed is feasible to use in learning web programming subjects for students of SMK Al Hafidz Leuwiliang.



Graph 3. Recapitulation of Learning Design Expert Assessment

Model Final

The results of the *small group* test are poured into the storyboard, henceforth this *storyboard* design is developed into a final model.

1. Login Page

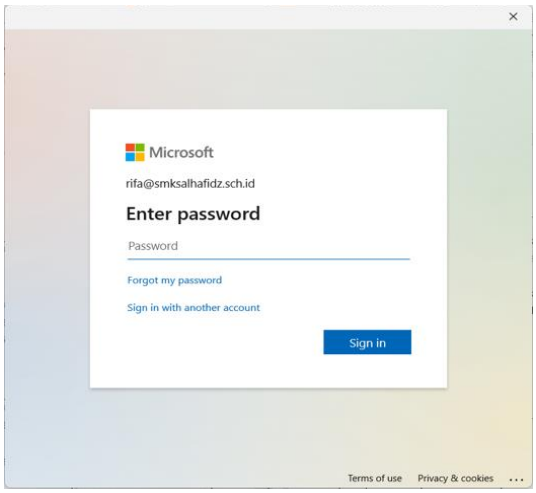


Figure 2. Login Page

2. Teams page

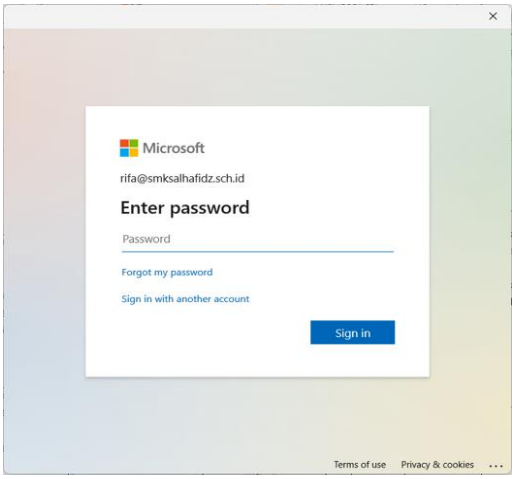


Figure 3. The Teams Page

3. Classroom Page

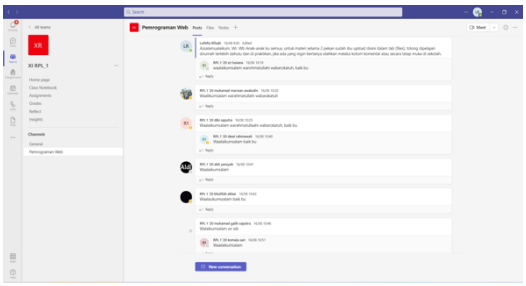


Figure 4. Class Page

4. Page Files

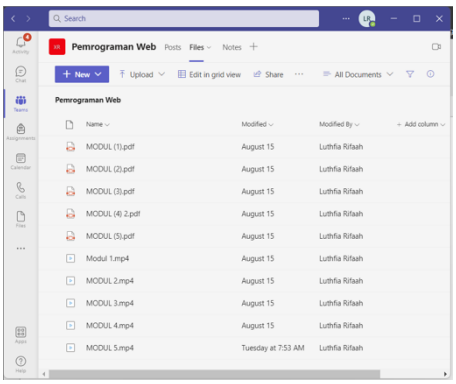


Figure 5. Page Files

5. Assignment Page

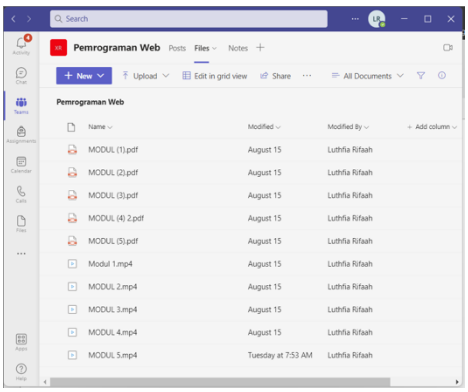


Figure 6. Assignment Page

6. *Microsoft Form* Assignment page on assignment menu

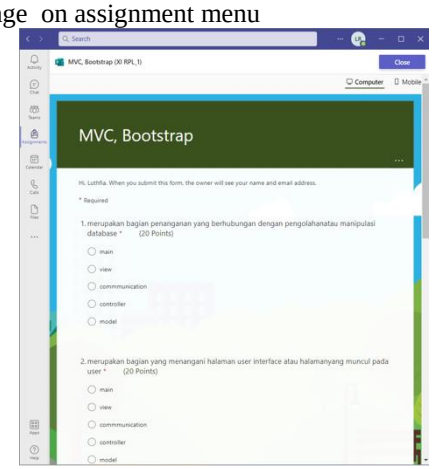


Figure 7. Task Page

7. Values page

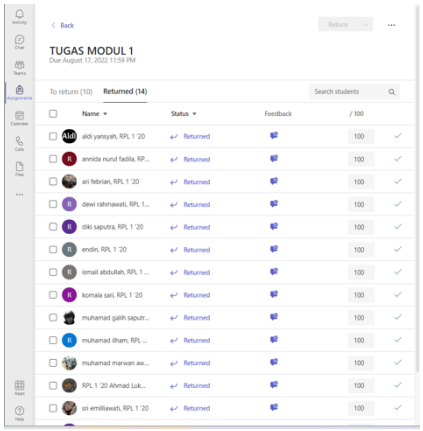
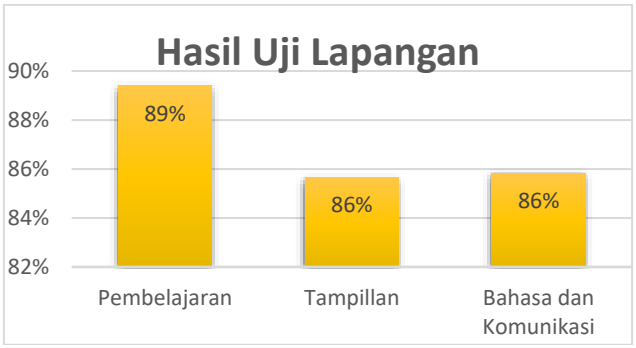


Figure 8. The Values Page

Experiment

Field Test (Model Feasibility)

Based on the results of the field test recapitulation on the 4 m graph, the results of the assessment calculation obtained an average value of 87% which means "Good". This means that this prototype is suitable for use in learning basic web programming subjects for students of class XI RPL at SMK Al Hafidz Leuwiliang.



Graph 4. Field Test Results

Model Effectiveness Testing

1) N-Gain Scores
   Based on the calculation results of N-Gain, the average value of N-Gain was obtained by 0.75. If converted with Table 3.6, a percentage of 75% is obtained and is categorized as "Quite Effective". So it can be said that the online learning model for the basic subjects of web programming class XI RPL SMK Al Hafidz Leuwiliang is quite effective to use.
2) Uji Paired Sample Test
   Based on the calculation of the paired sample test, a comparison of $T_{calculation} > T_{table}$ was obtained, namely 13.72 > 2.06866, it can be concluded that there is a significant difference so that through flipped *classroom* learning can improve the learning outcomes of basic web programming subjects, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Conclusion

The development model used is the ASSURE learning system design model which is integrated with the PEDATI model at the learning strategy development stage. The selection of this model is based on consideration of its

complete, detailed and systematic process integrated with the PEDATI model which is very specific to the development of *flipped classroom* learning.

The results of the learning feasibility test analysis are determined based on the results of the assessment of learning material experts, learning media experts and learning design experts. The results of expert testing of learning materials obtained a percentage of 78%, by assessing three aspects, namely learning, material and language. The results of testing by media experts obtained a percentage of 79% carried out on three aspects, namely aspects of media display, accessibility and program compatibility, and media presentation.

The results of testing by learning design experts obtained a percentage of 83% carried out on three aspects, namely aspects of learning, media display, and language.

Based on the test results of the three experts, this basic web programming learning development model is categorized as 'good' so that it is suitable for use in learning in class XI RPL SMK Al Hafidz Leuwiliang.Effective The test of the effectiveness of the model obtained based on the results of the N-Gain calculation showed a value of 0.75 or 75%. Based on the results of these calculations, the development of learning for basic web programming subjects at SMK Al Hafidz Leuwiliang is quite effective. And the paired test results are $T_{count} > T_{table}$ or 13.72 > 2.06866 so that through flipped classroom learning can improve learning outcomes in basic subjects of web programming, because there is a noticeable difference between learning outcomes in pretest and posttest data.

Implication

The implications in this study can improve the quality of education for the SMA / SMK level in the implementation of information and communication technology-based learning. Peseta didik is more interested in following the learning process which has an impact on improving the quality and learning outcomes. This learning development is also able to encourage subject teachers and especially researchers to always innovate and act more creatively in providing solutions to problems in the technology-based learning and communication process.

Suggestion

1. **For Teachers**
   Teachers can use and optimize this web-based learning as an alternative learning medium for students to overcome difficulties in delivering quite a lot of material with limited time, and teachers can provide a variety of learning.
2. **For Students**
   Students can take advantage of this information and communication technology-based learning to learn basic web programming learning materials independently.
3. **For Schools**
   Schools can optimize the development of information and communication technology-based learning as a support in the learning process at school.

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Development of Yanbu'a-Based Audiobook Learning Media to Improve Qur'an Reading Skills at TPQ Darussa'adah Cidahu

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Abstract: This study aims to analyze: (1) To find out the procedure for developing Yanbu'a Based Audiobook Learning Media Joint Model Borg & Gall and Dick & Carry to Improve the Ability to Read the Qur'an at TPQ Darussa'adah Cidahu, (2) Feasibility Level of Yanbu'a Based Audiobook Learning Media Borg & Gall and Dick & Carry Combined Model To Improve The Ability To Read The Qur'an at TPQ Darussa'adah Cidahu, (3) Effectiveness of Yanbu'a Based Audiobook Borg & Gall and Dick & Carry Combined Model To Improve Qur'an Reading Ability in TPQ Darussa'adah Cidahu. This research method is a development research or also called Research and Development (R&D). Using the combined Borg & Gall and Dick & Carry models with ten stages: (1) Preliminary study; (2) Planning; (3) Model design; (4) Expert validation and one to one test; (5) Model revision; (6) Small group test; (7) Model revision; (8) Large group test; (9) Revision of the final product; (10) Implementation. The subjects in this study were TPQ Darussa'adah Cidahu students. The result shown was that the audiobook feasibility assessment by the material expert obtained a score of 96.5% (very feasible). The feasibility assessment by the design expert obtained a score of 100% (very feasible). The feasibility assessment by media experts obtained a score of 87% (very feasible). Based on the results of the study, it can be concluded that the development of audiobooks can improve the ability to read the Qur'an. This can be seen from the calculation of the respondent's average N-Gain greater than the control N-Gain which has a value of 0.82.

Keywords: Development, Audiobook, Bookcreator

Introduction

Education is one of the platforms to realize the talents or abilities that humans bring from birth, so that human have skills that can be used to support themselves. Education in Indonesia has not been as expected, judging from educational institutions that have not been able to produce quality human resources. Schools are inseparable from the role of a teacher, where the role of the teacher is very dominant in determining the output of an educational unit or school. Therefore, professional teachers are not only required to be able to teach well but more than that, the role of the teacher is required to be able to understand the character of the participants comprehensively in order to know the ability of each student to absorb learning material.

One of the determining factors for success in learning activities is the use of learning media. Learning media can help increase interest so that concentration on learning is more focused so that it can improve learning outcomes as expected. The professionalism of the teacher is expected to bring students to fun and creative learning situations that are not boring. This is because in the learning process there are still many teachers using a monotonous and teacher-centered lecture method and the final results are not optimal.

Smarphone can be used as a tool to access practical, easy and fun digital reading materials (Dewi et al., 2019). Especially in the current situation of the Covid-19 pandemic, students can take advantage of their time by reading books. Teachers and parents need digital learning media that allows students to use for learning at home.

Learning media are very diverse in variety and form. Learning media includes tools used to convey the content of teaching materials consisting of books, software and so on (Nurfadhillah et al., 2021). One of the interesting, creative, and digital learning media to support the development of children's understanding related to reading the Qur'an is audiobooks. The audiobook is used as a learning medium to increase students' understanding. This audiobook can be accessed by students anywhere and anytime.

The selection of TPQ Darussa'adah as a school institution that will be the place of research, namely through several considerations based on the initial observations of researchers, firstly TPQ Darussa'adah is one of the TPQs assisted by researchers, secondly TPQ Darussa'adah has adequate learning facilities such as laptops, LCD projectors and there is wifi that is easily accessible so that it is possible to be used as a place for research and trial of products to be produced by researchers, third, the lack of interesting learning media in the school, so teachers need interesting learning media to improve students' Qur'an reading skills.

Model Development Concept

Development research is a systematic study to design, develop and evaluate programs, processes and learning outcomes that must meet the criteria of consistency and effectiveness internally (Rayanto, 2020). Meanwhile, according to Tegeh, development research is an effort to develop and produce a product in the form of materials, media, tools and learning strategies (Sutarti, 2017). Development research is used to develop and validate an effective educational product for school use and not to test theories. The steps of the process are referred to as the R & D cycle, which consists of studying research findings related to the product to be developed, developing a product based on these findings, the field of testing in the settings where it will be used and revising it to correct deficiencies found in the stage of applying for testing (Sutarti, 2017).

Learning development models can provide guiding principles in analyzing, producing and improving the learning environment and generating learning strategies (Octavia, 2020). The selection of the Dick and Carey instructional design model because this research and development is based on the use of a systems approach to the basic components of learning system design which includes analysis, design, development, implementation and evaluation. These two models are very suitable to be combined to produce an audiobook that will be applied to students at TPQ Darussa'adah Cidahu.

Audiobook Media Development

Learning media is also increasingly developing along with the development of the world of information and technology, in the current era of globalization almost all circles from children to old age can already operate technology. There are many technologies that can be used to assist learners in understanding learning materials. Many people believe that technology will be able to help learning situations where learning with effort becomes learning with fun. So the learning process, especially science lessons that are fun, creative, not boring and no longer scary, will be the right choice for teachers (Tambunan et al., 2019).

An audiobook is a recording of a book text or other written material that is talked about by a person or group of people. In Indonesia, several government agencies have developed books in audio form but still in limited form. These institutions include the Book Curriculum Center (Puskurbuk) and are followed by the Educational Radio Media Development Center. With audiobooks, students who have limited kouta problems can better understand the learning material without having to use a large kouta (Ningsih, 2022).

Book creator is an application consisting of text, images, and sounds and is published in digital form that can be read on computers and other electronic devices such as androids, smartphones, or tablets (Khikmawati et al., 2021). Through the features in this book creator, it can facilitate the diverse learning styles of students and teachers can add quizzes in the form of simple games that are tailored to the cognitive abilities of students. So that it can increase student learning motivation and provide a more meaningful learning experience because the appearance and arrangement of the material are packaged according to the cognitive development and learning style of students.

Website 2 APK Builder is an application that runs on a windows operating system where this application is useful for making it easier to convert web-based applications to apk-based. The way it works is simple, namely by changing the web file format (.html) to the android application format (.apk) so that this web-based application can be run properly on an Android smartphone where the media is expected to be interactive learning (ADITYA, 2021). The Yanbu;a method is a method of learning to read the Qur'an in addition to reading in it there is also learning to write and memorize the Qur'an, the Yanbu'a book consists of 7 volumes to read it students must not spell but must read directly quickly, precisely, lancer and not intermittently adjusted to the rules of makhorijul letters. The Yanbu'a method is also an application of Thoriqoh Read and Memorize the Qur'an, whose writing is adapted to Rosm Ustmani and is called complete literacy and memorization of the

Yanbu'a method. This method is a means to learn to read the Qur'an systematically, practically and easily absorbed by students (Palufi & Syahid, 2020).

Method

Research Objectives

This study had three tujans, including; 1) To find out the procedure for developing Yanbu'a-based audiobook learning media with a combined Borg & Gall and Dick & Carey model to improve the ability to read the Qur'an at TPQ Darussa'adah Cidahu, Sukabumi Regency; 2) Analyzing the feasibility level of Yanbu'a-based audiobook learning media with a combined Borg & Gall and Dick & Carey model to improve the ability to read the Qur'an at TPQ Darussa'adah Cidahu, Sukabumi Regency; 3) Analyzing the effectiveness of the development of Yanbu'a-based audiobook learning media with a combined model of Borg & Gall and Dick & Carey to improve the ability to read the Qur'an at TPQ Darussa'adah Cidahu, Sukabumi Regency.

Development Steps

This research uses procedures in accordance with the stages in the development of Yanbu'a-based audiobook learning media. The procedural steps in this research and development use the Borg & Gall model integrated with the Dick & Carey model. The Borg & Gall model is more dominant for making book creator-based learning media viable and usable while the Dick & Carey model is more dominant to the resulting learning media materials and strategies. The design of the Borg & Gall and Dick & Carey model development steps can be seen in Gambar 1.

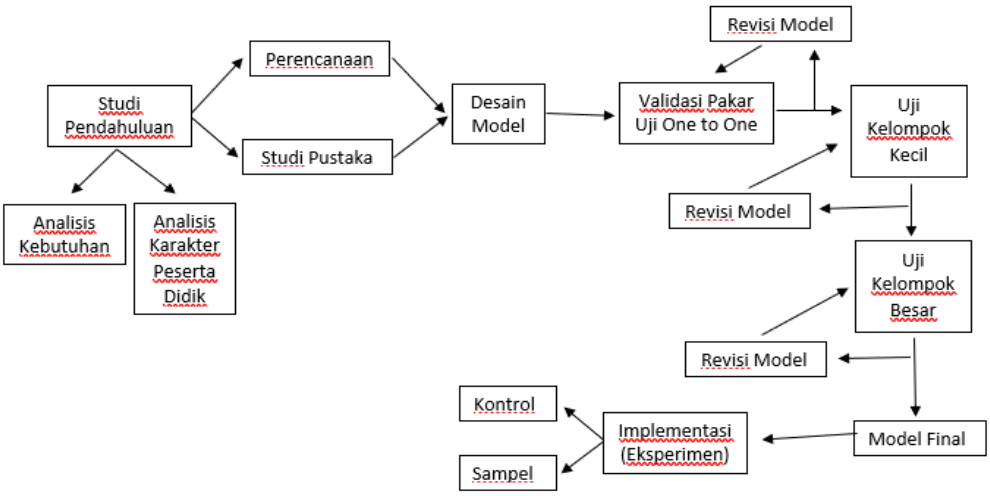

Figure 1. Design Development Steps Borg & Gall and Dick & Carey

In this development research, two data analysis techniques were used, namely qualitative data analysis techniques and quantitative descriptive analysis. Qualitative data analysis techniques go through four stages, namely data collection, data reduction, data display and conclusions drawing / verifying. As for quantitative data analysis techniques using the N-Gain score Test which is carried out by calculating the difference between the pretest value and the posttest value. By calculating the difference between the pre-test and post-test values or the gain score, it can be known whether the use of a certain method can be said to be effective or not (Rahma, 2021).

Results and Discussion

Preliminary Research

The result of this needs analysis is that there are no digital books that can be used in learning activities. On the other hand, the availability of device facilities and internet networks in the school and home environment is quite adequate and supportive. In addition, a good response was also given by teachers, parents and students

who are used to using smartphones to support audiobooks. Researchers conducted interviews with two teachers. Interviews were conducted to determine the level of ability to read the Qur'an, available learning infrastructure, and the need for learning media at TPQ Darussa'adah Cidahu. The results of the preliminary research obtained were 100% of teachers stated that students have the ability to read the Qur'an, especially low comprehension of hijaiyah letters. This is based on learning outcomes which show as many as 16 students or 64% have a score below KKM and 9 students or 36% reach KKM where the KKM value is 70. 100% of teachers also stated that the infrastructure in schools is very supportive of audiobooks.

Product Development

Development research is a process of researching a problem systematically, critically and scientifically to improve ability and understanding, obtain new facts, or carry out a better interpretation. In the development process carried out by the researcher is the integration of the Borg & Gall and Dick & Carey models which have 10 stages, namely; 1) Preliminary studies; 2) Planning; 3) Design; 4) Expert validation and one to one test; 5) Revision of the model; 6) Small group test; 7) Model revision; 8) Large group test; 9) Final revision; 10) Implementation.

In the preliminary study stage, it shows that there is no digital-based learning media that can improve students' ability to read the Qur'an. Then planning is carried out, namely the preparation of research plans such as the formulation of goals. After planning, then next make a model design. Product designs are arranged in ms word and saved in pdf form which is then made an audiobook with the book creator application. Those audiobooks are converted to android-based by using the Web 2 APK Builder app. The result of this android-based audiobook is called the draft 1 model.

After obtaining draft 1, expert validation was carried out by three people, namely the material expert test, the learning design expert test and the media expert test. Then one to one tests are carried out, small group tests, large group tests and field tests. This field test is to determine the effectiveness of the product carried out by an experimental method consisting of two classes, namely the control class and the sample class. The results of this effectiveness test use the N-Gain score formula.

Product Eligibility
Material Expert Test

Based on the results of the material expert recapitulation in Figure 2 showing the results of the calculation of the material expert assessment, an average value of 96.5% was obtained, which means "Very Feasible". This means that in the aspect of the material developed it is very feasible to use for research.

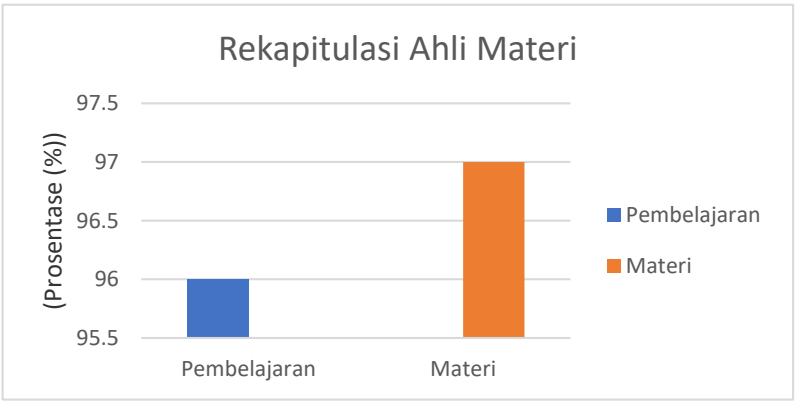

Figure 2. Material Expert Recapitulation

Test the Design Expert

Based on the results of the media expert recapitulation in Figure 3, it shows that the calculation results of the media expert's assessment were obtained on average 87% which means "very feasible". This means that in the aspect of the developed media it is very feasible to use for research.

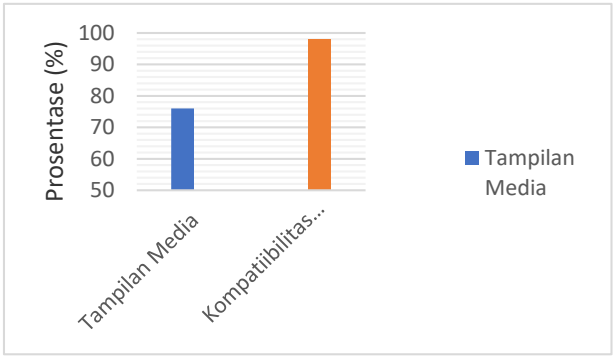

Figure 3. Recapitulation of Learning Media Experts

Media Expert Test

Based on the results of the design expert recapitulation in Figure 4, it shows that the calculation results of the learning design expert's assessment obtained an average value of 100% which means "very feasible". This means that in the aspect of the developed design it is very worthy of use for research.

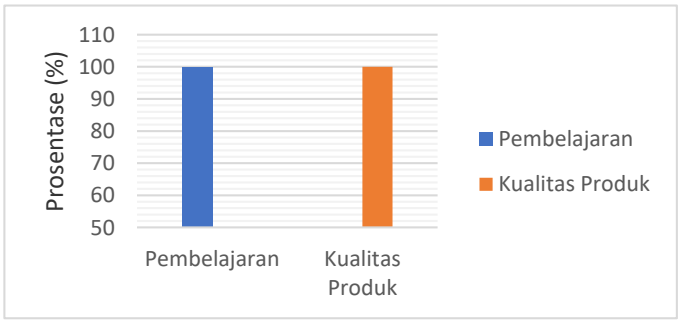

Figure 4. Recapitulation of Learning Design Experts

Test One to One

Based on the data obtained through one to one trials, the product is categorized as "very feasible". This shows with an average trial result of 85%.

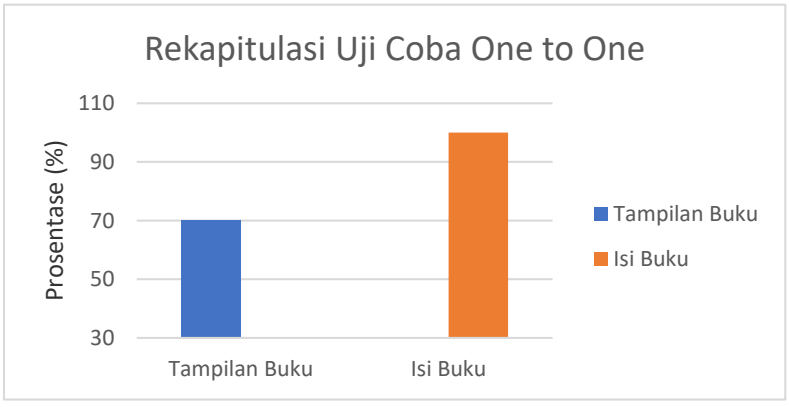

Figure 5. One to One Trial Recapitulation

Small Group Test

Based on the data obtained through one to one trials, the product is categorized as "very feasible". This shows with an average trial result of 95%.

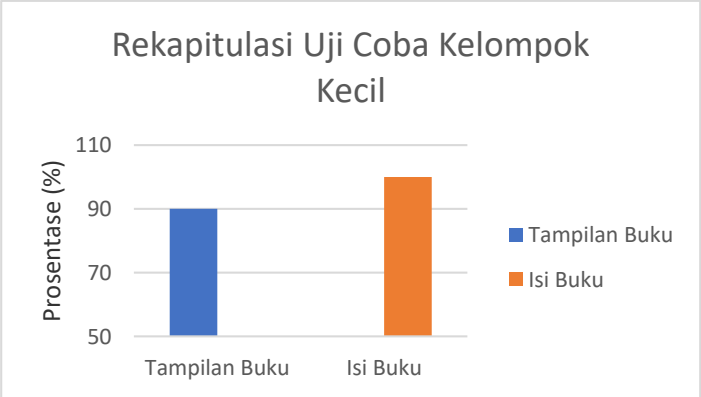

Figure 6. Recapitulation of Small Group Trials

Large Group Test

Based on the data obtained through large group tests, the product is categorized as "very viable". This shows with an average trial result of 85.5%.

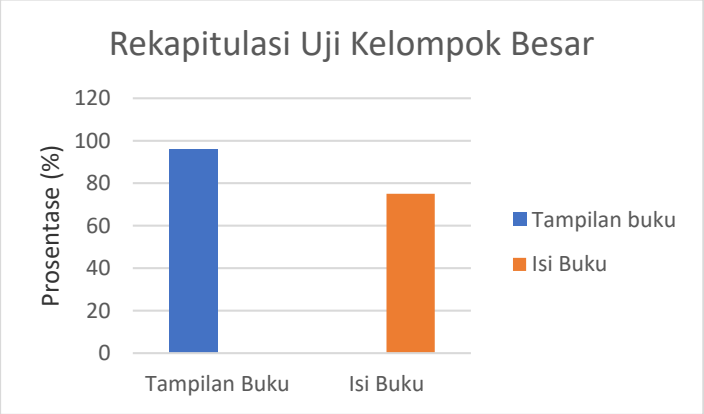

Figure 7. Recapitulation of Large Group Tests

Product Effectiveness

To determine the effectiveness of this audiobook product, field trials were carried out with experimental methods consisting of a control class and a sample class. Researchers conducted a trial of 20 students who were sampled and 20 students who were controlled. The 40 learners were given pretests before using the audiobook. After the pretest is carried out, the sample learners are assisted by teachers and parents to download the audiobook application that has been sent through the Wa class group, then the sample learners use audiobooks with the guidance of teachers and parents. After hearing and reading the material in the audiobook, students are given posttest.

Analysis of pretests and posttest data or called N-Gain is an analysis to test the effectiveness of audiobooks on students' ability to understand the material. Pretests and posttest were given to 20 learners who were sampled. Pretests are done before using audiobooks while posttest are done after using audiobooks. The value of pretests and posttest is the result of cognitive knowledge of the sample in using audiobooks. The following are presented the results of the analysis of the value of N-Gain.

Based on the table above, the control N-Gain has an average value of 0.49 while the sample N-Gain is 0.82. The N-Gain value of the sample is greater than the control N-Gain value, so there is an increase in the ability to read students to the material effectively. So it can be concluded that the development of audiobooks can improve the ability to read the Qur'an, especially in hijaiyah letters.

The Need to Use Audiobook

An audiobook is a digital book in which there is a sound recording. The development of audiobooks in this learning is used in order to improve the ability to read the Qur'an at TPQ Darussa'adah. Based on the needs analysis conducted by researchers at TPQ Darussa'adah, there is no availability of digital books used in the learning process. Meanwhile, the availability of device facilities such as laptops, computers and projectors is adequate. The availability of an internet network in the school environment supports the existence of audiobooks in learning.

Based on the interviews conducted, it also shows that TPQ Darussa'adah students have the ability to read the Qur'an, especially the low hijaiyah letters. This lack of motivation and interest in learning to read the Qur'an is due to monotonous learning. Learning only uses printed books without other media so that motivation and interest in learning are low and cause the resulting learning outcomes to be less than optimal. Learning results show that as many as 64% of students have a score below KKM and as many as 36% of students achieve KKM with a KKM score of 70.

Visual learning styles are learning styles that focus on the sense of sight. As many as 85% of TPQ Darussa'adah students tend to be interested in visual media used in learning. With this media, learning becomes fun, active and creative. Audio-visual media-based learning is learning that can facilitate the presentation of learning materials so as to increase student learning motivation. This medium is able to relieve boredom towards students and make them more active in learning. The audio-visual media used in TPQ Darussa'adah is audiobook media. The involvement of parents in assisting students to use the audiobook is very much needed. The role of parents is to supervise students during independent learning at home.

Advantages and Disadvantages of Audiobooks

The advantages of audiobooks include; 1) Yanbu'a method-based audiobooks; 2) Audiobooks have an attractive design; 3) The audiobook comes with practice questions and answers; 4) The audiobook comes with a teaching guide of Yanbu'a method. While the shortcomings of audiobooks are that audiobook is android-based so that only android-based smartphones or tablets are able to access the audiobook.

Barriers and Challenges to the Audiobook Development Process

The obstacles faced by researchers are not yet proficient in using book creator applications and are not yet proficient in typing Arabic in word. Meanwhile, the challenge faced by researchers is that researchers must be able to operate book creator applications and type Arabic through word.

Research Limitations

The audiobook developed by researchers is not fully able to answer the needs of teachers and students in the basis of learning the Qur'an, especially in understanding hijaiyah letters. This audiobook presents not only interesting writing but the audio made is also interesting. There are several limitations to the audiobook developed, including; 1) Audiobooks can only be accessed when there is an internet network; 2) Audiobooks can only be used on android-based devices; 3) This audiobook has only been applied in one school; 4) There is a need for a parent's role in the use of audiobooks.

Conclusion

The feasibility of a learning media product developed is determined based on the validation results of the test of material experts, design experts and learning media experts. The feasibility test results from the three experts obtained results with an average percentage of test results from material experts of 96.5% which means they are very feasible to use, the percentage of learning design expert test results is 100% which means they are very feasible to use and the percentage of learning media expert test results is 87% which means they are very feasible to use. The results of the analysis of the effectiveness of a product are determined by a comparison of the N-Gain values of the control and the sample. The control N-Gain had an average value of 0.49 while the sample N-Gain was 0.82. The N-Gain value of the sample is greater than the control N-Gain value, so there is an

increase in students' reading ability to the material effectively. So it can be concluded that the development of audiobooks can improve the ability to read the basic learning of the Qur'an, especially in hijaiyah letters.

Implication

The implications of this research can improve the quality of student education, especially in increasing understanding of the basic learning of the Qur'an, especially hijaiyah letters. The implementation of audiobooks can make students more interested in following the learning process which has an impact on improving the quality and learning outcomes. The development of this learning media is also able to encourage teachers and researchers to always innovate and dig deeper into creativity in providing solutions to problems in the existing learning process.

Suggestion

The results of this study still have shortcomings and there are still many things that need to be studied and redeveloped. Researchers have suggestions for future research including; 1) Other researchers are expected to create audiobooks without internet access. 2) Other researchers are expected to create audiobooks that can be accessed in addition to being android-based. 3) Other researchers are expected to be able to apply more than one school. 4) Other researchers are expected to be able to improve the quality of audiobooks to make them even better.

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The Development of *Multiple Intelligence-Based* E-Books on Grade V Science Learning In Elementary Schools

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Abstract: This study aims to produce an *EBook based on Multiple Intelligence* in class V science subjects in Gunung Putri Cluster Elementary School and analyze their feasibility and effectiveness. This study used the development model of Borg and Gall and Dick and Carey. To test this feasibility using the assessment of 3 experts, namely media experts, design experts and material experts. Media expert test results are 73.5% or fall into the feasible category, material expert test results are 99.35% and design experts are 99% or in the very feasible category. The results of the *independent t test* obtained a significance of 0.0 27 < 0.05 meaning that it was rejected indicating that there was H_0a difference in the science scores of students in the experimental class using *Multiple Intelligences-based* EBooks with control classes using printed book media / science packages.

Keywords: EBook, Multiple Intelligence, Science, Elementary School

Introduction

Education in Indonesia has entered 21st century learning. Education in this century is required to prepare learners who are able to face global economic competition. *Partnership for 21st Century Skills* emphasizes that the 21st century must teach 4 competencies, namely *communication, collaboration, critical thinking,* and *creativity* (E. Y. Wijaya et al., 2016). 21st century skills are important skills that must be mastered by everyone in order to succeed in facing challenges, problems, life, and careers in this century (Redhana, 2019). In the 21st century, education is increasingly important to ensure that students have learning and innovation skills, skills to use technology and information media, and can work and survive with *life skills* (E. Y. Wijaya et al., 2016).

In the first role of a teacher is to be able to prepare students who have 21st century skills. Learning in the 21st century demands many things from a teacher, especially those related to abilities and skills (Tarihoran, 2019). A teacher needs to master several areas, be proficient in pedagogy including innovations in teaching and learning. In addition, the teacher acts as a role model for trust, openness, perseverance, and commitment for his students in facing life in this century. In preparing students who are able to get used to 21st century life skills, it is necessary to have the quality of learning with learning systems and resources that can support it. The quality of learning can be seen from the readiness of teachers in preparing quality teaching materials. Teaching materials prepared to support the learning process must also be in accordance with the demands of the 21st century and also the all-technological round of industry 4.0.

Problems in the learning process were found at SDIT As-Salaam Gunungputri, based on the results of observations it was found that; 1) students have difficulty in understanding science material because it is considered a difficult subject, 2) students are less interested in science learning, 3) students have difficulty in finding reference sources for science material literacy, 4) students want learning with audiovisual media, 5) students want learning resources that can be carried everywhere easily. Then, the results of an analysis of the needs of students in the aspect of identifying problems in learning show data, material that is considered difficult in science learning content, namely heat transfer. The material on heat transfer is found in Theme 6 KD 3. 6 Applying the concept of heat transfer in everyday life.

The use of theme books as a source of teaching materials for students at this research location only focuses on discussing the material or focusing on developing the cognitive aspects of students. With heterogeneous student characteristics, teaching materials should be needed that are able to facilitate the characteristics of each student.

Based on the results of observations made by researchers, class V students at SDIT As-Salaam have a tendency to carry out learning activities that use activities such as observation, music use and are happier when invited to study outside the classroom. Like the theory of intelligence expressed by Hogward Gadner known as *multiple intelligence.* This theory argues that every human being has some kind of intelligence, in which in doing something every human being inevitably uses a whole type of intelligence. The only difference is the portion of use of each such intelligence.

The development of *multiple intelligences* for learners needs to be carried out. With a student who realizes how his type of intelligence is, he will understand how to learn so that it will be maximized and improve his learning outcomes. Based on the analysis of the needs of students and teachers, as well as the importance of *multiple intelligence* for students, it is necessary to develop interesting and effective teaching materials in improving student learning outcomes.

Theory Review

Multiple Intelligence

Gardner's rationale for coming up with this theory about *multiple intelligences* was about the limitations of IQ tests focusing only on mathematical (logic) and language abilities in uncovering individual intellectual abilities. In fact, each individual has a unique and different way of dealing with the problem at hand. Gardner (Aji & Bhakti, 2021) so that the scores a person gets from an IQ test cannot yet describe a person's intelligence.

This theory of *Multiple Intelligences* eliminates the assumptions that have existed so far about humans. According to Gardner (Indria, 2020) there is not a single human activity that uses only one kind of intelligence, but rather the entire intelligence which has been considered seven or eight kinds of intelligence, and in the latest book is added again the kind of intelligence becomes sembilan. All these intelligences work together as a whole and unified whole. The composition of the integration, of course, varies in each person and in each culture. But overall all of that intelligence can be changed and improved. Then Asri (Indria, 2020) the most prominent intelligence will control other intelligences in solving problems. Compound intelligence consists of eight types, namely verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, musical intelligence, kinesthetic intelligence, interpersonal intelligence, naturalist intelligence, intrapersonal intelligence (I. K. W. B. Wijaya, 2018).

EBooks

E-book stands for *Electronic Book* or electronic book. An e-book is nothing but a form of book that can be opened electronically through a computer. This e-book is in the form of files with various formats, EBook is a series of ordinary writing made with the help of *Microsoft Office* software or other similar *software* (Fitria & Heliawan, 2017). After the series of writings, it becomes like writing in conventional printed books as it is on the market. In addition, EBooks according to Shiratuddin (Khoirunnisa et al., 2020). EBooks are textbooks that are converted to digital format. EBooks also have the meaning of a learning environment that has an application that contains a multimedia database that stores multimedia presentations on the topic of a book.

Theories That Support Learning Using EBooks Based on *Multiple Intelligences*

Behavioristic Theory

Behavioristic learning theory is a learning theory initiated by Gagne and Berliner about behavior changes as a result of experience. This theory then developed into a school of learning psychology that influenced the direction of development of educational and learning theory and practice known as the behavioristic school. This school emphasizes the formation of behaviors that appear as learning outcomes (Lestari & Yudhanegara, 2017).

Behavioristic learning theory is a school in learning theory that places great emphasis on the need for observable behavior (Nahar, 2016). Based on the explanation of behavioristic theory, the implications of behavioristic theory in the development of EBooks are the interaction of students and teachers in the application of learning media. With the EBook contains a stimulus and response in its use. Students will be more interactive and enthusiastic in using interesting EBooks.

Cognitive Theory

Cognitive theory is a theory that focuses on a person's knowledge or cognitive. In contrast to behavioristic theory, cognitive theory is more concerned with learning processes that prioritize learning outcomes. In contrast to learning theories in the behavioristic paradigm that explain learning as observable behavioral changes that arise as a result of experience, cognitive learning theory explains learning by focusing on changes in internal mental processes used in an effort to understand This mental structure includes knowledge, beliefs, skills, expectations and other mechanisms in the learner's head (Anidar, 2017). Belajar according to cognitive theory is a process or effort that involves mental activity that occurs in humans as a result of the process of active interaction with their environment to obtain a change in the form of knowledge, understanding, behavior, skills, values and attitudes that are relative and imprinted (Sutarto, 2017). Based on the explanation of cognitive theory above, the implications of cognitive theory in the development of EBooks are that learning media does not only emphasize the existence of stimulus and response, but there is an essence of material that supports improving student learning outcomes, improving student abilities, and being able to learn to learn.

Research Methodology

The research methodology used is *research and development methods.* The development model used in this study is the development model of Borg and Gall and Dick and Carey. The stages include: 1) Preliminary study, 2) Planning, 3) Media design, 4) Small group test, 5) Large group test, 6) Final media, 7) Product effectiveness test.

Data collection in this study used several instruments, including validation sheets, interview sheets and questionnaire sheets. In this development research, the data used are qualitative data and quantitative data. Criticism and advice from material experts, media experts and design experts, which can be gathered to improve the development of *Multiple Intelligence-based* e-Books. Data collection in the study was carried out using a questionnaire. Questionnaire research instruments are filled by material experts, media experts, and design experts.

To be able to find out the effectiveness of this product, researchers carried out calculations by comparing the results of the *experimental class posttest* with the control class. In carrying out this calculation, researchers use the help of SPSS software. The results of the experimental class and control class *posttest* data will be processed first so that they are normally distributed and homogeneous, then the results of the data processing will be tested using the t test.

Research Results

Due Diligence

Media Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Media	Struktur kebahasaan	80%	Sangat layak, tidak perlu direvisi
	Tampilan Media	72%	Sangat layak, tidak perlu direvisi
	Rekayasa Perangkat	72%	Sangat layak, tidak perlu direvisi
	Keterlaksanaan	70%	Sangat layak, tidak perlu direvisi

Figure 1. Media Expert Validation Results

Based on Figure 1, it can be concluded that the average of the media expert tests on existing aspects is 73.5% thus, according to the media expert test, the product made is feasible, but needs revision. The results of input and suggestions from media expert validators have been carried out on the eBook.

Material Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Materi	Isi Materi	98,75%	Sangat layak, tidak perlu direvisi
	Manfaat	100%	Sangat layak, tidak perlu direvisi

Figure 2. Material Expert Validation Results

Based on Figure 2. It can be concluded that the average of the material expert test on the aspects of material content and benefits is 99.35% thus, according to the expert test, the product made is very feasible, it does not need to be revised.

Design Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Desain	Pembelajaran	98%	Sangat layak, tidak perlu direvisi
	Kualitas Produk	100%	Sangat layak, tidak perlu direvisi

Figure 3. Design Expert Validation Results

Based on Figure 3. It can be concluded that the average of the design expert test is 99% thus according to the expert test the product design made is very feasible.

Product Effectiveness Test

In the effectiveness test, the comparison of post-test values between the experiment class and the control class uses the *Independent Sample T Test*. The data tested is the post-test value in the experimental class with the post-test value in the control class. The t-test can be done after the data is known to be normally distributed and homogeneous, so it is necessary to calculate the normality test and homogeneity test first.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelompok	Statistic	df	Sig.	Statistic	df	Sig.
Nilai IPA	Eksperimen	,192	29	,008	,935	29	,074
	Kontrol	,147	28	,124	,935	28	,081

a. Lilliefors Significance Correction

Figure 4. Normality Test Results of *Posttest* Values of Experimental Class and Control Class

Based on the figure data of 4.18 the calculation of the normality test above shows that the sig value of 0.074 > 0.05 for the post-test value of the experimental class and the sig value of 0.081 > 0.05 for the post-test value of the control class, it can be said that the post-test value of the experimental class and the control class is normally distributed data.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Nilai IPA	Based on Mean	,137	1	55	,713
	Based on Median	,004	1	55	,951
	Based on Median and with adjusted df	,004	1	47,800	,951
	Based on trimmed mean	,078	1	55	,781

Figure 5. Results of the Posttest Value Homogeneity Test of the Experimental Class and the Control Class

The figure above shows the homogeneity test calculation data, obtained sig values of 0.713 > 0.05 so that the post-test value data of the experimental class and the control class can be said to be homogeneous. Furthermore, the posttest value data of the experimental class and the control class will be carried out t-test calculations or hypothesis tests. The results of the hypothesis test using the *Independent Sample t Test* can be seen in Figure 6.

Group Statistics

	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
Nilai IPA	Eksperimen	29	86,21	8,591	1,595
	Kontrol	28	81,29	7,683	1,452

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai IPA	Equal variances assumed	,137	,713	2,277	55	,027	4,921	2,161	,590	9,253
	Equal variances not assumed			2,281	54,686	,026	4,921	2,157	,598	9,245

Figure 6. Results of Independent Sample t Test

Based on the figure above, the results of the independent sample t-test show that the value of probability or sig. (2-tailed) which is 0.027 < 0.05 which means that it is rejected or there is a difference in students H_0' science scores between the control class and the experimental class. The average post-test score in the experimental class is 8 6.21 and the average post-test score in the control class is 81.29. There is a difference in the average value difference of 4.92. Judging from the assessment criteria, the confidence is t_{Hitung} greater than the confidence valuet_{tabel}, it H_0 is rejected.

The results obtained are = 2,277 t_{Hitung} consulted at = 1,699 (significance level 5% and df = 29t_{tabel}), so it can be said that > or 2,277t_{Hitung} > t_{tabel} 1,699 which means that there is a difference in students' science scores in experimental classes using *Multiple Intelligence-based* EBooks with a control class that uses a printed book or an IPA packet book. Thus it can be concluded that there is an effectiveness in the use in *Multiple Intelligence-based* EBooks on science learning in class V SDIT As-Salaam.

Conclusions and Suggestions

Conclusion

Multiple Intelligences-based eBooks are declared suitable for science learning in elementary schools. The eBooks developed have gone through the validation of media experts, material experts and design experts. Media expert validation with a score of 73.5% belongs to the "Decent" category. Material expert validation with a score of 99.35% belongs to the "Very Worthy" category. And the design expert's validation with a score of 9 9% included the "Very Worthy" category.

Multiple Intelligence-based eBooks are declared effective for use in grade V science learning in elementary schools based on the average results of science scores of students studying using *Multiple Intelligence-based* EBooks of *86.21*. The average score is higher than the class that uses the science package book, which is 81.29. Then judging from the results of the independent sample t-test, the significance of 0.0 27 < 0.05 means that H_0 it was rejected, indicating that there was a difference in students' science scores in the experimental class using *Multiple Intelligences-based* EBooks with control classes using printed book media / science packages.

Suggestion

Research and development of learning media like this requires a lot of investment and resources, so suggestions to schools to allocate a budget in the form of sufficient research funds to improve the research and development of eBooks based on *Multiple Intelligences*

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Social Tourism in the World and Turkey

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Abstract: In European countries, social tourism is a well-known tourism strategy implemented to provide a better life by involving disadvantaged groups in social activities. Tourism, which is a need of developed societies, continues its development by spreading to social strata that are large and have limited economic power. This phenomenon has been identified as "Social Tourism", which is a type of institutionalized private tourism that gained importance rapidly after the Second World War. Social tourism; It covers the participation of the masses with relatively insufficient economic power in tourism with some special precautions and aids and all the relations created by this. Social tourism has an important place in today's tourism policies. Among the special purposes of social tourism are the transportation of tourism to large masses and the benefit of these masses from all kinds of opportunities such as vacation, rest and entertainment. Social tourism environment in Turkey has positive and negative features. In terms of natural opportunities, there are wide opportunities for social tourism as well as for traditional tourism.

Keywords: Social tourism, Tourism in the World, Tourism in Turkey

Introduction

Tourism is changing its shape from high-income masses to large social masses with limited economic power day by day. As a result of the rapid change in the structure of tourism after the First World War, possibilities of traveling, seeing, having fun and resting, unlike the past centuries, were not specific to specific strata and became the property of common strata with limited income and economic power. These possibilities have been realized by the special measures taken by the state or have been presented in different ways by the organizations where people work. Organizations that determine the positive effects of rest and vacation on the physical and morale of working people have seen that productivity has increased compared to the past with the vacation and rest opportunities they provide.

In European countries, social tourism is a well-known tourism strategy implemented to provide a better life by involving disadvantaged groups in social activities. These disadvantaged groups include the disabled, low-income families, young people, the elderly, workers or people with chronic diseases (McCabe, 2015:12). There are various practices and organizations although there is not a large academic literature on social tourism. The current literature consists of applied practices and the needs of disadvantaged groups.

Social tourism literature in Turkey is at an early stage. There are only a few studies on the management of social tourism or the meaning of social tourism (Sarıbaş and Akbaba, 2018:196-197). Social tourism practices in Turkey are also limited, compared to the diversity of social tourism practices in Europe. For this reason, social tourism cases studied academically in Turkey can make a significant contribution to the literature. As a matter of fact, there is a social tourism project called "Alternative Camp" carried out by the Alternative Life Association in Turkey. The camp is Turkey's first free-of-charge camp for people with disabilities and provides holiday opportunities for disadvantaged groups. Although the camp model is similar to the European social tourism models (Hall and Brown, 2012:37), the camp has never been the subject of academic research as a social tourism application. The camp is a social entrepreneurship project that cooperates with international organizations and is carried out entirely by volunteers. For this reason, the research aims to examine the potential of social tourism to create an inclusive tourism form, a non-governmental social tourism organization and management model.

Social Tourism Concept

The Roots of Social Tourism

The roots of the concept of social tourism go back to the modernization of tourism in the early twentieth century. In the literature, the term social tourism was first used in 1844 for Thomas Cook's group tours.

However, in reality, the concept of social tourism, as it is understood today, started to evolve as a labor movement (Haulot, 1983:588). In the context of tourism activities, labor movement means having the right to paid vacation. Workers' right to 'paid rest' was proposed on the agenda of the International Labor Office (ILO) Executive Board in Geneva, and the ILO proclaimed the 'Annual Paid Holidays Convention'. With this contract, 'resting the body' has become a social problem because it includes workers' rights. This situation has led to a rapid development in all kinds of tourism, including the opening of social tourism facilities in Europe (International Labor Organization, 1936). Initially, social tourism was perceived as more beneficial as it provided the workers with the opportunity to rest as a human right. However, when the other benefits of social tourism began to be recognized by government agencies, social tourism opportunities began to develop. To illustrate, Ouvry-Vial states that after understanding the importance of holidays on mental and physical development in France, there are some practices such as bringing animation shows to social tourism facilities and increasing the benefits of social tourism (as cited in Richards, 1996: 157).

Not only the labor movement but also other environmental factors have triggered the increasing interest in social tourism practices. During the First World War, tourism was domestic and the main theme was usually going to the countryside or beaches and spending the hours relaxing after work (Richards, 1996, p. 7). After the First World War, countries began to pay attention to the welfare of communities (especially Scandinavian and Southern European countries), which became a key factor in the further development of social tourism (Leibfried, 1988:125-133). Immediately after the Second World War, the demand for mass tourism increased rapidly and new foundations (for example, non-governmental organizations, unions, associations and youth groups) paved the way for international or national networks and increased attention was paid to the need for social services (Belanger and Jolin, 2011: 476). As a matter of fact, after the United Nations Declaration of Human Rights, various countries started to prepare social tourism policies based on Article 24 stating that "Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic paid holidays" (United Nations, 1948). To sum, the 1950s were important years in terms of social tourism in countries such as Germany, Belgium, France and Spain, where social structures such as health institutions and unions developed (Diekmann and McCabe, 2013:21).

First Definition of Social Tourism and Foundation of ISTO

Three years after the declaration of Human Rights, Hunzicker made the first definition of social tourism: "Relations and phenomena in the field of tourism resulting from the participation of economically weak or disadvantaged elements in the society" (Hunzicker, 1951:1). In 1957, Hunzicker added comments to specify the terms of the definition and argued that social tourism is "a special type of tourism characterized by the participation of low-income people, providing them with special services" (Minnaert, Maitland and Miller, 2011:404).

Following this, the first congress on social tourism was held in Bern in 1956. Then two more congresses were held in Vienna (1959) and Milan (1962). With a joint decision from these congresses, the agencies participating in the Milan Congress met in Brussels in 1962 and agreed to establish the International Social Tourism Bureau (now ISTO; International Social Tourism Organization; formerly BITS). The purpose of ISTO was to create an international association for discussions, research, conferences and to generate support for those who are already involved or will be involved in social tourism activities (Haulot, 1983:559). A few years later, ISTO gained strong partnerships with UNESCO, the World Tourism Organization (UNWTO), the International Labor Organization, the International Cooperation Alliance, and the International Committee for the Preservation of Historic Monuments and Sites (ICOMOS) (Haulot, 1981:210). Although ISTO's initial definition for social tourism is relatively general, according to Belanger and Jolin (2011), it is "Impacts and phenomena resulting from participation in tourism, and more specifically, the participation of low-income groups" (BITS, 2003). Moreover, ISTO has had a vital impact on the concept of social tourism (ISTO, 2016:477). The first reason is that the organization influenced the WTO while preparing the Manila Declaration on the principles of social tourism. The second reason is that ISTO influences third world countries and defines the provisions and objectives of social tourism internationally (Minnaert, Diekmann and McCabe, 2012:23). For example, in 1972 ISTO introduced social tourism as a fundamental social phenomenon of our age after the General Assembly in Vienna (cited in Belanger and Jolin, 2011:477). This promotion has encouraged governments around the world to include social tourism in their tourism plans and policies. According to Belanger and Jolin (2011:477), ISTO has defined social tourism and paved the way for the development of today's social tourism. In fact, before the ISTO was established, many countries defined and used social tourism according to their own political ideologies (Higgins-Desbiolles, 2006:1200). For example, according to Allcock and Przeclawski, the main purpose of social tourism in Eastern Europe, where revolutionary socialist ideologies were on the rise, was to increase productivity by giving workers rights such as paid travel. In addition, at that time, Eastern Europe

organized tours to communist countries under the name of socialist education tours for the young population in order to strengthen communist ideologies. Meanwhile, capitalist countries such as England and France used social tourism as a symbol of individualism, freedom and propaganda tools parallel to human rights (cited in Higgins-Desbiolles, 2006:1200). In addition, Western European countries such as Portugal and Switzerland and Scandinavian countries offered social tourism in the form of funds for youth travel and social resorts. In the United States (a neo-liberal country) social tourism was represented by organizations such as the Young Farmers Association, which promoted youth travel and made tourism more accessible. Although different terms are used today for the concept of social tourism, there is a worldwide consensus on its purposes (Higgins-Desbiolles, 2006:1200). To clarify the impact of ISTO and WTO on determining and disseminating the provisions of social tourism, it would be appropriate to refer to Article 14 of the Manila Declaration (WHO, 1980): "Modern tourism arises from the adoption of a social policy. Workers earn annual paid vacations and it represents the recognition of man's fundamental right to rest and leisure."

The Transformation of the Concept of Social Tourism during the Rapid Development of Mass Tourism

The spread of neo liberalization to most countries, the idea of free competition and the loss of power of the states deeply affected the tourism sector worldwide (Higgins-Desbiolles, 2006:1200). The crucial effect of neoliberalism for the tourism sector was the rapid development of mass tourism. With the spread of mass tourism, many positive expectations have arisen. The first expectation from mass tourism was that it would increase the standard of living and new job opportunities in rural areas. Based on this, it was expected that disadvantaged communities would have the chance to develop their economies (Minnaert et al., 2012:21). The second expectation from the spread of mass tourism was an overall increase in the travel and vacation frequencies of current travelers, while expanding the target market by adding inexpensive packages for low-income families and individuals. As expected, people became more able to travel than in the past, and those who were in the workforce and could not go on vacation due to unsuitable prices began to take part in tourism activities.

However, the situation was not as democratic as it seems. The rural population still could not contribute equally to tourism as hosts or benefit from tourism as guests. From a guest perspective, tourism packages could be afforded by the middle class. From the host's point of view, the local community has not been able to reap the benefits of tourism development for various reasons. Therefore, mass tourism development has had no effect on reducing unemployment and raising the living standards of local people. However, the development of mass tourism has caused large hotel chains to enter rural areas, and this has also been the cause of the unequal distribution of incomes as hotels outsource their employment and facilities from the local area. (Minnaert et al., 2012:20). For this reason, the concept of social tourism has developed in parallel with the age of mass tourism. As a matter of fact, as can be understood from the following statement of the WTO in the Manila Declaration, the unexpected consequences of mass tourism were one of the most important issues to be discussed:

Tourism has become a contributing factor to social stability, mutual understanding between individuals and people and individual recovery. In addition to its known economic aspects, it has gained a cultural and moral dimension that needs to be supported and protected against harmful distortions that may be brought by economic factors. Public authorities and travel agencies should participate accordingly in the development of tourism by formulating guidelines aimed at promoting appropriate investments (WTO, 1980, article 15).

Due to the concerns of tourism-related authorities such as the WTO, Haulot (1981:212) a year after the Manila Declaration improved the definition of social tourism by adding some keywords ('justice', 'dignity' and 'for all'): Social tourism justifies its individual and collective goals to be consistent with the view that all measures taken by modern society should ensure greater justice, greater dignity and greater enjoyment of life for all citizens.

Describing this process as the modernization of the definition of social tourism, Minnaert argues that ethical values are included in the understanding of social tourism with this definition, which was put forward as a result of the damages caused by mass tourism. (Minnaert et al., 2012:20).

The Development of the Concept of Social Tourism after the Spread of Mass Tourism

After the rapid development of mass tourism, although the meaning of the concept of social tourism has been redefined by the relevant tourism institutions, a consensus has not yet been reached on a single definition of social tourism. During this period, three important events took place that had a significant impact on the definition of social tourism:

I. After the 1990s ISTO considered changing the term 'social tourism' to 'tourism for all' to reflect equal tourism participation, which is the hallmark of social tourism compared to mass tourism (Higgins-Desbiolles, 2006:1201). For this reason, the concept of 'tourism for all' was published worldwide in 1996 with the Montreal Declaration. The paper begins with the best-known definition of social tourism (1996): social tourism is all relationships and phenomena that result from participation in tourism, and especially from the participation of social strata with modest incomes. This participation is made possible or facilitated by well-defined measures of a social nature (article 3).

In summary, the declaration asserted that 'tourism for all is the key to economic power', 'society shaper', 'a tool for social cohesion', 'an opportunity for personal enrichment', 'a partner in global development programs'. The declaration stated that developing and developed countries should recognize social tourism. In addition, with the 13th, 14th and 15th articles of the declaration, the frameworks to be defined as social tourism organization were determined. In summary, in articles 13, 14 and 15, it is stated that all non-profit organizations related to tourism management are members of the social tourism movement, which has the vision of making tourism accessible to all people without any discrimination (ISTO, 2016:3-5).

II. Moral and ethical values gained importance in all tourism types with the adoption of the Global Tourism Ethics Code by UNWTO in 1999. The main idea of adapting the Global Code of Ethics to tourism was to provide free and liberal tourism without any discrimination, by clarifying tourism as a source of sustainable development at both the individual and societal level.

We aim to promote responsible, sustainable and universally accessible tourism within the framework of the right of all people to enjoy their leisure time or to travel while respecting the preferences of their society (UNWTO, Global Code of Ethics for Tourism, 1999).

With this new development, social tourism has become a part of existing international tourism strategies.

III. Considering the past failure to provide opportunities to rural communities with the development of mass tourism, ISTO began to focus more on host communities rather than meeting visitor needs or the demand side of social tourism. Indeed, ISTO has revised the position of communities by incorporating the host perspective into social tourism practices. In 2003, they defined social tourism as: Effects and phenomena resulting from participation in tourism, more specifically low-income groups. This participation is made possible or facilitated by initiatives of a well-defined social nature (as cited in Minnaert et al., 2012:21).

Following this, in 2006 ISTO revised the Montreal Declaration to highlight the new aspect of the concept of social tourism, emphasizing the importance of the host perspective while implementing social tourism practices. New phrases were added to the declaration and the term 'solidarity' was introduced. For example, Article 13 states that the word 'social' evokes the words 'solidarity' and 'fraternity'. The main ideology of solidarity was to motivate tourists to participate in local developments or volunteer activities. Another example is the acceptance of the idea of improving the living standards of local communities through social tourism practices with Article 14 (ISTO, 2016:6-7).

Sustainability of Social Tourism

Sustainability ideology emerged after the Brundtland report in 1987 (Dresner, 2008:73). As a result, social tourism has integrated a sustainability approach, as most other types of tourism or other sectors do. The nature and characteristics of social tourism already had the necessary qualifications to embrace sustainability. In the Lisbon Strategy of 2002, tourism aimed at sustainable development through lowering unemployment rates, increased knowledge and increased social integration, all of which was already addressed by social tourism (Dumitru, Negricea and Slapac, 2009:90). Evidence of addressing the concept of sustainability from the earliest stages of social tourism practices can also be seen in basic approaches to social tourism such as 'tourism for all' and 'accessible tourism'.

In addition, social tourism's earlier focus on integrating host community perspectives into social tourism practices to enhance the financial and social well-being of local people can be found in the United Nations World Tourism Organization's later definition of sustainable tourism as a form. Therefore, by its very nature, social tourism follows the proposed principles of sustainable forms of tourism. As a matter of fact, some academics have argued that community-based and pro-poor tourism, which is defined as sustainable tourism activities, are subcategories of social tourism (Minnaert et al., 2012:21). Arguing that the host perspective makes social tourism practices sustainable, Almedia (2011:484) defined social tourism as follows: Social

tourism is socio-politically promoted by the state with clearly defined goals for psychophysical recovery and socio-cultural uplift for individuals.

Like Almedia (2011), Minnaert et al. also argue that host and community perspectives are important elements that make social tourism sustainable. Emphasizing that social tourism is not a kind of commercial or mass tourism, Minnaert et al., express that "tourism with added moral value aiming to benefit the host or visitor in tourism exchange" (Minnaert, Maitland and Miller, 2007: 9). Indeed, after the definition, Minnaert et al. (2007:9) adds: Unlike the rest of the tourism industry, social tourism sees holidays not just as a product but as an expression of a certain moral belief. Vacation can be seen as a universal right or as a means to achieve goals other than commercial tourism.

According to Baumgartner (2013), there are three similarities between sustainable tourism and social tourism. First, both types of tourism seek to increase equality and involve all layers of society in tourism activities. This is a profound way of creating social synergy. Second, both have strategies to increase economic welfare, such as expanding the tourist season and increasing local employment in tourism. Thirdly, according to Baumgartner (2013:169-170), while protecting the environment is one of the main principles of sustainable tourism, CO_2 emissions from transportation are lower than mass international tourism activities as social tourism supports domestic tourism. The reason for this is that the means of transportation in domestic tourism are buses, not cars or planes. Additionally, many types of social tourism offer nature-based accommodation such as campsites or bungalows. However, there are also differences between sustainable and social tourism, as the primary purpose of social tourism is never to create a market to profit from disadvantaged groups (Baumgartner, 2013:176).

Other evidence of the partnership between sustainable and social tourism can be given from existing social tourism practices. As a matter of fact, the 2030 Agenda, which mentions 17 sustainability goals, deals with the integration of disadvantaged people into tourism activities to prevent inequality and the inclusion of local people in tourism processes to prevent poverty (United Nations, 2015). Looking at ISTO members, it is seen that there are many social tourism associations that focus on disadvantaged groups and rural citizens and integrate sustainability and responsibility dimensions into their current practices. For example, in France, there is an ISTO member association called Acteurs du Tourisme Resistance, which was established as an umbrella association to promote sustainable tourism and protect nature by promoting responsible tourism within the country. In Brazil, an ISTO member association called Arariba Turismo and Cultura organizes study tours to integrate youth and adults into community-based tourism practices. In Costa Rica, the Asociacion Comunitaria Conservacionista de Turismo Alternativo y Rural works for the coordination of tourism-related organizations and collaborates on sustainable development and responsible tourism that engages and encourages the public in tourism. In Morocco, an ISTO member called Association Amoud pour le Developmentpement organizes workshops and campaigns to promote responsible and sustainable tourism. The Istituto Cooperazione Economica Internaziole in Italy uses sustainable tourism for a more human rights neutral society through promotions and environmental protection. There is also an additional association, Ente Nazionale Demokrico di Azione Sociale, created in Italy, as in Portages, to improve the well-being and health of young people and workers, and to create social cohesion using social tourism as a tool. Another application in social tourism is Tunisia Solidarity Tourism Association. The association encourages tourists to participate in social developments. The Confederacion Autonoma Sindica Clasista is an organization dedicated to protecting the human rights of workers, and they have recently used social tourism as a tool to improve workers' well-being. Finally, the Brussels-based European Alliance for Responsible Tourism and Hospitality was established to create a working network for responsible tourism. The aim of the alliance is to promote responsible tourism in the framework of sustainability for the benefit of communities and solidarity against poverty.

Current Trends in Social Tourism

It is generally accepted that current economic and social developments are centered around sustainability concerns that lead to the rise of new concepts, practices and governance perspectives in the field of tourism. For example, the latest trend of inclusive tourism is accessible tourism evolved with the work of Scott Rains. He observed that tourism providers make the physical environment and virtual communication resources accessible to the blind, deaf and wheelchair users, and that although these places are accessible to a disadvantaged individual, the activities and experiences that a place offers are often not accessible. He argues that for a place to be called accessible, it is not enough to build yellow roads for the visually impaired or to build ramps next to stairs in public places. The concept of accessibility used in tourism should include accessible activities, accessible communication and accessible experiences (Rains, 2009). Rains defines inclusive tourism as follows: Inclusive tourism is a global movement to ensure the full social participation of all persons with disabilities in

travel, citizenship and cultural contribution, and in the process do the same for everyone else. The word 'inclusive' refers to the concept.

This definition dates back to 2009, but recently academics and international organizations such as UNDP and UNWTO have developed the concept and started to develop guidebooks for hotels and restaurants to make tourism accessible to all by redefining disadvantaged tourism users from a broader perspective. For example, the Queensland Government's Department of Tourism (2017:6) redefined disadvantaged groups as: Persons with physical disabilities; persons using wheelchairs or mobility scooters, persons using a walking frame or crutches, or persons with difficulty with finger or hand coordination, persons with visual impairments, persons with hearing impairment or deafness, persons with perceptual or cognitive impairments affecting communication, caregivers of persons with disabilities, prams and people with strollers.

Considering all the debates about what social tourism is and current developments in its relationship with sustainable tourism and social tourism, the latest conceptualizations of social tourism can be grouped into the following approaches:

i. Differentiation,
ii. Integration,
iii. Sub-categorization,

The differentiation approach to the definition of social tourism aims to distinguish it from other types (Scheyvens and Biddulph, 2018: 7). According to Scheyvens, social tourism has the same concerns and target market as accessible or fair tourism. However, Sycheyvens argues that social tourism differs from other types of tourism, and that it primarily focuses on all disadvantaged groups, including economically disadvantaged people who cannot afford a vacation, and that social tourism is different from other types of tourism (Scheyvens and Biddulph, 2018: 7).

In the integrated approach, similar types of tourism are combined under inclusive concepts such as "accessible social tourism" (Soler, Diaz and Vera, 2018: 155). Soler et al. (2018) argues that the barriers people face are not just about accessibility to facilities, but also economic and knowledge-based problems. Barriers to economic concerns such as finding a budget to train staff in tourism facilities or making information accessible in hotels or tourism destinations and offering low-priced packages are solved by social tourism. From this point of view, the following definition was made by Soler et al. (Soler, Diaz and Vera, 2018:155). In order to create a new comprehensive definition of social tourism, we can state that Accessible Social Tourism is a series of initiatives aimed at facilitating the active participation of people with special needs in tourism and at the same time achieving social networks for its users and economic benefits for society.

The subclassification approach for the definition of social tourism was made by ISTO. According to ISTO, accessible, young, old, responsible and family tourism are subcategories of social tourism, and social tourism is an umbrella concept that encompasses all types of alternative tourism appealing to disadvantaged groups. ISTO has recently defined social tourism as "social tourism includes all activities that contribute fairly and sustainably to greater access to holidays and tourism activities for all".

In summary, the definitions of social tourism vary depending on different perspectives in different countries or institutions and are open to discussion with its subcategories or more recent types of tourism. Despite ISTO's efforts to define the boundaries of social tourism, the meaning of social tourism is still changing today and there is no consensus on its exact meaning as it has been since the beginning (Minnaert et al., 2012:23). The final article of the Montreal Declaration explains the complexity of social tourism definitions. The Declaration suggests that there are many social tourism models in the world that have developed according to the purposes of countries to implement these models. Therefore, the definitions of social tourism will differ according to the cultures of the countries without deviating from the 'tourism for all' vision.

Social Tourism Models and Implementations

Considering the evolution of the concept of social tourism throughout history, it can be said that social tourism has become more inclusive with a wider target group such as poor youth, low-income families, workers, those with chronic diseases, those with psychological problems, the disabled and the elderly, and the unemployed. Since demand and regulatory policies differ in each country, social tourism practices are also different (Diekmann, McCabe, & Minnaert, 2012:35). In other words, there cannot be a single social tourism practice; however, countries can choose the most suitable for them to implement social tourism (ISTO, 2016). Therefore,

in the second part of the first chapter, various social tourism practices in the world and the common features of social tourism models in Europe are explained.

The Reasons of Implementing Social Tourism Model of EU

According to McCabe (2015), European countries implement social tourism practices for three reasons. First, improvements in the sustainability framework and further political improvements are common in European countries. Since social tourism provides the social and economic dimensions of sustainability, European countries prefer to implement social tourism. Secondly, human rights and the rights of persons with disabilities are critical issues in European countries. Social tourism has gained in value in Europe as 'tourism for all' and 'accessible tourism' are compatible with government regulations and ideologies. Third, during the First World War, the socialist eastern part of Europe applied social tourism to increase the welfare of the society and to spread socialism through youth travel. For this reason, the concept of social tourism naturally spread all over Europe. However, the benefits of social tourism to the state and its users are strong (McCabe, 2015).

Current Tourism Models in Europe

Hall and Brown (2012) identify some similarities between European countries in terms of social tourism practices. Indeed, Hall and Brown (2012) provide an organizational model that illustrates the commonalities of European social tourism systems.

Financing structures and intermediaries that will implement social tourism practices are essential elements of all European countries. According to Diekmann et al. (2012:43), intermediaries are important because they are bridges between demand and supply that support the operational management of social tourism practices. Regarding the importance of financing mechanisms, Diekmann and McCabe (2013) state that social tourism would be impossible without a public, private or charitable organization that implements it. The other two factors (demand and supply) in Hall and Brown's (2012) model are the ones that differ. The common aspect of the demand is that all groups (young people, families, the elderly, the disabled) included in the European Union policy are disadvantaged groups (McCabe, 2015: 12):

- Young adults with fewer opportunities (Ages between 18-30),
- Families facing financial pressure,
- Disabled people,
- Retired people aged over 65.

Political conditions, the state's economy, ideologies or basically the size of each group create differences in demand (Hall & Brown, 2012). For example, Austria focuses on families, while Belgium focuses on young people and low-income families. While Cyprus supports the elderly and disabled, Romania supports the elderly, young, disabled and workers (McCabe, 2015:16-21).

The treatments or budget allocations applied while performing social tourism practices also differ between countries. For example, Italy gives social tourism users a voucher that pays 20% or 45% of their holiday expenses based on family income. Denmark supports all holiday expenses of disadvantaged families. In the United Kingdom, the Family Holiday Association Charity pays the amount and arranges the holiday, and sometimes gives additional money to social tourism users when they have extra funds (Kassa, 2012:143). Like treatments, the purposes of applying social tourism practices also differ between countries. For example, The Sunshine Fund in Ireland aims to create a social synergy for disadvantaged children (MacMahon, 2012:105). However, Cyprus aims to extend the tourism season with its social tourism practices (McCabe, 2015:16-21).

According to Hall and Brown, the type of financing mechanism in European countries is similar (Hall and Brown, 2012). However, there are differences from country to country. According to McCabe (2015), there are five types of financing schemes in Europe:

I. State-financed subsidized packages: Examples exist in Spain, Portugal and Greece. In these countries, the state allocates a budget for social tourism practices. A successful example of this practice is the IMERSO program in Spain, which sends groups of seniors on vacation. However, the risk in this system is the possibility of the government's budget cut, which was previously experienced in Spain and Portugal. Nevertheless, this program means an advanced organization for social tourism.

II. Government-supported coupon programs: Government-supported coupons mean giving coupons to disadvantaged people so that they can have a holiday experience. Example countries are France, Hungary and Romania. A good example is the Hungarian National Holiday Foundation's program, which gives a certain amount in spa vouchers.

III. Regional government programs: Regional or state-level organizations or offices determine how social tourism is implemented and make agreements with intermediary organizations for operational processes. Example countries are Belgium, Brussels, Austria and Lithuania. An exemplary program is the Holiday Participation Support Center in Brussels, which has a tourism office that organizes every step for social tourism.
IV. Charity provision: Charities or NGOs finance social tourism practices. This program is available in countries where there is no government support and where tourism takes place on a small scale. Examples can be found in the UK, Malta, Latvia, Ireland and Bulgaria. A well-known example of this type is the Family Holiday Association in the United Kingdom.
V. Private foundation programs: When related or unrelated organizations donate to social tourism, it means private foundation. Examples are found in Denmark and Finland. For example, the Slot Machine Association in Finland donates a certain amount of money from gambling to social tourism foundations.

According to Diekmann and McCabe (2013:25), the financing system and the amount of financing are the main factors that determine the application method of social tourism in countries and all social tourism applications depend on financing mechanisms. For example, while some countries use a single type of financing, other countries may combine their financing systems (Gabruc, 2016:99). For example, countries usually have specific social tourism facilities if the financing scheme is government funded and the budget allocation is high. In addition, if the budget allocated by the state for social tourism practices is limited, in most cases, countries give coupons to the target audience while implementing social tourism. However, the dependence of social tourism on monetary purposes may cause potential managerial risks for social tourism organizations in the future. For example, in most European countries, especially in the United Kingdom, the social tourism practices supported directly or indirectly by the states have started to receive less budget due to the economic crises in the countries (Diekmann et al., 2013:25).

Another similarity between European countries in applying social tourism is social tourism services such as transportation, accommodation, destination services and visitor attraction centers. The services to be provided by social tourism organizations vary according to the political environments and economic systems of the countries. For example, while low-income families have their own hotels in Germany (Hall and Brown, 2012:38), family caravan trips are organized in England (Kassa, 2012:142). In addition, Diekmann et al. (2012), the number of intermediaries affects the diversity of the service to be provided. The reason for this is that intermediaries are stakeholders who support social tourism practices by providing tourism services. For example, a social tourism organization creates a network with hotels to find accommodation for its target audience, and to define its target market, the social tourism organization receives support from charities and serves the disadvantaged.

While considering the supply and demand dimensions of the similarities between European countries in the implementation of social tourism practices suggested by Hall and Brown (2012), Minnaert et al. (2011) address the complexity of social tourism definitions.

First, the participation model encourages disadvantaged individuals to participate in standard tourism activities on their own. Second, the inclusion model aims at the simultaneous use of standardized tourism products by disadvantaged groups and all other users in order to increase overall tourism participation at all times. The products are specially designed for social tourism users and used by them only. For example, making a hotel accessible to wheelchair users. The latest model is the incentive that proposes that specially designed products can be offered to all groups at the same time to increase the economic benefits of social tourism for the host community.

Social Tourism in Turkey

Academic Studies about Social Tourism in Turkey

According to Yılmaz (1984), social tourism in Turkey started to develop in the 1960s with paid leave to workers, and continued with the reduction of working hours in 1965 with a law enacted for civil servants. However, considering the 58 years since its inception, academic studies on social tourism are still limited (Sarıbaş and Akbaba, 2018:196-197). Indeed, most of the studies are doctoral or master's theses written in the 1980s and 1990s. Since then, it seems that there are very few conference papers and articles on social tourism in Turkey. The most recent study is from 2016 and is not yet completed; It is a doctoral thesis and is expected to be completed in 2019. Therefore, according to Sarıbaş and Akbaba (2018), social tourism in Turkey is still in its infancy in terms of academic contribution.

Usta (1982:71) defines social tourism as “the relations formed by the economically weak people's contribution to tourism activities by being supported with special provisions and facilities”. The definition of social tourism was criticized by Demirkol (1988:4), who mentioned the similarities between the definitions of mass tourism, public tourism, worker tourism and social tourism in 1988. Until 2012, there are hardly any academic studies on social tourism. There has been an increase in social tourism studies in 2012 and 2013, and the concept of social tourism has been defined by Özgökçeler and Bıçkı (2013:560) as social tourism with a human rights perspective: Social tourism includes all activities that increase accessibility to tourism activities for people with special needs, including different sectors, activities. It is a type of tourism that produces social and economic benefits for groups.

According to Özgökçeler and Biçeki (2013: 560), the general motto of social tourism is sustainable tourism for everyone, and in this way, one of the main purposes of social tourism is to make tourism social integration, family unity, personal development and secondly, travel accessible to everyone. In addition, in 2012 and 2013, the needs of the target group's social tourism practices, the obstacles they encounter, and recommendations for developing social tourism have been the subject of several academic studies (Kızilirmak & Ertuğrul, 2012; Özgökçekler et al., 2013; Uğurlu & Ar, 2014). As a matter of fact, a case study was conducted to better understand the difficulties families face while integrating into tourism activities (Uğurlu et al. 2014). In addition, the importance of local governments in the development of social tourism has been emphasized in several studies by Kızılırmak et al. He stated the responsibilities of tourism-related state institutions such as financial support in the implementation of social tourism (Kızilirmak et al., 2014). Although there are few academic studies on social tourism, there are ongoing social tourism practices in Turkey. For this reason, academic studies in Turkey lag behind developing social tourism practices (Sarıbaş and Akbaba, 2018:200): Only definitions have been made over the years and the subject has been examined around similar dimensions. It did not go beyond expressing a general meaning. Turkey is close to the concept of social tourism in terms of its economic, social and religious structure. It is a country with an economic and social structure that heavily includes social tourism components. There is a strong belief that academic studies and government support for social tourism are not sufficiently known by individuals.

Implementations of Social Tourism in Turkey

According to Demirkol (1988:13-14), the government's tourism strategies do not directly include social tourism development strategies for various reasons. The reasons Demirkol mentions are Turkey's economic situation and being late for such tourism developments. However, with paid holidays and the increase in business tourism from Ankara to Istanbul, the civil servants' travel to hot beaches in the summer triggered the social tourism practice (Demirkol, 1988:12).

Social tourism practices in Turkey have started with holiday loans, holiday checks, discounted tickets for transportation and holiday payments in installments given by banks with the support of the government. In addition, there are public camp areas for civil servants, which set an example for social tourism. However, the fact that these facilities are closed is not a good environment for social tourism to benefit from social integration (Demirkol, 1988:37; Yılmaz, 1984:28-29). On the other hand, according to Bıçkı (2013:66), public camp facilities were privatized after 1993, and then the facilities were converted into luxury hotels, serving a higher segment of the society. From 1988 to 2012, social tourism practices could not develop or diversify in Turkey, as there was no reflection on social tourism. For example, the only different practices related to social tourism are partial holiday expense payments and opening dormitories for students in the summer season (Kızilirmak and Ertuğrul, 2012:6). Dormitories and other facilities that offer discounted vacation opportunities to students have been promoted by the Ministry of Culture and Tourism as a travel guide for young people since 1992.

According to Kızılırmak et al. (2012:43), the government has an indirect positive effect on the development of social tourism due to 2023 tourism policies. Actions are indirect because the purpose of policies is not explicitly to promote social tourism. Among the measures to be taken for 2023 tourism strategies is the development of domestic tourism with affordable prices and services, since Turkish people travel less and the average income of the target market is not high (Ministry of Culture and Tourism, 2007: 9-10). The reason for this is that Turkey always sees domestic tourism as an alternative to outbound tourism and the government takes measures to develop domestic tourism only in times of economic crisis (Bıçkı, Ak and Özgökçeler, 2013:65). On the other hand, after 1992, the government started to take an interest in the travel of young people and made effective programs such as Interrail, Euro Mini group, Euro Domino, Student Discount, train travel packages to Southeast Turkey and International Youth Transport, including state railways (Bıçkı et al., 2013:66).

Local governments also have important contributions in terms of the type of social tourism practices. However, due to the centralization of tourism management in Turkey and the fact that social tourism is not included in tourism policies by the state, the realization of social tourism is at the initiative of the municipalities (Kızilirmak and Ertuğrul, 2012:47). Examples are İzmir Gaziemir municipality, which receives children in the 9-14 age group every day during the summer months. In addition, Karabağlar municipality of İzmir takes 150 families who cannot take a vacation to Çeşme and Ilıca Beach (Bıçkı et al., 2013:67). In Istanbul, several local authorities take disadvantaged groups to campsites. Beyoğlu Municipality and Istanbul Metropolitan Municipality organize one-week camps twice a year in Kefken and Çiroz under the name of social service. However, the activities of Beyoğlu municipality are limited to sea, sand and sun tourism. Within the scope of social services, Ankara Metropolitan Municipality has been providing camp services for the elderly, disabled and successful students who cannot take a vacation since 2015, in order to motivate children to work for higher classes. Mavi Işıklar Education, Recreation and Rehabilitation Center in Samsun is another business. The facility was built by Samsun Metropolitan Municipality and has been serving the disabled and their caregivers or their families throughout the year since 2013. The total number of beds of the facility is 30 and it provides training for swimming, sports, business and social life. However, according to Arslan's (2017) case study, Mavi Işıklar Education, Recreation and Rehabilitation Center only serves to make a good impression on citizens without disabilities. According to a case study, only 64 out of 156 disabled participants actually suggested using the facility (Arslan, 2017:197-220). For this reason, Arslan suggests that the quality level of social tourism practices of municipalities should be questioned.

There are also some individual practices on social tourism as individual social responsibility projects of hotel owners or other people. Some of the hotel owners do this for religious purposes, such as helping people in the name of Allah, or for volunteering purposes. Another example is the holiday village opened by a Turkish doctor in Fethiye for dialysis patients.

In summary, social tourism practices in Turkey develop with the initiative of institutions, local governments, private foundations or individuals.

Advantages of Social Tourism Generally and Contribution to Society

Much of the research on social tourism has focused on understanding the benefits of practicing social tourism. Most of these studies focus on understanding the benefits for social tourism users. These studies are mainly concerned with the benefits of social tourism on low-income families and people with disabilities (Morgan, Pritchard, & Sedgley, 2015:8). In addition, the topics of social tourism studies are often related to improving the quality of life or social equality by involving people in tourism activities.

According to Minnaert, Stacey, Quinn, and Griffin (2010), social tourism has two benefits. The first is social welfare and well-being. Minnaert et al. (2010) state that making tourism accessible to all individuals is an investment in building a happier and self-developing individual who will create a larger society with qualified employees who will return to the system. There are few studies of low-income families in the UK to support this position, as social tourism associations in the UK often serve disadvantaged families. The primary result of such research is that the quality of life of the participants increases and family ties are strengthened, as families have the chance to spend free, comfortable and quality time together (Bos, McCabe, & Johnson, 2015; Smith & Hughes, 1999; Minnaert, 2012). According to McCabe's (2009:678-679) research conducted in England, family members also look to the future more optimistically and can cope with the situation they are in. So taking a vacation helps family members recover from depreciation. By taking a vacation, families can take a break from their daily routine, which is important for their lifelong happiness (McCabe, 2009, p. 678-679). Another thing is that holidays can be an important opportunity for unplanned learning and behavior change for low-income families. This is because tourism offers an experiential learning opportunity, especially for children. Children can experience the subjects they learned in the classroom and in the real world re-learn the information (Bos et al., 2015:866; Minnaert, 2012). Another learning benefit that Minnaert (2012) refers to is communities of practice. In other words, communities that are taken on vacation can then arrange their own vacations because they are familiar with the travel planning processes. Finally, social tourism offers an important opportunity for family members to develop social skills. Family members can easily minimize problems among themselves and children can be more active at school (Bos et al., 2015). Vacations can also teach people new skills, such as swimming. In addition, the holiday can improve the senses such as being more attentive to the environment or animals (Smith and Hughes, 1999:125).

In addition, social tourism has some benefits on the well-being of the elderly. According to some scientists (e.g. Morgan, Pritchard, and Sedgley 2015; Farrell, 2015), social tourism can contribute to the mental and physical health of the elderly and their self-confidence increases after the holidays.

Disabled individuals also benefit from social tourism in terms of increasing their quality of life. According to Pagan (2015:374), who compared disabled and non-disabled people who go on vacation, "The contribution of vacation trips in the fields of health, work and housework satisfaction for disabled people is higher than those who take a vacation."

The second benefit of social tourism (2010) according to Minnaert et al. is "social inclusion". According to Jolin, "social tourism, with its ambition to democratize tourism, contributes to the fight against inequality and exclusion and promotes social cohesion" (as cited in Minnaert et al., 2010). Due to economic insufficiency, most families are excluded from tourism activities and social tourism includes these individuals in the market. In addition, since the families or people excluded from the society are not fully integrated into the society, tourism activities can be a tool to revive the integration process (Minnaert et al., 2010). From the point of view of the disabled, it is difficult to travel due to insufficient facilities. And the lack of these facilities starts all over. Looking at the "accessible tourism" literature, there are many studies to develop a website where people with disabilities can make reservations for their holidays (Loi and Kong, 2016). However, there are also talented or disabled people with financial disabilities. In this case, social tourism is the key to include these people in life by using tourism as a tool (Small and Darcy, 2010:13; Kastenholz, Eusebio, & Figueiredo, 2015:1263; Pagan, 2015:376). According to Gabruc (2016:99), in order to increase the social inclusion effect of social tourism, relevant institutions should adopt innovative approaches in terms of financing systems. Because social tourism organizations, depending on only one type of financing plan, can result in failures in operational efficiencies.

Conclusion

Tourism, which is a need of developed societies, continues its development by spreading to social strata that are large and have limited economic power. This phenomenon has been identified as “Social Tourism”, which is a type of institutionalized private tourism that gained importance rapidly after the Second World War. Social tourism; It covers the participation of the masses with relatively insufficient economic power in tourism with some special precautions and aids and all the relations created by this. Social tourism has an important place in today's tourism policies.

Among the special purposes of social tourism are the transportation of tourism to large masses and the benefit of these masses from all kinds of opportunities such as vacation, rest and entertainment.

Social tourism environment in Turkey has positive and negative features. In terms of natural opportunities, there are wide opportunities for social tourism as well as for traditional tourism. Especially the long summer season ensures that participation in tourism takes place over a long period of time. In addition, the legal existence of paid leaves, the forcing of working conditions to take a vacation, and the increase in income are factors that enable social tourism. Among other factors, there are issues such as the predominance of the agricultural structure in Turkey, the low level of income, and the fact that tourism has not turned into a social organization.

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Detection of Cardiovascular Abnormalities Using Artificial Intelligence and Heart Sounds

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Abstract: Auscultation of the heart is one of the most crucial techniques physicians use to learn about a patient's heart. Therefore, a lot of effort has been devoted to developing more sophisticated stethoscopes to assist physicians for better diagnosis. Most of this work has been to design stethoscopes to provide clearer signals. This work is an initial effort to include an Artificial Intelligence (AI) system in the stethoscope to perform a preliminary diagnosis of multiple heart conditions. To train the neural network, heart sounds representing 42 different issues are used. Due to the limited number of training data, noise is added to the available heart sounds. This serves the dual purpose of increasing the training data and to partially account for the variation in the heart sounds collected from different patients. These heart sounds are used to extract features such as mean, median, standard deviation, signal entropy, kurtosis, skewness, etc. for neural network training. An optimal neural network architecture is developed to classify these 42 heart conditions with 98% accuracy.

Keywords: engineering, life preservation, smart systems

Introduction

As human heart pumps blood into the veins and arteries, it generates sounds which can be heard using stethoscope. The normal heart sound can be divided into two major parts called S1 and S2. The closure of mitral and tricuspid valves at the start of systole causes the S1 sound while the S2 sound is generated by the closure of the aortic and pulmonic valves at the end of systole. Certain heart abnormalities leave their distinct features in the heart sounds which may be used by cardiologists for medical diagnostics. This can range from innocent heart murmur which is harmless to severe heart issues that may need attention. Electrocardiogram (ECG) is another useful system for diagnosing heart abnormalities. Unlike auscultation, ECG is based on the electrical activity of the heart which is a much cleaner signal than the sound. With ECG equipment becoming cheaper and more readily available in doctors' offices, the use of ECG machines has become more common among physicians. The problem with ECG equipment, however, is its lack of availability in remote areas. The problem in these areas is even more exasperated by lack of access to cardiologists.

Some work has been done to address this issue. For example, a group at MathWorks ("Suhum", "2019") extracted features from heart sounds obtained from PhysioNet to detect cardiovascular issues using K-nearest neighbors. This system is capable of distinguishing between abnormal and healthy hearts with accuracy of 75% for normal and 98% for abnormal cases. Another similar idea was to develop a system based on Artificial Intelligence (AI) to detect afib arrythmias with 99% sensitivity and 97% specificity (EKO Health, 2017). Another AI based system has been developed to classify pathologic, innocent and no murmurs with 93% sensitivity, 81% specificity and

88% accuracy (Pediatric Cardiology, 2018). Convolutional neural network has also been used to classify normal and abnormal heart sounds with 91% accuracy (Bilal, M. 2021). Additionally, a group at Johns Hopkins University developed AI based stethoscope capable of diagnosing pneumonia with 87% accuracy (Elhilali, M., West j., 2019).

The focus of all the research in this area so far was to classify just normal and abnormal heart conditions or diagnose very few heart abnormalities. This led to the development of many useful devices. However, not many studies have been done to make individual diagnosis of many different heart conditions which is the aim of this work. This is particularly important for telemedicine and providing healthcare services to people living in remote areas who may not have access to physicians. Here, an AI based system is developed to classify 42 different heart conditions with high level of accuracy as described below.

Design Approach

Training Data

In this study, a set of 42 heart sound signals are used for training. These signals represent normal and 41 different conditions that may be associated with cardiovascular system. Since the number of data is not nearly enough for training, featureless white gaussian noise is added to these heart sounds to generate enough training data. Moreover, adding noise may also help to roughly account for variations in cardiovascular sounds obtained from different patients. To this end, noise from a signal-to-noise ratio (SNR) of 33 to 80 in intervals of 0.1 is added to the sound signals to generate enough training data. At an SNR of 33, the noise is dominant, but the heart sound could still be perceived. To generate labels, three physicians are consulted to classify the sounds into their appropriate diagnosis as shown in Table 1. It is obvious from this table that different heart signals may lead to the same diagnosis. For example, the signals with indices 1-5 represent healthy hearts even though the sounds are distinctly different. In this study, each of 42 heart sounds are considered to be distinct leading to the same number of labels for training. This makes the training of the neural network more difficult, but results to a more flexible classifier.

Table 1. Heart Diagnosis Categories with their Corresponding Track Number

Heart sound data index	Categories
1, 2, 3, 4, 5	Normal Heart Sound
6	Atrial Septal Defect
7, 8, 24, 28, 30, 38	Pulmonic Stenosis
9, 18	Congestive Heart Failure
10	Hypertensive Heart Disease
11	Constrictive Pericarditis
12	Bicuspid Pulmonary Valve
13	Bicuspid Aortic Valve
14, 25, 40	Mitral Stenosis
15, 42	Mitral Valve Prolapse
16	Mitral Valve Prolapse and Aortic Stenosis
17	Still's (Innocent) Murmur
19	Pulmonic Stenosis and Pulmonary Hypertension
20	Aortic Stenosis and Aortic Regurgitation
21, 26, 29, 41	Mitral Regurgitation
22, 23, 33	Aortic Stenosis
27	Surgically Repaired Aortic Valve
31	Aortic Regurgitation
32	Mitral Valve Prolapse with Mitral Regurgitation
34	Carotid Bruit
35	Mitral or Tricuspid Prolapse
36	Pulmonic Regurgitation
37, 39	Right Bundle Branch Block

Training of neural network could become much easier if effective features extracted from the raw data are used as input. This is due to the number of these features being much smaller than the raw data leading to reduced size of the neural network architecture. Numerous mathematical techniques such as Wavelet Transform, Fourier Transform and others may be used to find these features. After extensive research (Suhm, 2019), the features listed in Table 2 were chosen for this study. The rationale behind this choice was the fact that a group at Mathworks

used the same features to successfully diagnose normal and abnormal heart sounds with 98% accuracy. A brief explanation of each of these features is also given in this table.

Table 2. Features extracted from the Heart Sounds

Feature Number	Feature Name	Description
1	Mean	The mean of a set of data is found by adding up all the values then dividing that by the number of values present
2	Median	The median of a data set is the middle value of all the values
3	Standard Deviation	The standard deviation is how much a data set deviates from the mean
4	Mean Absolute Deviation	The mean absolute deviation is the average difference between all the data values in a set from the mean
5	25^{th} percentile (Q1)	The 25th percentile of a data set is the median value of all the values less than the median
6	75^{th} percentile (Q3)	The 75th percentile is the median value of all the values greater than the median
7	Inter quartile range (IQR)	The interquartile range of a data set is the difference between Q3 and Q. IQR is used to find any outliers in a data set.
8	Skewness	The skewness is how much the imbalance there is from the mean of a data set
9	Kurtosis	Kurtosis is how sharp the peak of a curve is compared to normal distribution. If the peak is higher than normal, this is leptokurtic. If the peak is lower than normal, this is platykurtic
10	Signal Entropy	Signal entropy is the amount of information the signal carries given by $H = -\sum p(x)\log(p(x))$
11	Spectral Entropy	Spectral entropy is the measure of the spectral power distribution and is related to signal entropy
12	Dominant Frequency Value	Frequency with the largest amplitude on the spectrum
13	Dominant Frequency Magnitude	Locates the maximum value before the cutoff frequency.
14	Dominant Frequency Ratio	Ratio of the energy of the maximum to the total energy.
15-27	Mel Frequency cepstral coefficients (MFCC 1-13)	Coefficients that make up the Mel Frequency Cepstrum (MFC). The MFC depicts the short-term power spectrum of a sound. Based on the Mel Scale, which is used to make high frequency sounds be in the range of human hearing.

Results and Conclusion

As mentioned before, white gaussian noise was added to the original signal to generate enough data for training. This led to generating 96811 data from which 67769, 14521 and 14521 were used for training, validation and testing, respectively. Two different neural network architectures were used in this study.

The details of these architectures are shown Tables 3 and 4.

Table 3. Architecture of the First Neural Network

Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Classification Accuracy
45 neurons ReLu*	Dropout	35 neurons ReLu	Dropout	25 neurons ReLu	Dropout	97.43%

Note that the input and output layers are not included in these tables since their specifications are dictated by 27 input features (see Table 2) and 42 output classes (see Table 1), respectively. As shown here, both neural networks achieved a classification accuracy of around 97%.

Table 4. Architecture of the Second Neural Network

Layer 1	Layer 2	Layer 3	Classification Accuracy
50 neurons ReLu*	40 neurons ReLu	30 neurons ReLu	97.65%

The training progress and other information for these networks are shown in Figures 1 and 2.

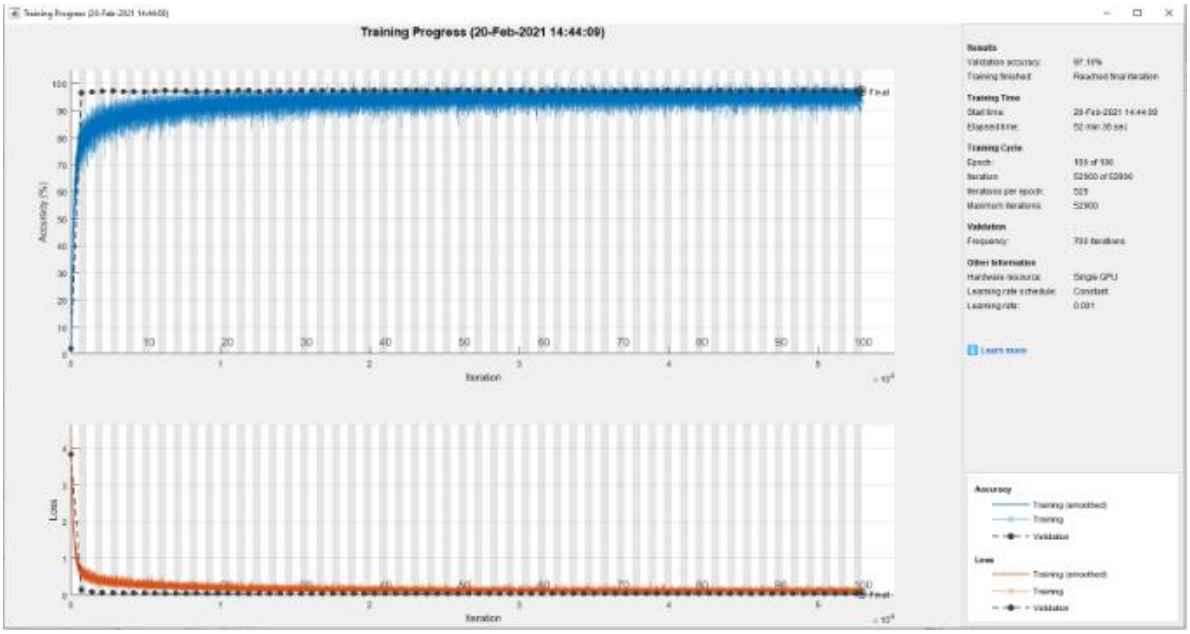

Figure 1. Training Progress for 45, 35, 25 with Two Dropout Layers (100 Epoch)

The future goal of this project is to make a stethoscope that utilizes AI to make a diagnose of heart defects. However, to effectively make a smart stethoscope, much more data is needed. This requires many hours of specialized medical staff to collect the data from many patients. The controlled environment and assumptions used in this work are not the most accurate representation of a real medical environment. The spontaneity and unpredictability of the practice of medicine is hard to replicate. While the fully functional smart stethoscope may be years away, but once developed it can vastly improve access to proper health care especially in remote areas.

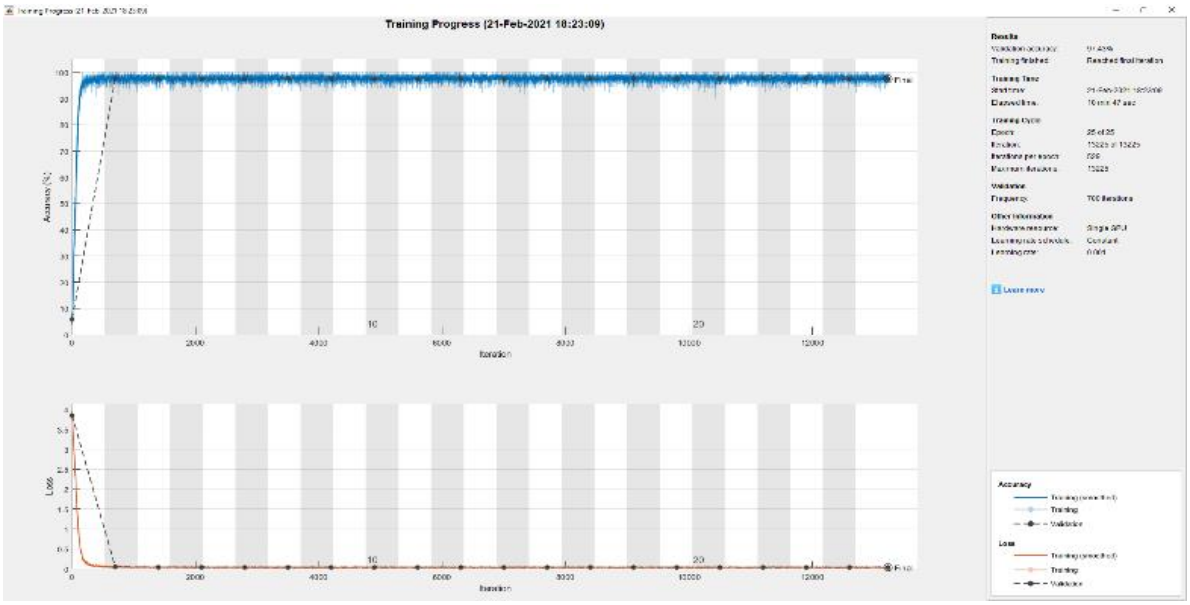

Figure 2. Training Progress for 50, 40, 30 without Dropout Layers

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The Importance and Use of Blockchain Technology in International Payment Methods

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Abstract: Blockchain technology, which has entered our lives in recent years, constitutes one of the most remarkable issues of the 21st century. According to Merriam Webster, blockchain is defined as; "It is a database with information shared in a digital network that is decentralized and accessible to all stakeholders and can be used at any time". Looking at this definition, we can clearly understand that blockchain technology is actually a way to store certain information. Today, it can be seen that rapid technological developments in cryptocurrency techniques are an effective measure against security vulnerabilities such as hacking and theft encountered in the realization of fund transfers. The reason behind this is that the underlying blockchain technology of cryptocurrencies filters out duplicate and incorrect transactions. The emergence of cryptocurrencies as a payment system along with these conveniences has brought debates in traditional financial transaction markets. This means that conventional financial institutions face risks and threats from the popularity and effectiveness of cryptocurrencies. Today, when we look at it, we see the state or state structures – such as Central Banks – that guarantee the reliability of currencies in traditional currencies. The most important feature of the digital currency is that it does not have this central structure and does not have any authority to affect the currency.

Keywords: Blockchain technology, International payment methods, Digital currency

Introduction

With the emergence of the digital world, the way of life of people all over the world has changed. The digital world has contributed to the reshaping of many different fields such as economy and politics. We see a clear example of this in cryptocurrencies, a virtual money model that emerged alongside traditional currencies, which have become an important alternative for the financial system.

Blockchain technology, which has entered our lives in recent years, constitutes one of the most remarkable issues of the 21st century. According to Merriam Webster, blockchain is defined as; "It is a database with information shared in a digital network that is decentralized and accessible to all stakeholders and can be used at any time". Looking at this definition, we can clearly understand that blockchain technology is actually a way to store certain information.

It is important to understand why such a technology is needed and what are the reasons behind it. A more detailed description of blockchain technology will be given in the following sections. The purpose of making a more detailed definition of this concept is to explain the concept better. After the definition is made, it will be stated in which areas the blockchain technology can be used. It will be explained with examples from different sectors such as finance, government, insurance, health and tourism sectors, including both B2B and B2C international trade.
Cryptocurrencies are referred to as the "wild west" in financial systems as they have moved beyond the contemporary boundaries of the 22nd century. They are appeared as an alternative way at financial system and a risk to the traditional finance service providers currently available. First of all, to give an example of one of the advantages of cryptocurrencies, these systems allow faster and more cost-effective transfers of funds in global trade bypassing traditional financial intermediaries such as banks. Today, it can be seen that rapid technological developments in cryptocurrency techniques are an effective measure against security vulnerabilities such as hacking and theft encountered in the realization of fund transfers. The reason behind this is that the underlying blockchain technology of cryptocurrencies filters out duplicate and incorrect transactions. The emergence of cryptocurrencies as a payment system along with these conveniences has brought debates in traditional financial transaction markets. This means that conventional financial institutions face risks and threats from the popularity and effectiveness of cryptocurrencies.

In addition to the above-mentioned advantages, the complexity of the crypto currency model as a new virtual currency has an impact on the exchange of goods and services. Unlike other traditional currencies, this system is a simple decentralized electronic currency that is not controlled by governments or banks. The lack of a centralized structure causes a decrease in confidence in this currency. Today, when we look at it, we see the state or state structures – such as Central Banks – that guarantee the reliability of currencies in traditional currencies. The most important feature of the digital currency is that it does not have this central structure and does not have any authority to affect the currency.

Technology behind Blockchain

As the name suggests, blockchain technology is a chain of blocks and this means virtual meaning. In the definition made by Gupta (2017), blockchain is expressed in its most stable form: "It is a shared and distributed ledger that facilitates the process of recording transactions and tracking assets in a business network". However, today, thanks to technological developments, blockchain is no longer used only in computer sciences, but also in the business world. Blockchain technology has become a useful mechanism for businesses due to its peer-to-peer decentralized network structure, distributed database, consensus mechanism, advanced cryptographic systems and immutability. For example, with this developing technology, the way strategists see cost and benefit analyses and how they establish a business relationship has also changed. The more inclusive definition of Gupta can be said as follows; "Deeply, a peer-to-peer distributed ledger which is cryptographically secure, immutable or hard to change, append-only, and can just be updated through peer-to-peer consensus or agreement is called as blockchain" (Bashir, 2017). Figure 1 is important to better understand the idea of how blockchain contributes to our lives by seeing the difference between centralized, decentralized and distributed networks.

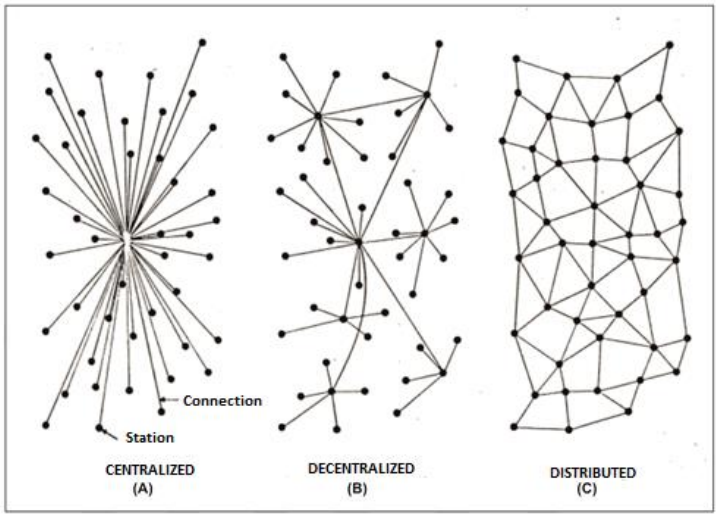

Figure 1. Network Types
Source: Baran, 1964.

Thanks to the blockchain technology, the risks in the vulnerable nature of central networks are minimized, and for this reason, it is observed that there is a shift towards distributed networks. Baran (1964) explains this problem by saying, "The central network has a weak structure. This is because destroying the single central node will completely cut off communication between the end stations." As can be seen in Figure 1, it could be said that such problem is looking partially to be solved. This is because all end stations are taking all data in distributed systems based on blockchain. A copy of the approved information is kept at each end station and it is extremely difficult to want to change this information. In the following headings, the details of this technology will be elaborated and examples of its application areas will be presented.

Basics Knowledge about Blockchain

In the article of Satoshi Nakamoto and his group for Bitcoin, this technology was mentioned for the first time and blockchain was used as a synonymous term with Bitcoin in the early days. The dramatic rise of Bitcoin from the earliest times to the present has caused the blockchain technology to remain in the background. When we look at it today, it will be seen that Bitcoin is a product formed based on blockchain technology thanks to some other technologies. Thanks to using of Bitcoin at business world, blockchain has reputation and recognition at business world too. At this point, Bitcoin has acted as a catalyst. It can be said that Bitcoin is a new payment method

supported by different technologies. When this technology first hit the market in 2008, it was starting to be famous especially in the financial sector. However, when digital currency system is taking into account, Bitcoin was not the first attempt. The first examples of electronic money are also seen in the 1980s. It is David Chaum who proposed the terms of digital cash and blind signature. He talks about this in his article "Blind Signatures for Untraceable Payments". At the beginning of 1990s, Chaum founded DigiCash as electronic money. It is seen that the first transaction with DigiCash was made in 1994. Although a few attempts were made for electronic currency after DigiCash, it seems that the system remained in the background until 2009. The developments in the electronic money had almost no progress till the end of 2010s. The genesis block which has a meaning of "the first block in the Bitcoin blockchain network" was created and mined by Nakamoto in 2009 (Gates, 2017).

Such development was the milestone at banking sector and how payment transactions could be done. In 2008, Mortgage Crisis has been blowed. Such crisis was a message to all people. People at business sector realized the weaknesses and problems of the existing payment methods. During this period, the decrease in trust in banks and other central institutions caused Bitcoin to fill this trust gap. Bitcoin's anonymity, ease, security and fast transaction have attracted the attention of users. In this system, users do not need intermediaries and do not have to go through the bureaucratic processes required by intermediary institutions for a transaction.

While the first stage of the blockchain network was the use of Bitcoin for payment systems, the network began to evolve as new uses of the network such as smart contracts were discovered. During this period, the second phase emerged, where Ethereum, another payment structure, focused on smart contracts and decentralized autonomous organizations. The third stage of the blockchain is Factom, which emerged as a blockchain-based broadcast network. It is connecting itself to the Bitcoin or Ethereum networks by providing a smaller and more scalable network of federated nodes (Laurence, 2017).

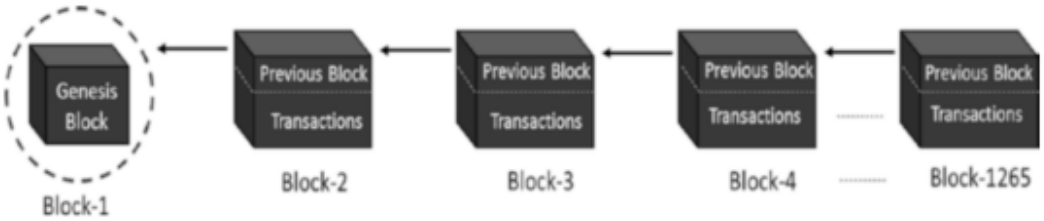

Figure 2. The Structure of Blockchain Works
Source: Singhal, Dhameia and Panda, 2018

By looking Figure 2, it could be seen how blockchain system is structured. It is understandable that the process starts with the first block called genesis and then consists of data blocks. These data blocks are blocks that are chained together after predetermined rules are applied. Each new block has the summarized data/knowledge of the previous one. Created new one adds new data/knowledge to the chain. This process includes hashing and validating all nodes in the network. Figure 3 and Figure 4 are presented as an example to show how transaction process is going on in a system. There are four different parties under transaction. They will be called as Alice, Bob, Charlie and Dave. In the example they will do payment transaction with other party. At blockchain system, such parties are called as "nodes". When each payment transaction is done new block is created. All nodes get info about new created block and record the data. When this transaction is doing everyone can monitor the transaction history whenever nodes want.

Figure 3. The Beginning of Payment Transaction
Source: Singhal, Dhameia and Panda, 2018

From the Figure 3, it could be seen that Alice$50. This is the first step of the transaction. As explained before, such chain is recorded as the genesis block- first block at chain. All parties at the system have the same copy simultaneously.

Figure 4. Second Step at Payment Transaction
Source: Singhal, Dhameia and Panda, 2018

It is seen that Alice pays $20 to Bob and starts payment process. By doing this, new block is created on the chain showing in Figure 4. It is seen that this operation is recorded as an immutable data in the ledger of each node. All nodes of the chain monitor, verify and then record a copy of the transaction. This process continues in this way as new transactions are made cyclically. Unlike traditional record keeping methods, at blockchain system, any transaction is recorded constantly whenever a transaction is performed and whatever happened. Thanks to this characteristic, the system is working as synchronized and it prevents cheatable activities caused by repetition. There are also advantages of networking, such as getting rid of transactional environments and reducing the time spent in processing. It will also appear that validation concerns disappear as the data is validated by all participants or nodes. As a result, blockchain distinguishes itself with its consensus-based mechanism, immutable data structure, resource capability and a synchronized ledger (Gupta, 2017).

Terminology of Blockchain Technology

Up to this stage, it has been seen that thanks to the developments in technology, data has been enabled to be copied and distributed over a network where borders have been lifted around the world. With Distributed Ledger Technology, everyone in the network has a copy of the same information. However, it is also a fact that the old version of this technology lacked the security of data shared within the network. At the beginning of blockchain technology, what was sent to the system was encrypted information and only the data owner could make sense of it. Encryption alone was not enough for the network, as any changes in the data could not be updated on the network. For this reason, it was necessary to develop a structure that included every participant in the network through a consensus mechanism provided in the system. With the help of consensus mechanism and encryption, safe and valid recording of data in the system is ensured. Thanks to the technology that includes all these features, all nodes have his/her own encryption, the same data copy which is accepted and verified by the system, and the blockchain that enables data distribution over the network with various permission options. All technological terminology related to the blockchain can be accessed under the following subheadings (Usta and Doğantekin, 2017).

a. Cryptography; This technology is the main enabling technology for the blockchain. However, this technology should not be seen as a new technology among encryption methods. For example, Julius Caesar was one of the first to use encryption when he needed privacy in his messages. The system that he used at his message was called the Caesar Cipher. Such method was one of the popular and useful encryption technique at his time. The information to be shared in this system included only the change and hashing of letters and numbers, which allowed the owner of the password to decrypt and read all the information. In this way, information was kept safe. However, today, this system is not seen as the most efficient and safe way of sharing information with the developing technology. According to its original version, it can be said that modern cryptography has come a long way. It was mentioned that David Chaum was the first person to write an article about cryptography. At his article, he mentioned that data could be protected with cryptology. Chaum also recommended a payment system named as “blind signatures”. Blind signatures system enables that data can be hidden before signing and the digital signature can be verified without revealing confidential data content. Apart from Chaum, we see that Szabo also

focuses on solving the problem of double spending without the need for a central authority. However, these studies remained as studies and were not implemented till Bitcoin was developed by Satoshi Nakamoto in the late 2000s (Gates, 2017).

Cryptography system needs advanced mathematical operations which is the most important step for building blockchain. Cryptography can be basically defined as the science which helps keeping things secret by using encryption techniques. Besides, other main useful features such as data integrity, authentication and non-denial are what cryptography has. Encrypting plain texts with an algorithm and ciphertext are the basic starting point of cryptography. Plain text cannot just to be a text message or lettered information rather it could also be a numerical data or something like that. In cryptography, only the receiver who can decrypt it with the algorithm and key can see the encrypted information text. The message cannot be read by any others if the key is held by the any nodes. It is said that symmetric key cryptography and asymmetric key cryptography are the two types of cryptography. Symmetric key cryptography uses the same key for encryption and decryption, and sharing this key between nodes requires a secure communication way. This type of symmetric key cryptography is widely used such as HTTPS, SFTP, and WebDAVS which have large data sizes. On the other hands, the other cryptography requires two keys: the first key is the public key for encryption. The second key is the private key for decrypting the message. Because the message is digitally signed, authentication and confidentiality as well as non-repudiation are ensured. In addition, the need for a secure channel for key exchange is eliminated (Singhal, Dhameia, & Panda, 2018).

b. Peer-to-Peer Networks (P2P); P2P networks are a type of distributed systems network. These networks enable blockchain technology and many other applications to be processed without a central authority. This type uses the computing power of each node, such as processing power, storage capacity, and bandwidth, and consists of individual computers or nodes that enable data exchange between peers. The first sector to be affected by this system is the financial sector. As cryptocurrencies threaten the central authority of banks, the financial sector was the first to be adversely affected by this advantage of this crypto currency. This will not only affect the financial sector. Besides this, any business that acts as an intermediary between groups of people such as buyers and sellers, producers and consumers, borrowers and lenders will also be affected by this peer-to-peer interaction. (Drescher, 2017).

Three different peer-to-peer networks can be mentioned: pure, hierarchical and hybrid peers. Pure networks do not require a structured system or network, and there are random connections between nodes. Data exchange is done via message forwarding. However, this can result in a broadcast storm due to too much messaging traffic. We see that hierarchical networks are not independent of authority. Super nodes with higher resource characteristics manage peer-to-peer communication. It can be said that this network is disadvantageous because the defence mechanism of the network is weak because a super node is needed to direct the information exchange. Finally, in hybrid networks, as the name suggests, it is seen a mixture of pure and hierarchical networks. This type of network includes nodes and the directory server where the server enables the connection between the nodes via their IP addresses. Networks such as Spotify, Napster, and Bit-torrent are examples of this type of network. It is seen that the broadcast storm problem has disappeared in hybrid systems. But it still has the disadvantages of hierarchical systems. Therefore, this network is best for a small number of inquiries. (Li, 2017).

c. Hash Functions and Hashing; Hash functions are one of the most important components of blockchain. They are not new concept for our world. But it has gained popularity with the blockchain. Hashing means that the activity under the cryptographic foundations of converting a data or message into a series of numbers or letters. The hashing, in its simplest form, is a mathematical algorithm. It converts any size of data into 32-character fixed-length strings according to hash type (Laurence, 2017). Original data expressed in a different format is represented in these characters. It is a one-direction operation and such operation cannot be returned to the original form provided by the path hash functions. Figure 5 illustrates the hash efficiency simply.

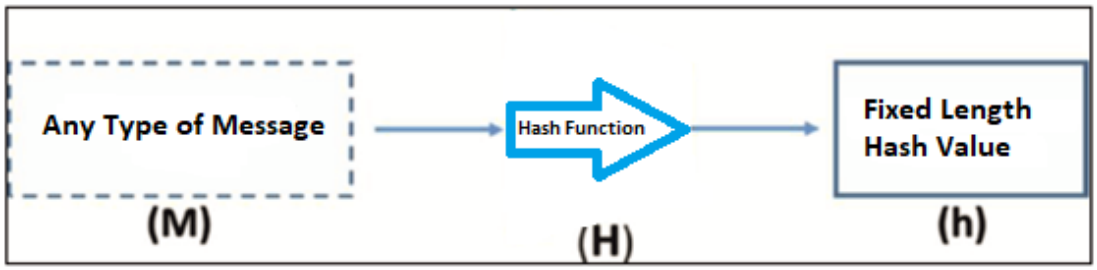

Figure 5. Basic Hash Efficiency
Source: Singhal, Dhameia and Panda, 2018

(M) represents the input that needs to be converted to a value-added or message digest, represented as (h). The hash function (H) is the mechanism or algorithm that will perform this conversion. The direction is a one-way operation that represents the operation that cannot be resolved backwards. The original input (M) cannot be estimated or found (Drescher, 2017). Hash functions are mostly used in digital signatures. However, it is seen that this function is also used for some protocols such as identification protocols. From the view of digital signature framework, the hash saves time and space. For ensuring data integrity, the hash compares the recalculated hash and the original hash to help determine if the hash value has changed at some point. To implement these applications, hash functions are expected to have the following properties:

a. Converting all kinds of data into new data in a short time,
b. Being deterministic which means that the same input produces the same hash value each and every time,
c. Being pseudorandom which means that the hash value cannot be estimated from the input value,
d. Being one-directed way which means that possibility to converting the hash value to the original input data doesn't have,
e. Being unique which means that the hash function does not produce the same hash values for different inputs (Drescher, 2017).

There are also different classifications of hash functions, which are basically divided into keyless and keyed. For example; one of them is MD4. MD4 belongs to the message (MD) family, which is one of the oldest. Another one is the family of Secure Hash Algorithms (SHA). It is more popular and has varying versions (SH-0 to SH-5). In order to generate addresses, Bitcoin benefits from both of them. It can be seen that Bitcoin is using SHA-256 and RIPEMD-160 (Singhal, Dhameia, & Panda, 2018). Another example is the Merkle tree introduced by Ralph Merkle. It is a bottom-up tree of hash values. Working with a large amount of data, the Merkle tree creates a binary tree containing the raw data to be hashed from the lower (leaf) level to the upper (root) level. It can be preferred because it validates large data sets efficiently and helps to protect these clusters (Singhal, Dhameia, & Panda, 2018; Usta & Doğantekin, 2017).

d. Consensus Mechanisms: The blockchain represents a structure in which there are many reliable and valid participants who must agree on the data to be added to the system. Network must check and approve any activity to be added to. In this way, unity is achieved. This is why the consensus mechanism is needed in blockchain structures. This consensus mechanism enables data to be processed and validated by the network for distribution among peers. In simple terms, consensus can be defined as an agreement between nodes of the blockchain network that confirms data and shares it uniformly on every participant's device. (Laurence, 2017).

However, who will propose the block and how nodes will agree on the block proposed by any node are some uncertainties about consensus mechanism. Let's think about a mechanism where every node proposes a block at the same time, it is inevitable that there will be a chaotic environment where monitoring and control processes become difficult. To prevent such chaos, consensus mechanisms help solve the problem by applying certain rules. At this point, hash puzzles are assisting to the system about who will issue. For example; if any node wants to propose a block, then a complex hash puzzle must be solved faster than other nodes and dig the block. At the end, such node is earning the reward to dig the block.

Below it could be seen what an effective consensus mechanism must have:

(i) Consensus about laws, rules, transitions and states,
(ii) Consensus of nodes, methods and stakeholders,
(iii) A sense of identity inside of system. At this way, members will feel they are all equal (Morabito, 2017).

All kinds of threats and attacks can be eliminated as soon as possible at reconciliation mechanisms. Such mechanisms should be defined in this way. Basically, it is the expected threat to the network that determines the type of consensus used in a blockchain. But other criteria are also taken into account, including decentralized governance, core structure (predefined steps), authentication, confidentiality (access) and fault tolerance, integrity (verification and verification practice) (Morabito, 2017). The customized consensus method should have been created depending on the nature of the entries added to the system.

Proof of Work (PoW), Proof of Stake (PoS) and Practical Byzantine Fault Tolerance (PBFT) are the most well-known and used types of consensus systems (Singhal, Dhameia & Panda, 2018; Morabito, 2017). Proof of Work (PoW) consensus mechanism is working like that. As it is understood from the name, it needs the work of nodes, where in order to create a block and add the block to the chain, a lot of computational power is needed. A lot of energy, calculation, and speed are needed at this type of consensus. However, it is starting to be hard for nodes to verify and compute when so much data entry is starting to enter to the system. It will avoid fraudulent behaviour

as it is too costly to be rejected by the network for any node trying to propose a block. PoW is better in systems that do not require the trust of the participants. However, it works very slowly and the speed of this system depends on the last node verifying the transaction. Examples of the most popular PoW consensus are the Bitcoin and Ethereum blockchains. Proof of Stake (PoS) is more about the number of coins owned. The act of verifying transactions is directly proportional to the coin stake owned. More held shares increase the chances of participating in block verification. Factors such as stake age, randomization and node richness determine the criteria for being a validator in the PoS system. The most famous methods for validation are randomization and coin age selection, although the largest stake has a higher chance of being an approver. Thanks to all these features of PoS, system is working faster, environmentally friendly, cheaper and it has secure (Singhal, Dhameia, & Panda, 2018). However, criticisms of the system are appearing, since there are no penal sanctions for those who want to act fraudulently in this system. To this problem, Ethereum's Casper protocol has several solutions that develop a system where fake validators will cause them to lose their profits. Peercoin is the first and more famous example of a PoS system builted according to the age of stake. Finally, we can cite another alternative to consensus mechanisms, Practical Byzantine Fault Tolerance (PBFT). This system takes its name from the tactics of the Byzantine generals to decide whether the information obtained is correct or not. In this system, the discourse of the majority is important for verification. At this point, Byzantine Fault Tolerance can be defined as; It is the ability to protect itself from malicious actions by consensus provided by the majority of nodes sharing a network. In this method, the system continues to work by tolerating the Byzantine error. Basically, the system tries to synchronize other stakeholders in the network. But unlike other systems, these transactions do not happen through rewards or mining. In Byzantine Fault Tolerance, it is seen that every node in the network has a public and private key, but each node knows the public keys of the others. As a result, transactions can be verified or servers can be updated. First, the transaction is controlled by each node. The transaction is then signed and shared for a certain number of nodes to verify. For this reason, in order to keep any threat away from the network, the network must be aware of the status of each node (Singhal, Dhameia, & Panda, 2018; Morabito, 2017; Usta & Doğantekin, 2017).

Types of Blockchain

Blockchain has its own dynamics. It can be said that blockchain networks are built for some purposes such as contract execution, data storage and money transfer. Therefore, they need different structures to achieve these goals. The selected structure determines how the system will work and what its features will be. At this point, access right is one of the important features that should be determined. The structure of the chosen blockchain type determines who can read and write transactions, how transactions can be initiated and maintained, and who can verify transactions etc. Some transactions are made public, while others only need to be seen by a few parties. There are several approaches to categorizing blockchain types. Drescher (2017: 216) summarizes his approach from the perspectives of transparency, privacy, security and speed. Table 1 below shows the categorization of access rights;

Write Access	Read Access and Creating Transactions	
	Everyone	Restricted
Everyone	General and Unauthorized	Restricted and Unauthorized
Restricted	Open to Everyone and Authorized	Restricted and Authorized

Table 1. Four Structure of the Blockchain in respect to read and write
Source: Drescher, 2017.

For example, anyone can join the existing system as a reader, writer, and creator in public blockchains. On the other hands, access rights are held by participants in private blockchains.

Unlike Drescher, Bambara and Allen (2018) structured blockchain types into three. Although two of them are same as Drescher the third system is called as consortium blockchains. The system is limited only to the nodes specified in the protocol in such blockchain. Such blockchains are called “partially decentralized system”.

Possible Application Areas of Blockchain

Blockchain technology has its roots in the late 1900s. After gaining popularity after 2008 Crisis, it is first seen at finance sector (Usta and Doğantekin, 2017). Today, however, it is clear that blockchain can be used at different areas. Drescher (2017) provides a summary for concrete blockchain application areas that are test applications and could be in the future. Cryptocurrencies, micropayments, digital assets, notary services, auditing, tax and voting can be listed as some of them. Rather than Drescher, it could be added that Singhal, Dhameia, and Panda (2018) list the uses of blockchain technology in different areas. Finance, insurance, banking, healthcare, supply chains, IoT (Internet of Things), media and entertainment are some of them.

As it can be understood from the information above, it is concluded that there will be different areas where it will be applied in the near future. In summary, below it will be focused and explained in which areas blockchain is used such as law, insurance, finance and supply chain and logistics.

a. Law: Due to its smart contracts system, it is expected that in near future blockchain technology could change how the judiciary system will be. Lawyers will be expected to be technologists. Self-executing contracts will play a dynamic role in dispute resolution. In this context, a deep understanding of blockchain technology and distributed ledger technology by intermediaries is required in order to perform the process correctly and meet the needs of customers (Bambara and Allen 2018). While the industries are growing up, much of the work is still laboriously done manually which means that time is wasting in document creation and management activities. Such activity's cost to firms is more than $9,000 yearly. At this point, technologically based blockchain technology is expected to reduce wasted time and increase productivity thanks to its automotive process, accessibility, transparency, speed and data integrity features. Electronic Signatures, Intellectual Property, Property Rights, Automatic Regulatory Compliance and Machine-to-Machine Payments are some possible applications of blockchain technology which is started to use or expected to use at near future.

b. Insurance: The insurance industry is a competitive industry with high customer expectations. Blockchain technology is promising in terms of creating better products and markets in this industry due to its advantages such as increased efficiency, cost savings, transparency, faster payments and fraud reduction. Drescher (2017) states in his book that industries such as insurance will develop blockchain solutions and smart contracts are promising tools. He also mentions that managing property rights or how rules are enforced in a blockchain world will have a huge impact in the years to come. Together with this, in order to achieve a perfect automated smart contract in insurance, blockchain needs to accompany technologies such as the internet of things (IoT). With them, the blockchain network can automatically process insurance claims (Bambara and Allen, 2018; Gupta, 2017; Usta and Doğantekin, 2017).

c. Finance: Satoshi's article on Bitcoin provides a clear indication of how blockchain technology can be an alternative to existing financial systems. Blockchain technology is defining many financial activities such as stocks, bonds, mutual funds, and derivatives etc again. Due to some advantages mentioned before phases, new projects such as Ripple have been launched in the field of banking and finance after Bitcoin (Swan, 2015). Gupta (2017) gives examples of use in trade finance and cross-border transactions for the finance sector. For example; IBM is one of the first one transferring all information more than 4,000 users via blockchain system and distributed ledger. Decentralized Finance (DeFi) emerges as a new paradigm against the current system. With blockchain technology, as all know, network structure does not require some third one in order to do transactions between groups. So, it means that intermediaries will be eliminated anymore. The network mechanism establishes the trust mechanism between unknown sides. At the end, it could be easily said that a more efficient and limitless infrastructure has been created. Decentralized currencies, payment services and contracting etc could be seen as the main areas of DeFi (Chen and Bellavitis, 2020).

d. Global Supply Chain System and Logistics: In a complex global supply chain system, many goods are flowing between many parties. So, the traceability of the system has to be seen as an important element for the proper management of these flows. Many inefficiencies, delays and failures occur within the global supply chain and these return to agencies with high costs. It can be said that, visibility, fluctuating customer demand, inventory management, and coordinating operations are the main challenges in the global supply chain. Between these challenges, supply chain visibility is an important warning to all sides because visibility concerns are thought close relationship with quality and usability, where solutions to improve the traceability of flows throughout the entire system make an important contribution to the global industry.

We can list some examples of the flaws of current supply chains as follows;

(i) Half the cost of carriage for documentation in container transport,
(ii) Labelling errors in seafood products increased to 87 percent in the 2010-2012 period.

The report states that the global economy derives 2 percent of its income from counterfeiting, the global counterfeit value has risen to $1.2 trillion, the value will reach $2 trillion in 2020, that is, 2 percent of world trade, 5-6 percent of EU and US imports are estimating counterfeit, and showing that less than 1 percent of counterfeit imports can be detected at the US Customs and Border Patrol (OECD/EUIPO, 2019).

In the global supply chain system, Radio Frequency Identification (RFID), Quick Response Code (QR), Electronic Product Code (EPC), Enterprise Resource Planning (ERP) and Sensors etc are some of the technological tools currently used for the purpose of transparency. However, it cannot be said that these technologies alone provide

effective solutions. There is a long way to go in supply chain management, especially in terms of security and trust. If the data is still going on to be managed centrally, such negative points in the global supply chain system will continue to wait on the desks of the managers. For the customer, under these conditions, it will be difficult to verify the safety of the products they consume (Chen et al. 2017). It could be supported that blockchain is very helpful for global supply chains in order to support traceability and transparency at this point. For example, it is mentioned that blockchain has smart contracts which are very useful for tracking goods both upstream and downstream in the global supply chain. So, it is expected that the follow-up of global supply chain flows could be tracked better and easier. It must be also mentioned that blockchain assists to cost efficiency because it creates a real-time visible within the global supply chain.

In terms of logistics providers, the use of blockchain technology is also in question. Today, in global trade, the transportation of goods from the exporter company to the importer is provided by land, sea, air, railway and pipelines. CMR, Seaway Bill of Lading, Airway Bill of Lading and CIM transport documents are used, respectively, in transportation by land, sea, air and rail. These documents are the documents that contain the information about the goods to be transported and the details of the transportation. The information contained in these documents has importance that affects the export and import processes. Incorrect information in the documents will adversely affect these processes. Blockchain technology minimizes the risks by preventing the negativities to be encountered. In addition, thanks to blockchain technology, informal activities such as tax losses and smuggling will be prevented. With the use of it, tax losses at customs will be prevented. For example, the country of Egypt is currently trying to control this through the CargoX platform that it has created during the import processes. Relevant documents are uploaded to the system prior to the import transactions to be made to this country, customs inspection is taken before the goods arrive at the customs borders, as a result, tax evasion is prevented and the risk of loss and theft is minimized, and time is saved by completing the import transactions in a shorter time. Another advantage of creating the documents mentioned in logistics activities with blockchain technology is to prevent the problems that will be experienced in the cargo process during the shipment of these documents to the importer after the export process. As it is known, after the exporting company completes the export process, it sends the relevant documents to the importer according to the payment method via post offices. In this process, there is a possibility that export documents may be lost, stolen or destroyed due to force majeure. Blockchain technology reduces these risks to zero and again, it allows the importer to save time and the exporter to achieve financial savings. The WAVE BL blockchain infrastructure, one of the platforms that provide bill of lading with this system, it has reported that it has made more than one hundred thousand e-bill of lading transactions in the first three quarters of 2022. Shipowners using this system, on the other hand, are described as leading shipowners in their sector such as MSC, ZIM, ONE and Hapag Lloyd.

Well-Known Blockchain Platforms

Platforms with open or private source codes that project creators can use to start their projects are called blockchain platforms. These platforms can be open source or private according to business purposes (Usta and Doğantekin, 2017). These platforms have been developed for different purposes in different sectors. Some criteria come to the fore in the selection of the platform to be used. These criteria can be broadly listed as follows:

A. Is the platform constantly being improved?
B. Which kind of blockchain is needed?
C. Which programming language does it use?
D. What is the popularity of the blockchain platform?
E. Does the blockchain platform has the consensus protocol?
F. Which kind of functions (security, transparency etc.) are needed?

It is known that Bitcoin is the first one of such platforms. After Bitcoin, so much new platforms have been appeared such as Ethereum, Hyperledger, Ripple, IBM Blockchain, Microsoft Azure Blockchain, Quorum and Corda according to the aims and requirements. Below side some of the important ones like Bitcoin, Ethereum, Hyperledger and Corda will be mentioned briefly.

Bitcoin

Bitcoin can be defined as an open-source platform for peer-to-peer payment transactions. Bitcoin is an innovative alternative to banks and intermediaries like Western Union. There are numerous inefficiencies in conventional existing systems. A few of them are as follows; transaction fees are high, a transaction takes a long time to settle, it is not completely transparent, and transactions are tied to authority. Thanks to Bitcoin platform, all of these inefficiencies are overcome. Bitcoin system is constituted according to consensus mechanism. In order to ensure

the continuity of the network, PoW incentive mechanism is also used. In addition, one other function of it is that system is working as a decentralized distributed ledger in which data can be recorded in an immutable and secure manner (Usta and Doğantekin 2017). Nakomoto (2008) summarizes what Bitcoin is in the Whitepaper: "A purely peer-to-peer version of electronic cash and it allows online payments to be sent directly from one party to another without going through a financial institution."

Ethereum

Ethereum is a state machine that allows transactions in a trusted messaging framework with a proof-of-work mechanism like Bitcoin. But the network is also being developed to have PoS to increase performance. Besides enabling transactions, Ethereum also has many other applications such as smart contracts application (Karame and Androulaki, 2016). Ethereum is an important tool especially for businesses that conduct transactions over contracts. It can also be used to transform global supply chains when performance issues and scaling issues can be properly managed by network developers.

Hyperledger

Hyperledger is another open-source community. The system is designed to meet the different expectations and needs of businesses gathered under the umbrella of the Linux Foundation, which consists of around 230 organizations, such as trust and autonomy. That's why Hyperledger has a philosophy of responding to these changing needs. Due to its features, the system is used in many areas from finance to supply chains. Its most striking use is seen in the project developed by the IBM Food Trust, which tracks food from soil to fork.

Corda

Corda was launched in 2018 two years after Hyperledger. It is another enterprise blockchain development community to provide a distributed platform for recording and processing shared data. Such platform is specifically designed to improve business deals between trading partners. For this reason, smart contract logic that provides pre-agreed rules has brought different perspectives to enterprise blockchain projects as they offer a unique feature of Corda, a flow framework to facilitate processes between notary pools and partners to manage transactions and reconciliation. While similar in some ways to Hyperledger and Ethereum, it differs in that the platform offers a single-node infrastructure.

The Challenges of Digital Currencies for the International Monatary System

Although Bitcoin or a similar digital currency does not seem close to replacing sovereign currencies, its popularity makes economists question developments in the international monetary system.

Evolution of Private Currencies

Nishibe states that Bitcoin is a pioneer for the development of private currencies that can be managed by individuals, companies or public authorities that will compete against conventional currencies (Nishibe, 2016). Nishibe sees crypto money as a means of realizing his proposal to denationalize the currency and allow free competition of currencies, as noted by the Austrian economist Friedrich Hayek (Nishibe, 2018). According to this view, private currencies will begin to compete with national currencies, and ultimately this competition will break the public monopoly. In addition, offering alternative means of payment to individuals will make them reject unstable currencies and will cause them to prefer currencies characterized by low inflation.

According to Nishibe, for example, Japan's fights with deflation and the quantitative easing policies of the US Federal Reserve (Fed) causes some sharp ups and downs about currencies and volatility at markets. In the light of Hayek's theory, this makes the dollar, euro and Yen not attractive currencies (Nishibe, 2017). This is why Nishibe advocates the idea of broader monetary competition beyond national currencies through the inclusion of digital private currencies.

Volatility of Digital Currencies

We can characterize his argument by pointing out that in the 2010-2014 period, Bitcoin was more volatile than gold and major national currencies (Dwyer, 2015) and would therefore be "expelled" from the system if a choice were made in the Hayek sense. However, Bitcoin may appear competitive for certain economies marked by the high volatility of national currencies, such as Argentina or Zimbabwe.

Time-consuming Process

Halaburda and Sarvary point out that network and inertia effects play a very important role in the context of monetary competition (Halaburda and Sarvary, 2016). Inaction, also emphasized by Birch, appears to be a potential barrier to self-adoption of a new currency according to Mondex's experience. It is essentially based on a currency infrastructure and this represents a fixed cost that the user will try to amortize over time. For example, Mondex states that in the case of an electronic wallet, a new user must first go to a bank, fill out a form, deposit the amount to be deposited in the wallet, and then wait to receive the magnetic card. Despite the promise of lowering transaction costs, these annoying steps can be discouraging for some potential users.

Converting Conventional Currencies to Digital Currencies

Similarly, for digital currencies, Halaburda and Sarvary say users should have a digital wallet and find a way to convert their currency to Bitcoin. Traders accepting Bitcoin must adapt their accounts to include the new currency, i.e., set a price in Bitcoins for their goods or services and find ways to convert between Bitcoin and national currencies (Halaburda & Sarvary, 2016). These actions represent so many costs that they can limit the size of Bitcoin users. Such inadequate users will affect the size of the market as well as an important determinant of the international impact of a currency.

Competition between Dominant Currencies

Unlike Hayek, Wong drew on the experience of competition between the sterling and the dollar at the beginning of the 19th century to emphasize that the value of a currency lies in the use of it by more than one third party. This mechanism automatically leads to the permanence of a small number of international currencies (Wong, 2019). Dominant currencies tend to capture new markets and limit the development of competing currencies. In this perspective, digital currencies are unlikely to dominate the international currency scene, currently competing for the dollar, euro and yuan.

Diversity of Digital Currencies

Halaburda and Sarvary say that the diversity of digital currencies jeopardizes their chances of being used. The Financial Times (2018) listed 1,387 cryptocurrencies in a recent article, including Bitcoin, 39 of which have a market cap of more than one billion dollars and represent about a third of the cryptocurrency market. Each has its own rules for process verification protocol and emission limits. This diversity is an obstacle to the digitization of money because the fragmentation of projects can be a barrier to reaching the critical user base necessary for a payment network to function properly. The Bank for International Settlements (cpmi 2015) emphasizes that the small size of digital currency markets cannot guarantee the efficiency of their technology if a significantly larger number of transactions are made.

A Secure Asset

Bitcoin is sometimes presented as a safe asset in international financial markets, especially by Andolfatto (2018), who supports Bitcoin with its relative simplicity in terms of monetary mechanism and policy. An asset is considered safe if it can be traded without fear that one party will know more about the asset's value than the other. Financial instruments such as life insurance are more complex than Bitcoin or gold, which makes them more attractive.

Safe Haven

Nishibe specifically mentions the episode of the Cyprus financial crisis in 2013, when Cypriot and Russian investors preferred to get their value out of Cyprus by converting them to Bitcoin. For this reason, the value of Bitcoin in dollar terms doubled between March and April 2013. This capital flight in times of crisis towards a value considered "safe haven" is characteristic of safe assets. Kaul and Sapp defined a “safe haven” as a currency that brokers invest in during times of uncertainty (Lee, 2017). Habib and Stracca explained that the ideal safe haven should be isolated from market turbulence in times of crisis (Habib, Mileva and Stracca, 2017).

Global Liquidity

According to Habib and Stracca, another important feature of safe havens is liquidity on a global scale. In this context, Bitcoin has a comparative advantage. The peer-to-peer networks underlying digital currencies, as noted

by Bank for International Settlements (cpmi 2015), are global by definition. They do not discriminate based on the location of the individual and therefore allow international transfers (Reiss, 2018). In addition, the transaction speed does not change according to the distance between the payer and the payee. Finally, in a context where restrictions are imposed on international payments by financial authorities, the decentralized nature of these networks makes it difficult to impose restrictions on transactions in cryptocurrencies.

Exchange Rate Volatility

In the literature, exchange rate volatility is mentioned as a factor that distinguishes between the dollar and the euro (Chinn and Frankel, 2019). Finally, it shows that the reliability of historical reserve values of reserve currencies is an important parameter in investors' preferences.

Financial Tool for Developing Countries

Bitcoin could also create a financial instrument in developing countries by allowing it to provide a means of deposit that allows one-time withdrawals, such as the M-Pesa advocated by Birch (Birch, 2017). However, there is also a major obstacle to the development of digital currencies in developing countries. Access to the internet, which is indispensable for these currencies, is still limited.

The Future Expectations for Crypto Currencies

According to Birch, Central Banks issuing digital currencies will be one of the most promising developments for cryptocurrencies. However, the attitudes of national regulators differ significantly on these currencies (Birch, 2017). For example, after one of the websites (Silk Road) was closed at the beginning of 2010s, US officials pointed out that decentralized digital currencies have an interesting potential for payment systems. In 2014, the British government announced that the technology owned by cryptocurrencies has the capability to improve existing payment systems. In the second quarter of 2017, the Japanese Financial Services Agency officially recognized Bitcoin as a means of payment, allowing payments in Bitcoin for goods and services (Financial Times 2017b). Koning says that in the modern paradigm, Central Banks do not offer dematerialized payment instruments such as current accounts or credit cards to the public, and private banks do not offer paper money such as banknotes (Koning, 2016). If Central Banks decide to make the voice of digital currencies heard in some way this will also be seen as an indication of a break from the current paradigm.

In addition to the positive developments above, there have also been some negative developments regarding crypto money technology. In 2016, the European Central Bank made a statement that digital currencies had neither legal validity nor currency in economic terms. In 2017, the Beijing Government opposed cryptocurrencies to protect the value of Yuan and financial stability. At the end, the Central Bank of China banned Bitcoin trading at domestic market. This led to the end of Bitcoin-Yuan trading with cryptocurrencies such as OKCoin or Huobi traded on Asian exchange platforms (Financial Times 2017a).

Birch also demands a centralized digital currency. The words of David Andolfatto on this subject, vice president of the Federal Reserve Bank, are a reference to Birch. According to Andolfatto, there is no major obstacle preventing Central Banks from offering online money services to individuals and businesses, such as direct accounts in digital currency with the possibility of deposits (Andolfatto, 2018). According to Birch, the main advantages of such services would be to encourage innovation in payment systems and improve financial stability as central bank direct accounts would be less risky than deposits in banks (Birch, 2017).

Finally, with the participation of these instruments in the financial system, the participation of even the most disadvantaged segments of the society into the financial system will be accelerated. It can be said that a centralized digital currency would be superior to Bitcoin because it would be better suited to the needs of society. For example, in countries like Norway, cash is almost never used. The Bank for International Settlements points out that it may be more attractive to issue a centralized digital currency in such countries where cash is almost never used. However, care should be taken as there are many unknowns about the cyber security of such structures (Bech & Garratt, 2017).

The Effect of Blockchain on International Payment System

A blockchain system allows users to easily monitor their transactions. It records these transactions and is a large distributed ledger that prevents these records from changing (Nofer et al., 2017). However, it creates a secure and

transparent environment because only registered users in the network have access to blockchain data and changes in the system are implemented and documented instantly (Li et al., 2020).

These systems support distributed network structures and digital data storage. The most common application is crypto money systems and the most known of this system is Bitcoin. Blockchain technology was discovered in 1991 and became known with the implementation of Bitcoin in 2009. In this designed system, security is provided without the use of third parties.

Blockchain system differs from existing data systems in terms of data generation. As mentioned earlier, data in the blockchain system is stored in interconnected blocks like a chain, and these stores have limited storage capacity. When a block is introduced to the system, it creates its own timestamp. Data stored in these blocks can typically be saved and accessed by any members. However, these data are transaction data that cannot be changed or deleted. Thanks to this feature, the blockchain system provides a superior security to the distributed ledger.

In modern cryptocurrencies, inclusive finance is realized by combining the technology of increasing the advantages of blockchain and Bitcoin in the issuance mechanism (Boi-ko, 2018). Compared to the old cryptocurrencies, it can be said that the new cryptocurrencies have more advantages in terms of credit subject, organizational structure, currency stability and ecological structure. According to Costigan and Gleason, thanks to these modern cryptocurrencies, people all over the world will receive equal financial services, payment costs will be significantly reduced in international business activities, and due to such advantages, it will become the most widely used currency (Costigan and Gleason, 2019).

It can be said that cryptocurrencies have some difficulties as well as the advantages mentioned. The following sections will explain the positive effects and things to do and adverse effects and possible solutions of cryptocurrencies on the international payment system.

Positive Effects and Things to Do to Increase These Effects

It is known that cryptocurrencies do not need centralized regulations for payment transactions. It is easy to mentioned that this is one of the biggest impacts of cryptocurrencies on international payment systems. If this situation is explained, cryptocurrencies do not need banks or governments for payment or money transfer transactions. This is the biggest reason for the increase in the processing speed of international payments in almost all cryptocurrencies used. Thanks to these systems we have mentioned, there is no need to obtain permission from any authority or to comply with any regulation in order to make an international payment (Kuah, 2020).

Similarly, thanks to cryptocurrencies, an ordinary individual can perform instant person-to-person transactions worldwide. This means that people do not pay high transaction fees to intermediary institutions such as banks for international money transfers. Banks or brokerage firms charge RTGS fees for processing an international transaction. On the other hand, cryptocurrencies do not charge such fees in international payment systems. In addition, it is seen that transaction fees are higher in traditional international payment systems compared to international payment systems using cryptocurrencies (Dostov et al., 2019). In addition, cryptocurrencies add anonymity to the international payment transaction (Kuah, 2020). Institutions such as banks or other intermediary institutions that make the payment process reveal the identity of the person or institution making the transaction when performing an international transaction. This identity is not revealed in transfer transactions made with cryptocurrencies. Therefore, the protection of personal data between the parties performing the transaction is ensured.

Another issue that needs to be mentioned is the form of taxation. Customers using a traditional form of international payment must pay capital gains tax to the federal government when they make an international payment. It can be said that cryptocurrencies are more advantageous in such taxation transactions. For example, governments can make international payment systems using cryptocurrencies attractive by exempting some transactions under one hundred dollars from tax. Such a situation will encourage retailers, gas stations, restaurants and other similar establishments to accept cryptocurrencies (Corbet et al., 2020). In short, it can be said that the scope of cryptocurrencies will increase if the federal governments show the necessary attention to these currencies and make the necessary regulations.

In addition, the actions of various governments or monetary authorities that affect market dynamics such as the inflation rate, the determination of interest rates, control the value of the conventional currencies. Such factors adversely affect international money transfer systems and can also slow down the speed of the payment system. This does not apply to cryptocurrencies. It can be said that cryptocurrencies add value to international payment

methods at this point because the factors mentioned above do not have any effect if the payment method is made with crypto systems (Coppola, 2019).

Similarly, in international payment systems using cryptocurrencies, the transaction cost is lower than in traditional international payment systems. One of the reasons for this is that cryptocurrencies do not have any physical currency. As is known, these systems have digital currency. They can carry digital currencies in wallets and all they need to access that currency is to remember certain keys (Coppola, 2019). Therefore, it can be said that the transaction cost of international payment systems using cryptocurrencies is much lower than the transaction cost of traditional international payment systems.

Another advantage of cryptocurrencies in the context of international payment systems is that wallets can carry various international currencies as well as national currencies. These cryptocurrencies allow their customers to transact in various currencies in international payment systems (Coppola, 2019). To put it simply, customers using cryptocurrencies can pay in any currency they want in line with the currencies available in their wallets in the international payment system (Coppola, 2019). This means that cryptocurrencies influence international payment systems by offering cross-currency payment options. For example, let's say an American businessman wants to pay someone in Japan. The businessman in America has to send the payment in US dollars (USD), but the recipient in Japan has an account that accepts the Japanese yen (JPY) (Dostov et al., 2019). This means that traditional international payment systems ask the businessman in America to convert US dollars (USD) to Japanese yen (JPY) in exchange for paying the party in Japan in Japanese yen (JPY) (Giudici, Milne, & Vinogradov, 2019). The conversion to USD-JPY may take several days, during which exchange rate fluctuations affect the conversion of USD-JPY. This may cause harm to one or both parties transacting using traditional international payment systems. If the transaction was made with one of the cryptocurrencies rather than the traditional payment method, both parties would not have been harmed in the event of a serious movement in the exchange rate. The American businessman would convert the US dollar (USD) to any cryptocurrency, and the Japanese side would have converted the cryptocurrency to Japanese Yen (JPY) and completed the transfer, and the transaction would be completed within minutes (Giudici, Milne, & Vinogradov, 2019). Another cryptocurrency to be used in this transfer is Rip-ple. Transactions with the cryptocurrency Ripple do not require any currency conversion. Also, conversion from any currency to Ripple can happen automatically. The example appears to influence international payment methods by adding automation to cryptocurrencies and adding various new features that traditional currencies cannot.

Another point worth mentioning is that in many parts of the world, including the USA, some banks and intermediary institutions support the use of cryptocurrencies. These establishments have special meters for customers who want to make their payments with cryptocurrencies. This is another reason why users increase their trust in cryptocurrencies.

Finally, the advantages of blockchain in the L/C payment method, which is used as a traditional payment method in international trade, will be emphasized. As it is known, in international trade, buyers and sellers (importers and exporters) are located in different countries. For this reason, companies that will trade for the first time generally have a trust problem with each other. In order to solve the trust problem, the banks have an important task. One of the traditional payment methods is the letter of credit payment method. It can be said that the letter of credit payment method is more secure than others. In L/C method, the issuing bank guarantees that the payment will be made to the seller who meets the conditions in the letter of credit. Although the system seems safe as a payment method, it has a difficult structure to implement in practice. For example, since the system is paper-based and does not work in coordination, the same documents could be prepared by the companies again, the document control processes are carried out manually by the banks, these processes cause time loss for companies and banks, because the system is paper-based, it includes the risk of forgery and fraud, due to the risk of forgery and fraud, banks conduct more rigorous examinations and this makes banking services expensive, the risk of documents being lost during the document submission processes may occur, and as a result of all these, the workflow processes in customs administrations may slow down. The difficulties of this method (document, presence of many parties, expertise, etc.) are eliminated thanks to the encryption method provided by the blockchain technology. As stated before, the parties involved in the system – in which more than 100 people or institutions and more than 1000 data must be managed in each letter of credit transaction – can track every transaction made or to be made in blockchain technology, making payments with letters of credit very fast and secure. And this contributes to the solution of the other problems mentioned above. This is a good example of the discovery and development of new usage areas such as smart contracts in later processes, while providing the use of this blockchain network only in the Bitcoin payment system at first. At this point, it should be noted that the second phase of Ethereum, which is another payment structure, focused on smart contracts too.

Adverse Effects and Possible Solutions

Cryptocurrencies also have various shortcomings in payment systems. One of the biggest challenges of cryptocurrencies is scalability. For example, the number of transactions Visa makes in the international payment system is much higher than the number of payments made using cryptocurrencies. In addition, cryptocurrencies may face limited transaction speed. MasterCard and VISA, which are traditional international payment systems, have higher processing speed in international payments (Boukhalfa, 2019). One of the reasons behind this situation is that crypto money payment systems do not have sufficient infrastructure around the world yet. In order to achieve maximum benefit, this infrastructure system will need to be spread all over the world.

Acceptability and stability are one of the most important requirements for an international payment system. Considering that many fiat currencies are still not viable in global trade today, it will take time for cryptocurrencies to be used as acceptable currency. Today, it is clear that the acceptability of cryptocurrencies is moderate compared to conventional ones globally. Likewise, one other adverse effect of cryptocurrencies in the international payment method is unstable volatile nature of these currencies (Boukhalfa, 2019). Price volatility in cryptocurrencies is a major issue and is the biggest reason why it is damaging international payment systems. Such situations mean that the use of cryptocurrencies is not yet fully accepted. Steps should be taken to increase the acceptability of these currencies and ensure the stability of these currencies in order to make users habitual to use cryptocurrencies.

Cybersecurity vulnerabilities of cryptocurrencies are another negative impact on international payment systems. Although technology may seem like our friend, malicious uses can negatively affect many systems, including cryptocurrencies. Hackers can hack into international payment systems using different cryptocurrencies or breach their information (Coppola, 2019). On the contrary, an advanced infrastructure emerges in traditional payment systems. These systems have robust security measures in international transactions. However, cryptocurrencies can protect against hacking and theft through innovative and advanced cryptographic technologies (Dostov et al., 2019). Blockchain technology has a crucial role at this point. This technology eliminates the possibility of duplication of an international transaction and minimizes the possibility of fraud in cryptocurrencies. However, it is needed to perform robust security measures used by traditional banking systems (Fry and Cheah, 2016).

The most important feature of cryptocurrencies is that they do not have a centralized structure. While this feature provides advantages in some cases, it also creates disadvantages in some cases. The lack of centralization is another challenge. This means that cryptocurrencies cannot be regulated by intermediary institutions such as the government or monetary authorities. This is also meant that users are not ready to use this decentralized structure without any legal authorities, which also harms international payment systems (Dierksmeier and Seele, 2016). Despite the nature of cryptocurrencies, federal governments should do their bit to ensure that cryptocurrencies can be used in international payment systems and mitigate their negative effects. In this direction, there is a need to introduce state-backed cryptocurrencies. Similarly, due to the lack of government regulation of cryptocurrencies, most businesses and investors cannot afford to take a risk using such international payment systems without government regulation (Corbet et al., 2020). Today, it is seen that international payment systems supported by cryptocurrencies lack government support and regulation. For this reason, many investors do not trust such international payment systems (Shanaev et al., 2020). As a result, federal governments and states are required to design and implement regulations for cryptocurrency markets. In this way, users' trust in cryptocurrencies will increase and they will be used more in international payment systems.

The technology risk and the unwillingness of federal governments to be a part of this system will cause investors not to invest in such international payment systems and these systems will not be used by people. For this reason, it is expected that steps will be taken in order to increase the security and recognition of the system.

Conclusion

Blockchain technology, which initially gained popularity with Bitcoin, later turned into a different way of doing business. Cryptocurrencies are now taking attention of most of the business sectors. This is a game chancing technology for a decentralized, distributed world which is likely to be possible in the near future. However, it should not be forgotten that it is an evolving technology that needs improvement and testing for its best understanding and implementation. Currently, it has still scalability, applicability, sustainability, expertise, etc. concerns over the issues. However, as new models are developed and tested, it will be better understood and developed in line with the future needs and requirements of businesses and customers.

Cryptocurrencies, one of the developing payment systems worldwide, have significant effects on international payment systems. Today, many researchers and scientists are investigating these effects to understand it.

Future research is needed to understand the relationship between cryptocurrencies and information technology infrastructure. The positive effects of the information technology platform on international payment systems are significant for cryptocurrencies. The biggest reason behind this is that most of the problems with cryptocurrencies are caused by weak information technology platforms in the world.

It highlights the negative and positive effects of cryptocurrencies on international payment systems and aims at possible solutions to improve the efficiency and practicality of cryptocurrencies to overcome the challenges associated with these currencies. The limitations of cryptocurrencies are responsible for their negative impact on international payment systems. It would also be useful to find possible solutions to overcome the difficulties associated with cryptocurrencies.

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