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ANALYSIS AND DESIGN OF LABORATORY ASSET LOAN WEBSITE USING USER CENTERED DESIGN (UCD) METHOD

Ni Made Yunni Astuti[1], I Gusti Ngurah Darma Paramartha[2]

[1,2]Institut Bisnis dan Teknologi Pelita Indonesia

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Corresponding Author:
Suhardjo Suhardjo
Email:
astutinimadeyunni@gmail.com

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Abstract:

Purpose:
This study aims to analyze and design a web-based Laboratory Borrowing Management System (LBMS) to support the digital management of laboratory assets and borrowing activities at National Education University (UNDIKNAS).

Methodology:
The study employed the User Centered Design (UCD) method to integrate user requirements with system and data architecture through Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) modeling. User interaction and usability were evaluated using the Maze.co platform involving five respondents, while system functionality and access security were evaluated using Black Box Testing.

Findings:
The Maze.co evaluation achieved a 100% Success Rate, with an average task completion time of 31.9 seconds, a misclick rate of 3.8%, and an average perception score of 5.00, categorized as Very Easy. Black Box Testing of eight primary test cases also achieved a 100% Pass rate and demonstrated protection against unauthorized access to the AdminController.

Implication:
The findings indicate that the proposed LBMS design provides a functional and user-oriented solution for supporting laboratory asset borrowing and circulation management at UNDIKNAS, while reducing the limitations associated with manual borrowing procedures.

INTRODUCTION

Development technology information has push transformation in organization education, including in management various services and facilities supporters activity academic. Utilization technology in education No always depending on sophistication technology, but need customized with needs and context its use (Wang et al., 2023). In context education high, one of the facilities that require support management information in a way systematic is laboratory. Laboratory own role important in support activity practical work and learning based experience, so that management assets and facilities laboratory need done in a way effective in order to be able to support activity academic optimally.

Management asset laboratory covers various activity, start from recording assets, monitoring availability, borrowing, returns, up to tracking history use assets. If activity the Still done manually, administrative process can become not enough efficient and potential cause problem in recording as well as monitoring assets. Research about system borrowing goods inventory based website show that digitalization of the lending process can used For increase security and management asset inventory (Kusumawardhani et al., 2025). Findings the show that system based website own potential For support management asset in a way more structured. At the National Education University (UNDIKNAS), the loan process asset laboratory previously Still use manual mechanism with form print. Condition the cause a number of constraints, including inaccurate inventory data and difficulties in track history borrowing assets. Problems that in the end can hinder smoothness management supporting facilities activity practicum. Conditions the show the need something capable system integrate information assets and lending process in one easy platform used by students and manager laboratory.

However, development system information No only related with How system can operate function technically. The system also needs designed based on needs and characteristics users. The system has function complete Not yet Of course can used in a way effective if interface and flow the interaction No in accordance with pattern think as well as need users. Therefore that, an approach that places users as part main in the design process become important in development system information.

One of relevant approach is User Centered Design (UCD). UCD places users as development process center with involving users in identification needs, design solution, until evaluation design. Research by Titania et al. (2024) shows that application of UCD to design UI/UX design can help produce appropriate design with need user. In study said, evaluation use System Usability Scale (SUS) on 20 respondents produce score of 62.25 which is categorized Good. Findings the show that involvement users in the design process can help produce more systems in accordance with need user.

The implementation of UCD has also been used in various type system based website. Hakim et al. (2022), for example, applied UCD in UI/UX analysis and design of the Roya La- Tansa Mart website. Meanwhile Therefore, Novianto and Rani (2022) applied UCD in development UI/UX design on the Learning Management System. Second study the show that approach oriented users can applied to various context digital system for produce design interface that takes into account need user.

Development UI/UX research also shows increasing use user -oriented approach. Deviyana (2025) developed UI/UX e- learning based website use method Design Thinking and gaining SUS score of 82.32 which is categorized Excellent. Research the show that implementation approach design that involves perspective users can produce system academics who have level good reception. However, the object study the system - focused e-learning, not on management assets and administration borrowing laboratory. Findings the strengthened by research by Hanafi et al. (2025) through Systematic Literature Review about development UI/UX design. Research the identify Design Thinking and UCD as dominant approach in UI/UX development, with strong orientation to need users. Study it also shows increasing use websites and applications mobile as well as use of Figma in the design and iteration process design. With Thus, there are sufficient ground strong for apply UCD approach in design digital systems that require interaction direct with user.

Although study regarding UCD and UI/UX has developing, still there is room for apply it in a way more specific to digitalization administration borrowing asset laboratory. Research previously discussed in document more Lots system - focused e-learning, e-commerce, archiving, or system information general, whereas study This focus on the lending process asset laboratory in the environment education high. With Thus, research This directed For fill in gap the through design Laboratory Borrowing Management System (LBMS) developed with involving users since stage identification need until evaluation design.

In the design process, the needs users Then translated to in structure and flow system use Entity Relationship Diagram (ERD) and Data Flow Diagram (DFD). Integration between UCD approach with ERD and DFD modeling allows need users No only translated to in design interface, but also to in data structures and system processes in a way systematic research This with thus No only development - oriented appearance website, but also on suitability between need users, data structures, process flows, and functions system.

For ensure the resulting design can used with good, research This do evaluation usability using the Maze.co platform with involving five respondents. Evaluation done with observe ability users in finish task, time completion, level misclick, and perception to convenience use. Use of five respondents in testing usability also has based on the Nielsen approach, although results quantitative from amount limited respondents need interpreted in a way be careful and don't used For do generalization to larger population wide.

Besides testing usability, research also uses Black Box Testing For evaluate function main system. Research results show that Maze.co evaluation results Success Rate by 100%, the average time settlement task of 31.9 seconds, the level misclick by 3.8%, and the score average perception of 5.00 with category Very Easy. Testing Black Box to eight the main test case also produces level success of 100% (Pass) and show existence protection to unauthorized access valid on AdminController.

Based on description said, research This aim for analyzing and designing lending websites asset laboratory with method User Centered Design (UCD) at the National University of Education. Research in a way special directed For identify need user, design system borrowing asset based website, translate need users to in design systems and interfaces, as well as evaluate usability and functionality resulting design. With Thus, research This expected can give contribution in development system management borrowing asset more laboratories structured, easy used, and appropriate with need user.

LITERATURE REVIEW

Web-Based Information Systems. System information based website is one of the form utilization technology information that can used for support data management and administrative processes in a way integrated. In context management assets, systems based website allows information about assets, availability, and activity borrowing stored and managed in a way more systematic compared to with manual mechanism. Kusumawardhani et al. (2025) showed that development system borrowing goods inventory based website can used for support management and security asset inventory.

Utilization system based the website also provides convenience in provision information to users Because information can accessible through connected devices with system. In context institutions education, system based website can used for support various activity administration and services academic. Maulidin and Suhardi (2024), for example, discuss utilization website as an information medium in environment education. Therefore that, the use of the website platform in development system borrowing asset laboratory viewed in accordance with need for provide information and loan process in a way integrated.

Laboratory Asset Management. Management asset laboratory is part important in support sustainability activity practicum. Assets laboratory need recorded, monitored, and managed so that the information about existence and use can known by the party in need. The loan process is not documented with Good can make things difficult manager in know the status of assets as well as history its use.

Study Kusumawardhani et al. (2025) regarding system borrowing goods inventory based website show that digitalization of the lending process can directed for increase security and management assets. Findings the relevant with study This Because the system developed is also directed for support the lending and management process asset digitally. The difference lies in the context object, namely study This in a way special focused on assets laboratory in the environment college tall.

User-Centered Design. User Centered Design (UCD) is approach design that places users as development process center system. Approach This emphasize understanding to need user, context usage, design solutions, as well as evaluation to resulting design. In study this, UCD is used as approach main for ensure that design Laboratory Borrowing Management System (LBMS) was prepared based on need user, not only based on consideration technical developer.

The implementation of UCD has used in various study UI/UX design. Titania et al. (2024) apply deep UCD system UI/UX design information archiving letter and show that approach the can help produce appropriate design with need users. Hakim et al. (2022) also applied UCD to the UI/UX design of the Roya La- Tansa Mart website, while Novianto and Rani (2022) used UCD approach in development UI/UX Learning Management System design.

In study this, the implementation of UCD is carried out through a number of stages main, namely understand context usage, determine need user, design solutions, and do evaluation together user. Stages the enable the design process done in a way iterative with consider input users on each stage development. Structure the UCD stages also become part main from design methodology research on documents source.

User Interface and User Experience. User Interface (UI) and User Experience (UX) are aspect important in development interacting systems in a way direct with user. UI related with visual elements and components used users when interact with system, while UX is related with experience users during operate tasks and achieve objective through system.

Study Deviyana (2025) regarding e-learning UI/UX development based website show that approach user - oriented design can produce design with high level of usability. Research the get SUS score of 82.32 which is categorized Excellent. Meanwhile that, Hanafi et al. (2025) via Systematic Literature Review find that Design Thinking and UCD are dominant approach in UI/UX development because own strong orientation to need user .

Based on study previously that, the UI/UX aspect becomes consideration important in study This Because system borrowing asset laboratory will used in a way directly by students and administrators laboratory. With Thus, success system No only determined by the existence of features, but also by capabilities users in understand navigation, finding information, and complete the loan process.

Usability Testing. Usability testing used for evaluate to what extent users can interact with system and complete the assigned task. In study this, evaluation done using the Maze.co platform with observe a number of indicators, such as level success settlement task, time completion, misclick, and perception users to convenience use.

Nielsen explains that qualitative usability testing can done with amount relative users small for identify problem in interaction and navigation. In study this, five respondents used in Maze.co evaluation. However, the document research also acknowledges that amount the own limitations if used for do generalization to larger population wide.

Besides that, research use USE Questionnaire for measure perception users to convenience use of instruments the developed by Lund (2001) and used for measure aspect experience users. Lund references are listed in the bibliography study.

Black Box Testing. Black Box Testing used for test function system based on expected input and output without see structure system internal code. Testing This used for ensure that available functions can walk in accordance with needs that have been determined.

In study This is Black Box Testing used for evaluate function main LBMS through eight test cases. Test results show all over the test case obtains Pass status, so that level success testing functional reach 100%.

Research Position. Based on study study previous research regarding UI/UX and UCD has applied to various context, such as e-learning, system archiving, Learning Management System, and e-commerce. Deviyana (2025) focuses on the system e-learning, while Hanafi et al. (2025) did mapping development UI/UX research through approach Systematic Literature Review. Research This own more position specific with applying UCD to the system borrowing asset laboratory in the environment college high. Focus study No only in UI/UX design, but also in translation need users to in the lending process, data structure, and flow system through ERD and DFD. With Thus, research This directed for give solution to problem administration borrowing asset the previous laboratory Still done manually.

Table 1. Summary research gap

Study	Object	Approach	Focus	Difference with study This
Kusumawardhani et al. (2025)	Asset inventory	*Web-based system*	Loans and security asset	No specific to assets laboratory and UCD
Titania et al. (2024)	System archiving	UCD	UI/UX	No system borrowing asset
Hakim et al. (2022)	*E-commerce*	UCD	UI/UX	Different context use
Novianto & Rani (2022)	LMS	UCD	UI/UX	Focus learning
Deviyana (2025)	*E-learning*	*Design Thinking*	UI/UX	No management asset
Hanafi et al. (2025)	UI/UX	SLR	Trends method design	Characteristic study literature
Study This	Asset laboratory	UCD	Borrowing, management assets, UI/UX, usability	Implementation in context laboratory college tall

RESEARCH METHOD

Research Design. Study This use approach design and development with apply method User Centered Design (UCD) in the analysis and design process system. UCD is used for put needs and characteristics users as base in determine solution design system. Research process done in a way gradually start from understand context use, identify need user, design solution, until do evaluation to resulting design. Approach the used for produce design Appropriate Laboratory Borrowing Management System (LBMS) with need users in the environment National Education University (UNDIKNAS) laboratory.

Study No only focused on design interface, but also integrates need users with design data structures and system process flow. Modeling Entity Relationship Diagram (ERD) is used for describe connection inter-entity in system, whereas Data Flow Diagram (DFD) is used for describe data flow and processes that occur in system.

Research Location and Users. Study implemented in the environment National Education University (UNDIKNAS) laboratory, Denpasar, Bali. Object study is the process of managing and borrowing asset the previous laboratory Still done manually.

Users who become focus in design system consists of on student as users service lending and admin/ manager laboratory as the party that manages asset data and the lending process. Identification need second group users the become base in determine features and flow developed system.

User Centered Design Procedure. Stages study refers to the UCD process which consists of on a number of stage main, namely planning, understanding context usage, determine need user, design solution design, and do evaluation to design.

Planning. Stage beginning done with identify problems in the loan process asset laboratory and determine objective development system. Problems main thing found related with the loan process still ongoing done manually, limitations information availability assets, as well as difficulty in know status and history borrowing.

At the stage this is also determined room scope systems and groups users who will use system , namely students and laboratory admin

Understanding the Context of Use. Stage This done for understand how is the loan process asset walking and how users interact with the process. Based on analysis conducted, users need more information easy about asset availability and details as well as mechanism more borrowing simple.

Need main identified covering transparency availability assets, simplification procedure lending and provision information asset in a way more complete.

Specifying User Requirements. Identification results context use Then translated become need system. Needs the covering function authentication, user data management, asset data management, management room, borrowing process, and delivery information regarding loan status.

Need users the Then become base in determine feature main LBMS. System designed so that students can get information assets and carry out the lending process, while the admin can manage asset, user, and activity data borrowing.

Designing the Solution. Stage design done with translate need users to in design system and interface. Design process covers compilation user flow, wireframes, and high-fidelity prototypes. Figma is used as one of the device for produce design interface and prototype.

Besides design interface, structure system modeled using ERD and DFD. The integration used for ensure that design interfaces, data structures, and system processes can walk in a way in harmony.

Evaluation. The resulting design Then evaluated through two types testing, namely usability testing and Black Box Testing.

Usability testing done using the Maze.co platform with involving five respondents. Evaluation used for measure ability users in finish task, time settlement task, level misclick, and perception users to convenience use system. Meanwhile that is, Black Box Testing used for test function main system based on scenario testing that has been determined. Testing done to eight main test case for ensure every function system produce output in accordance with what is expected.

System Design. Design process system done with connect results analysis need users with design system. Development flow can summarized as following:

Identification problem → Analysis context user → Identification Requirements → User Flow → Wireframe → High-Fidelity Prototype → ERD & DFD → Evaluation

Design system produce a number of feature main, including:

1) authentication user;
2) dashboard;
3) user data management;
4) asset data management;
5) management room;
6) loan process;
7) loan status information;
8) notification;
9) management by admin.

The features developed based on need users who have identified at the UCD stage.

Usability Evaluation. Evaluation usability using Maze.co is done with give a number of task to respondents for know whether users can complete the process that has been done designed.

Parameters used includes:

1) Success Rate;
2) Task Completion Time;
3) Misclick Rate;
4) User Perception.

Five respondents used in testing. Evaluation results Then used for evaluate convenience interaction users with design system.

Black Box Testing. Testing functional done use method Black Box Testing focused on the functions that can be observed from side users without analyze program code internally. Eight test cases used for inspect function main system. Every test cases compared between expected results and outcomes current system. Pass status is given if system produce output in accordance with scenarios that have been determined.

Besides function Mainly, testing also takes into account aspect security access, including effort prevent users who do not own right access for access function administrative.

Data Analysis. Result data usability testing analyzed in a way descriptive based on indicators obtained from Maze.co, namely percentage success settlement task, average time completion, level misclick , and score perception users. The results used for describe level convenience use design system.

Black Box Testing Data analyzed based on suitability between results current with expected results at each test cases. System stated fulfil tested function if all over scenario produces a Pass status.

RESULTS AND DISCUSSION

Identification of User Problems and Requirements. Stage beginning study produce identification to problems faced users in the lending process asset laboratory. Based on results observation and survey to student and laboratory admin, found three problem main, namely lack of transparency regarding availability status asset in a way real time, procedure loans that are still outstanding done manually and considered not enough effective, and lack of information about function and identity assets. Problems the show that need users No only related with availability facility borrowing digitally, but also relatedly with access information assets, process efficiency, and transparency of loan status. Students need mechanisms that allow they know availability tools and rooms before do activity practical, while the admin needs a system that can help management inventory, verification lending, and monitoring circulation assets.

Based on need said, research formulate a number of feature main LBMS, namely authentication, management tools, management room, system lending, management users, notifications, and dashboard. System borrowing use status flow PENDING → BORROWED → COMPLETED or REJECTED, whereas asset own status information such as available, borrowed, and maintenance.

Table 2. System Problems and Solutions

Problems Users	Need	Solutions on LBMS
Asset status No transparent	Information availability asset	Management tool with asset status
Borrowing still manual	Digital lending process	Submission form borrowing
Information asset limited	Asset detail information	Asset details page
Management administration not enough structured	Data control by admin	Dashboard and management users
Loan status information limited	Information change of status	Notification

Source: Processed Data 2026

Mapping the show that designed features own connection direct with problems found at the stage beginning research. With Thus, the design process No only based on assumptions developers, but lowered from needs that are obtained through interaction with user.

User Context and Persona. Analysis results context show there are two groups users main, namely students and laboratory administrators. Students need fast and responsive access for check availability assets and do submission borrowing, while the admin needs more access intensive for manage inventory, verify submission, and monitoring circulation assets.

Study Then translate results survey to in user persona. Student persona represent users who experience constraint due to the manual lending process and requiring easy system used for know availability asset as well as do borrowing online. Meanwhile that, the head persona laboratory represent need manager to a system that can reduce error recording and improving accuracy management inventory.

Use user persona in study This important Because help change the result data survey become characteristics more users concrete. With Thus, the design process can directed at goals and obstacles users certain, not only on need functional system in a way general.

Translation of User Requirements into System Design. Identification results need Then translated to in design user flow, wireframe, mockup, and prototype. On the admin side, the user flow system started from authentication Then going to dashboard that provides access to management users, tools, rooms, and borrowing. While that, the flow student made more simple and focused on access information asset as well as submission borrowing

Design wireframe used for validate structure and position element interface before developed become mockup and high-fidelity prototype. Stages the allows researchers inspect structure navigation and functions main before system developed more carry on.

One of characteristics important study This is integration need users with modeling system. ERD is used for describe connection between entities, while DFD is used for describe data flow in system. In design said entity users, assets, rooms, loans, and notifications connected with the lending and management process assets.

The integration show that UCD approach does not stop at design interface. Needs users also translated to in data structures and system processes. For example, the admin's need to control user status translated to in account status attribute like active, inactive, and blacklist, whereas need for track the loan process translated to in transaction status like pending, borrowed, completed, and rejected.

Prototype and Web Interface. Design results produce prototype for two groups user. On the admin side, the system provide page management tools, additions assets, asset details, management users, as well as management processes borrowing. On the other hand students, system provide asset list page, submission loans, loan details, and notifications.

In the borrowing process, students can choose available assets, filling digital form, submit submission, then get information regarding loan details and status. The system also provides notification after submission done.

From the side manager, system allows admins to add and update asset data. This feature important because one of them problem beginning study is limitations inventory data accuracy due to manual processes. With existence management asset structured, change information asset can updated directly on the system.

Usability Evaluation. Evaluation usability done using Maze.co with involving five respondents. The research use six questions that refer to dimensions Usefulness, Ease of Use, and Satisfaction from USE Questionnaire Lund (2001).

Perception results respondents show that all over respondents give score 5 on the sixth questions, so that the average score for every indicator and overall is 5.00. Based on classification used in research, the range 4.3–5.0 is categorized as “Very Easy”.

Table 3. Perception Results Users

Indicator	Average	Category
Convenience channel borrowing	5.00	Very easy
Clarity problem solved	5.00	Very easy
Effectiveness feature	5.00	Very easy
Convenience finish task	5.00	Very easy
Convenience find information	5.00	Very easy
Satisfaction use system	5.00	Very easy
Overall average	5.00	Very easy

Source: (data processed 2026)

The results show that LBMS design can understood and used by the group engaged users in testing. However, because amount respondents only five people, the results the should understood as results evaluation beginning to design, not as base for do generalization to all over users laboratory. Limitations it is also acknowledged in document study.

Maze.co Usability Testing. Besides perception user, testing using Maze.co provides data regarding performance users when finish assignment. Testing conducted on May 5, 2026 with five respondents and resulted in Maze score of 98.

Testing prototype show that all over respondents succeed finish task with Success Rate 100%. Average time settlement task is 31.9 seconds, while misclick rate by 3.8%. Drop-off recorded by 0%, which shows that all over respondents finish task until end.

Table 4. Maze.co Results

Respondents	Success Rate	Duration	Misclick
R1	100%	34.67 seconds	0
R2	100%	22.32 seconds	2
R3	100%	25.21 seconds	0
R4	100%	37.33 seconds	0
R5	100%	39.76 seconds	0
Average	100%	31.9 seconds	3.8%

Source: Processed Data 2026

The results show that all over respondents can finish scenario assigned task. Duration settlement range between 22.32 to 39.76 seconds, with respondent R2 as users with time settlement fastest.

From the perspective usability, Success Rate 100% and Drop-off 0% indicate that channel tested tasks can followed by all respondents. Meanwhile that, misclick rate by 3.8% shows Still there is A little error click, but in a way overall navigation can completed without failure assignment. Findings This consistent with score perception users of 5.00 which shows level convenience high usage.

Functional Testing. After evaluation usability, system tested use method Black Box Testing done to eight function main, namely Login, Register, User Data, Logout, Dashboard, Borrowing, and Notifications, including scenario input validation.

Table 5. Black Box Testing Results

No.	Feature	Main Scenario	Results	Status
1	Login	Valid credentials	In accordance hope	Pass
2	Login	Invalid email format	In accordance hope	Pass
3	Register	Valid user data	In accordance hope	Pass
4	User Data	Admin adds users	In accordance hope	Pass
5	Logout	Users go out system	In accordance hope	Pass
6	Dashboard	Statistics displayed	In accordance hope	Pass
7	Borrowing	Submission processed by admin	In accordance hope	Pass
8	Notification	Loan status changed	In accordance hope	Pass

Source: data processed 2026

All over eight the test case obtains Pass status, so that level success testing functional is 100%. The test also shows that system can limit access users who have not authenticated to Dashboard via URL directly. Besides that, validation server-side on login and registration process used For check email format and account status.

Findings the show that the resulting design via UCD no only can used with Good from perspective users, but also has fulfil function main designed. With Thus, the results evaluation from two sides — usability and functionality — providing proof supporters to eligibility LBMS design.

Discussion. Research result show that UCD implementation helps connect need users with design LBMS system. Problems beginning in the form of ambiguity availability assets, manual lending processes, and limitations information asset translated become feature management tools, availability status assets, forms digital lending, asset details, notifications, and dashboard.

Findings This strengthen results study previously shown that UCD can used For produce design more interface in accordance with need user. Titania et al. (2024) uses deep UCD system UI/UX design information archiving letter, whereas Novianto and Rani (2022) applied UCD to the Learning Management System. The difference is, the research This apply approach in the context management and lending asset laboratory, so that need translated user to in design related direct with circulation assets and administration laboratory.

Research results are also in line with study Deviyana (2025) which shows that approach oriented users can produce UI/UX design with level good usability. However, research Deviyana focuses on e-learning, whereas study This system-focused borrowing asset laboratory. With Thus, research This expand implementation approach design oriented users in context administration assets in college tall.

Interesting thing from study This is integration between UCD, UI/UX design, ERD, and DFD. The need users No stop at the visual design, however translated to in data structures and system process flow. For example, the need manager For control user status represented through user status attributes, while the borrowing process represented via connected transaction status with user and asset data. The integration give a more approach comprehensive Because aspect experience users and aspects structure system developed in a way sustainable.

From the side evaluation, success rate of 100%, Drop-off 0%, and misclick rate 3.8% shows that five respondents capable finish given scenario. The results reinforced by the average score perception 5.00. Although Thus, the results the No can direct generalized Because size relative usability sample small. Document study Alone confess that use of five respondents more appropriate For identify usability issues at the stage early and have limitations if used For generalization statistics.

From the side functional, all eight The test case obtained Pass status. The result show that function base like authentication, management users, dashboard, lending, and notifications can walk in accordance defined scenarios. Testing also finds and fixes problem with function getDashboardStats() previously cause number statistics No appears and is zero. After done improvements to database queries, statistics can displayed according to the data in the database. Findings This show that the testing process No only functioning as validation end, but also helps find and fix problem implementation.

In a way overall, results study show that UCD can used as approach For translate problems and needs users become design system borrowing asset structured and easy laboratory used. However, research furthermore need do evaluation with amount more users size and period more use long For get more evidence strong about effectiveness system in condition operational real. Recommendations is also in line with with research suggestions For do testing more further and integrate LBMS with system academic such as LMS or academic portals.

CONCLUSION

Study This produce Laboratory Borrowing Management System (LBMS) as digital solutions for overcome problem management and lending asset the previous laboratory done manually. Development system use approach User Centered Design (UCD) which involves the process of understanding context users, identify needs, designing solutions, as well as do evaluation to design together user. Approach the allows problem users, in particular lack of transparency information availability assets, procedures under-borrowing efficient, and limitations information assets, translated become feature system like management tools, management room, submission digital lending, notifications, and dashboard.

Evaluation results show that LBMS design obtains response positive from user. Testing using Maze.co on five respondents produce success rate by 100%, drop-off by 0%, the average time settlement task of 31.9 seconds, and misclick rate by 3.8%. In addition that, assessment perception users produced an average score of 5.00 which is included very easy category.

From the side functionality, Black Box Testing to eight case testing show that all over scenario obtain Pass status, so level success functional system reached 100%. Testing covers function authentication, registration, management users, dashboard, lending, and notifications. The system is also capable of apply validation to input data and limit access users who have not authenticated to page administrative.

With Thus, research This show that UCD implementation can produce design system borrowing asset appropriate laboratory with need users at a time own level good usability and functionality at the stage testing beginning. Contribution main study lies in the translation need users to in design interface at a time data structure and flow system, so that developed solutions No only oriented on appearance, but also on management processes asset laboratory in a way integrated.

Limitations. Study This own a number of necessary limitations considered in interpret results. First, evaluation usability only involving five respondents. The number the can used For testing beginning to problem usability, but Still limited if the result used For do generalization to all over users laboratory. Therefore that, score perception as much as 5.00 is necessary understood as description evaluation beginning to group test users.

Second, testing done in context prototype and environment limited research. Research Not yet serve evaluation use system in period long operational and with amount transaction more borrowing big. Because of that that aspect like stability system in use term length, change pattern use and impact system to efficiency administration longitudinally still need reviewed more carry on.

Third, research focused on development and evaluation systems in the environment National Education University laboratory. With Thus, the implementation systems in the laboratory with characteristics assets, procedures administration, and needs different users need through the process of adaptation and evaluation return.

Future Research. Study furthermore can expand evaluation with involving amount more respondents big and comes from from various group users, including student from several study programs, laboratory assistants, heads laboratory, and other parties administration. Expansion the expected can produce evaluation better usability representative.

Besides that, research next can integrate LBMS with system academics who have used by universities high, such as Learning Management System (LMS) or academic portal. This integration potential increase convenience access and reduce need users For move interplatform. Research continuation can also be evaluate system based on usage data actual, for example time processing borrowing before and after implementation, number error recording assets, level utilization asset laboratory, as well as satisfaction users in period certain. Approach the will give more evidence strong about impact of LBMS on efficiency management asset laboratory.

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