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Applying rapid application development methods for in Asisten BasketMu application to improve the user experience in training management

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Abstract

Coaches generally record the performance of team members during training. Recording athlete performance can measure athlete development and improve athlete abilities. In basketball, recording the performance of each team member has quite a high level of complexity. This research aims to produce a website-based application to help improve the coach user experience in recording and monitoring anthropometric developments, physical developments, and athlete skill developments during training and recording basketball player statistics during matches. This research uses the Rapid Application Development method for system development and system testing using the user experience method. This research has produced a website-based application called Asisten BasketMu. Based on user experience testing, Asisten BasketMu application no problems were found in user testing and the average score of Task Success has increased. The average score of Task Success from basketball player user interface is 97% and the average score from coach's user interface is 100%.

Keywords

Rapid application development, Asisten BasketMu, User experience

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Introduction

Basketball is a global sport growing in interest from fans of all ages. Interest in basketball is not only among athletes but also among academics and researchers due to the increasing availability of data and innovative methodologies that inspire fans to study basketball from a statistical perspective [1]. Basketball development in Indonesia is increasing rapidly, so basketball has spread throughout all regions. Various groups now demand basketball, including young people and adults [2-3]. A basketball club is a forum for its members to channel their talents on the basketball field and develop the basketball players' qualities. Suppose they want to build in a professional direction. In that case, they must be managed professionally by involving information technology to

assist coaches in maximizing training management [4]. Basketball is a team sport that requires high skill and physical fitness of athletes, and coaches have a vital role in the achievements of sports athletes [5-6]. The coach organizes training methods that suit the athlete's needs and goals. During training, coaches typically record the performance of team members, which can be used to measure basketball player development and enhance basketball player abilities [7].

In basketball, recording the performance of each team member has a relatively high level of complexity. Coaches are generally assisted by assistants to record each basketball player's actions, such as shooting, defending, rebounding, etc. Based on interviews and observations of some basketball coaches, they still make notes on paper forms. This makes it difficult for coaches to analyze basketball players' performance during training because the record data is still raw. In contrast, coaches need statistical data to see the progress of basketball player performance [8-9]. In a basketball game, the basketball players' skills significantly impact the entire team [10]. Recording and measuring basketball players' performance in training and matches is fundamental because coaches need to evaluate basketball players about their ability to play a maximum role in the game [11].

The use of information technology in the management of the basketball team has been done by some researchers, among them by creating an Android application for the administration of basketball teams that has the purpose of recording statistical data about basketball players during the game [6]. Other research is to produce a system or application to be used as a decision-maker in determining the core basketball player [4] and the best basketball player [7] to be followed in the team for the game. The other research aims to develop management applications for basketball training in the SABAC basketball team, specifically focusing on 2-point shooting exercises such as mid-range shots, under-basket shots, and layups [3]. There are other studies related to basketball teams. Still, most of them focus on statistical data analysis using data from NBA competitions, such as research using data mining to analyze the impact of injuries on basketball players and team performance [8] and research that uses data mining in combination with machine learning to analyze matches based on statistics already available for decision-making in the future [12-13].

In previous research, the majority of research objectives were to analyze data using various methods aimed at decision-making. Apart from that, some studies included data but only partially based on basketball playing skills. Therefore, the research will be carried out to produce a website-based basketball team management application focusing on mobile devices. The main contribution of this research is to create a software system that records and monitors anthropometric developments, physical developments and basketball player skill developments during training. The software development method in this research uses the RAD (Rapid Application Development) method, which is an object-oriented approach to produce a system with the main target of shortening application and process processing time so that as soon as possible, the

software system is empowered appropriately and quickly, which consists of the requirements stage [14].

Method

This application development method, in the process of analyzing the needs and design of the system, uses the Rapid Application Development (RAD) method. The Rapid Application Development (RAD) method is a software development process model that is classified as an incremental technique, as shown in Figure 1. RAD emphasizes short, short, and fast development cycles. RAD uses an iterative method in developing systems where a working model of the system is constructed at the beginning of the development stage with the aim of determining requirements. This method will explain the stages of system design.

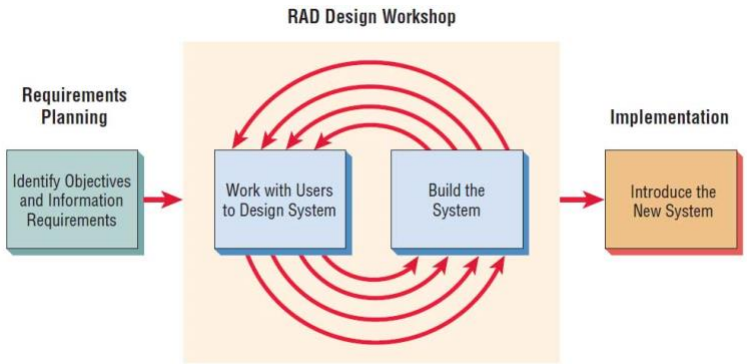

Figure 1. Stage of RAD Methodology

There are four phases in the RAD method, and the assessment stage involves analyzers and users, which are as follows: (i) Requirements Planning Phase is a meeting phase between the analyzer and the user to identify the purpose of the system to be built, identify the information requirements that will arise to achieve these goals and analyze all systems needed by users. (ii) RAD Design Workshop Phase is a phase in the form of a RAD design workshop between analysts and programmers to design a system to be built. Analyzers and programmers work together to build the system and show its representation to system users in the form of visual designs and work patterns. In this phase, users also respond to the prototype that has been designed. Analysts and programmers can improve and analyze the modules designed based on the responses of system users. (iii) Construction Phase is the execution phase in the form of making program scripts and is a continuation of the second phase. This phase also shows the platform, hardware, and software used. Any designs made in the previous phase will be improved using RAD tools. After the new function is available, it is shown to the user for interaction and revision. Then, the analyzer will make changes in each application design based on instructions from the user. (iv) Implementation Phase is the analyzer works intensively with the users during the workshop and designs some of the necessary technical and non-technical aspects. As soon as these aspects are approved, and systems are built and screened, new systems or parts of systems are tested and then introduced to the organization.

Results and Discussion

Requirement Planning Phase

The output results of the Requirement Planning Phase in the form of observations and interviews with admins, coaches, basketball players and their parents get information about user needs in carrying out basketball academy management by utilizing Information Technology, namely: (I) New basketball player members can register online, (II) Admins can more easily group basketball players and coaches according to age group classes, (II) Coaches can prepare training programs for 1 month to facilitate training programs at each meeting, (III) Coaches can collect data on basketball players who are present and absent at each practice, (IV) Coaches can record the development of routine and periodic anthropometric, physical, and skill measurements, (V) Basketball players and their parents periodically get information on training attendance reports and the development of routine and periodic anthropometric, physical, and skill measurements.

RAD Design Workshop Phase

The use case diagram of the Asisten BasketMu application is shown in Figure 2. According to the findings in the Requirements Planning Phase, there are three main actors: admin, coach, and basketball players and their parents. In accordance with the results in the Requirements Planning Phase of user needs, then the admin tasks relate to the data management activities of basketball players and coaches. The coach tasks within the system can input the score of the measurement results and manage the training program, and the basketball player can see the routine training schedule and see the personal skill scores. The next stage is Design, which is to create an application prototype idea in the form of low-fidelity or sketch, as shown in Figure 3. At this stage, in addition to creating a display design concept, it also determines the information data information that will be included in the design display. The results of observations and related trainer needs for data or information that is expected to be displayed on the system are anthropometric data, physical data, and skill data. Information data by the needs of basketball sports, such as anthropometric data, includes height, weight, right/left arm length, right/left leg length, and palm of hand length. Physical data has strength, speed, jumping, and endurance. Skill data includes inside, layups, free throws, mid-range, three-pointers, defense, dribbling, passing, and rebounding. Sketches in the form of low-fidelity prototypes are then implemented in high-fidelity prototype designs using software; in this study, the software used is Figma—the results of the high-fidelity prototype can be accessed at the link https://unimma.link/hbaa.

Based on User Experience testing in previous research [15], on the basketball player interface features the results that need attention for design improvements are: (i) users have difficulty finding the button to register, (ii) the history details display the use of the eye icon, which is the meaning of details is not understood by some basketball players which results in difficulty viewing match history details, and (iii) on the Payment display,

basketball players have difficulty understanding the meaning of the upload button which is intended to upload proof of payment. Meanwhile, the trainer interface features show results that need attention for design improvements: (i) on the score input display, there is a problem, namely the color of the edit icon almost resembles the color in the basketball player ore table, and (ii) on the attendance input display users have difficulty understanding the icon used as a button to make attendance, to provide convenience further changes are made with the form of the submit button. The parts that need improvement will be optimized at the construction phase to suit user needs.

Figure 2. Use Case Diagram Asisten BasketMu Application

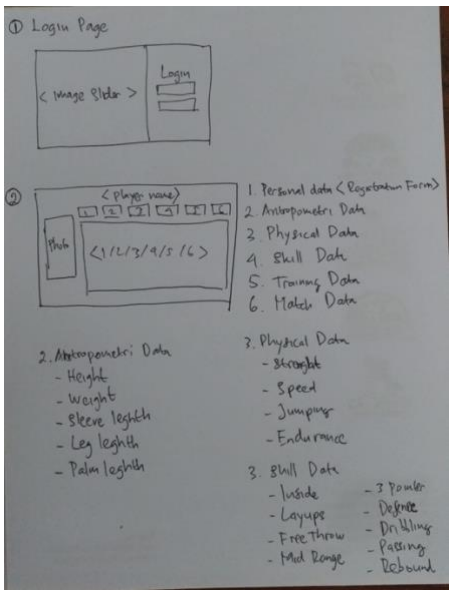

Figure 3. Low-Fidelity Prototype Asisten BasketMu Application

Construction and Implementation Phase

After the RAD Design Workshop Phase is completed with the design and test results, proceed to the construction and implementation phase. The resulting application is a website platform that can be accessed on mobile and desktop devices, but in this study, the main target device is a tablet. The results of the construction phase, as seen in Figure 4, are displayed on the basketball player account and in Figure 5 on the coach account. The results of the Asisten BasketMu Version 1.0 application can be accessed at the link: https://bba.asistenbasketmu.com/.

In this research, user testing uses the User Experience method by measuring performance based on metrics of success in carrying out assignments (Task Success) based on test scenarios that have been prepared. The Task Success metric was chosen because user testing will show the suitability of the navigation design and information architecture in the prototype with the needs and experience of users [24]. The Task Success metric model used in this study is Binary Success. User testing uses 15 players to test the player user interface design and five coaches to test the coach user interface design. The results of User Experience testing using the Task Success metric are seen in Table 1 for tests conducted on the basketball player user interface and Table 2 for testing on the coach user interface.

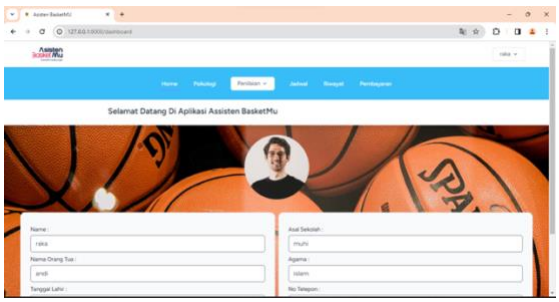

Figure 4. User Interface Basketball Player Account

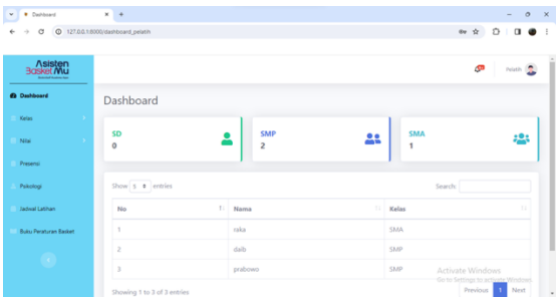

Figure 5. User Interface Basketball Player Coach

Compared to the results of prototype testing in previous research [15], there has been an increase in the average Task Success score, and no issues have been found in the operation of existing features. Based on User Experience testing on your Asisten BasketMu application prototype, the basketball player user interface feature has an average Task Success score of 77%. After improvements and developments in user experience testing, the average Task Success score increased to 97%, as shown in Table 1. In testing the prototype of the coach user interface display feature, the average Task Success score is 82%; after making improvements and developments in User Experience testing, the average Task Success score has increased to 100%, as seen in Table 2.

Table 1. Basketball Player User Interface Task Success Testing Results

Participant	Register	Login	Fill in Bio	View Home	View psychology	View Skill	View Physical	View Antropometry	View Practice	View Game History	View Detail Game History	View Payments	Upload receipt of payment	Logout	Averages
User 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 2	0	1	1	1	1	1	1	1	1	1	1	1	0	1	86%
User 3	0	1	1	1	1	1	1	1	1	1	1	1	1	1	93%
User 4	0	1	1	1	1	1	1	1	1	1	1	1	1	1	93%
User 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 6	1	1	1	1	1	1	1	1	1	1	1	1	1	0	93%
User 7	0	1	1	1	1	1	1	1	1	1	1	1	1	1	93%
User 8	1	1	1	1	1	1	1	1	1	1	1	1	0	1	93%
User 9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
User 14	1	1	1	1	1	1	1	1	1	1	1	1	0	0	86%
User 15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%
Avg	**73%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**80%**	**87%**	**97%**

Table 2. Coach User Interface Task Success Testing Results

Participant	Login	Dashboard	View Class	Edit Class	Delete Class	Vies Assessment	Score Input	View Attendance	Attendance Input	View Training Schedule	Input Schedule Training	Logout	Averages
Coach 1	1	1	1	1	1	1	1	1	1	1	1	1	100%
Coach 2	1	1	1	1	1	1	1	1	1	1	1	1	100%
Coach 3	1	1	1	1	1	1	1	1	1	1	1	1	100%
Coach 4	1	1	1	1	1	1	1	1	1	1	1	1	100%
Coach 5	1	1	1	1	1	1	1	1	1	1	1	1	100%
Avg	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Conclusion

The Rapid Application Development method can provide convenience in building the BasketMu Assistant application. Based on user experience testing, the Assistant BasketMu application is feasible because no problems were found in testing users that made it difficult for users to operate the Assistant BasketMu application, and the average value of task success has increased. The average value of Task Success from user interface testing to fifteen basketball players is 97%, while the average value from user interface testing to five coaches is 100%.

Acknowledgments

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