ARTICLE

Design, Development, Implementation, and Evaluation of a Mobile Application for Academic Library Services

A Study in a Developing Country

Hamid Reza Saeidnia, Marcin Kozak, Brady Lund, Nishith Reddy Mannuru, Hamid Keshavarz, Bakthavachalam Elango, Afshin Babajani, and Ali Ghorbi

ABSTRACT

Universities and scientific educational institutions today need targeted information services to ensure that their user communities have the information they need. This study aims to design, develop, implement, and evaluate a mobile application for academic library services at Tarbiat Modares University (Tehran, Iran). A four-stage process was utilized to accomplish this aim. In the first phase, relevant literature was reviewed to obtain appropriate data requirements for the app. A questionnaire was designed and administered to survey expert librarians on the most suitable data requirements. The second phase involved the design of the user interface and user experience with the assistance of experts, followed by the evaluation of the experience. The third phase involved the development of the app in the Android Studio environment using the Java programming language, based on the requirements identified in the first and second phases. The app was then made available to the user community. Finally, the app was evaluated in the fourth phase using a questionnaire tool. The researchers found this approach to application development to be both economical and effective in the context of a developing country.

INTRODUCTION

Academic libraries are recognized as essential institutions for providing scientific resources and facilitating access to the user community.[1] Considering the role of university libraries in providing guidance and quality information to satisfy users' information needs, these libraries are considered one of the most important scientific, educational, and research information bases on any campus.[2] University libraries support a wide variety of academic programs as part of their mission. Therefore, in every university, the proper functioning of the library is crucial, and any type of tool that facilitates this function and adds to its richness is also important.[3] The way these libraries provide services is also important. Library services are provided to fulfill a library's organizational mission and obligations to patrons.[4] Mobile services in the library are one of the most flexible types of library services.[5] These services are not limited to one physical place or specific population and can meet the needs of a fluctuating service population.[6] The goals and objectives of mobile library services are an integral part of the overall mission of the library

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system.[7] In this study, the authors designed, developed, and evaluated a mobile app for academic library services at Tarbiat Modares University. The app was designed to provide a range of academic library services to users, such as access to resources and information, as well as tools for searching and navigating the library's collections.

LITERATURE REVIEW

Past research has shown the effectiveness of different forms and methods of improving information access and dissemination in various organizations.[8] Our research aims to improve student access to information at Tarbiat Modares University.[9] The goal of this research is to design and develop a mobile app to address the lack of a comprehensive information access system in the central library at Tarbiat Modares University.

The field of research on information access and dissemination has a long history with many notable studies. The O'Neill thesis highlighted the importance of establishing a relationship between the library and researchers' information needs through customized profiles that include keywords and selected themes.[10] Horne and Kristensen described a campuswide table of contents service at Cornell University Library, which aimed to improve the performance of the service for scholars.[11] Hossain and Islam discussed traditional and electronic methods of information dissemination, emphasizing the importance of such services.[12] De Giusti et al. developed an ontology-based system to identify users' information context, which allows librarians to develop users' profiles beyond the information the users offer themselves.[13] Porcel et al. suggested a fuzzy logic method for the dissemination of research resources, which improves users' access to the information they need and recommends specialized and supplementary research resources to users.[14] This study intends to develop a mobile app specifically for students of Tarbiat Modares University to improve their access to information. We believe that students with access to this app, when it is developed, will access information better and faster.

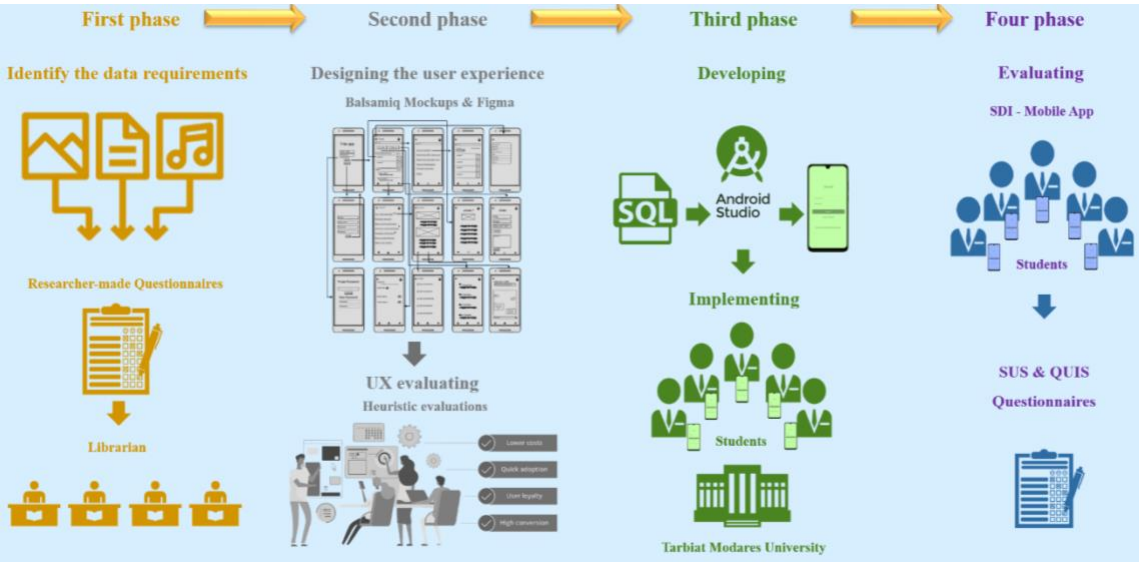
Information access has been identified as a major challenge for developing countries with limited access to personal computers, weak technological infrastructure, and barriers to accessing information due to restrictive policies.[15] This is particularly prevalent in some developing Asian countries.[16] Iran, despite having a strong communication infrastructure, also faces challenges with access to information.[17] The use of the internal internet (Iran's internet is heavily censored and monitored) is widespread, while access to the global internet is limited, resulting in shortcomings in accessing global and high-quality information.[18] As a result, many organizations and government centers in Iran rely on the internal internet for disseminating information.[19] Recent literature suggests that the status of information access in public and university libraries in Iran is low, with traditional methods of information dissemination (i.e., card catalogs) still in use.[20] However, studies have shown that university libraries in developing countries can play a significant role in human development by providing a noncommercial mechanism for distributing information on important societal topics such as health, agriculture, nutrition, and women's health.[21] To achieve this, it is necessary to move beyond traditional university library services and adopt new technologies, such as smartphone apps.[22] In developing countries, it is particularly important to strengthen people's ability to access reliable and accurate information.[23]

METHODOLOGY

In this study, a thorough review of scholarly literature was conducted to identify the necessary requirements for developing a mobile app. A graphical abstract, represented in figure 1, outlines the project description. Expert librarians were responsible for selecting the necessary

requirements from the chosen features for the application. The design of the mobile app prototype was carried out with the assistance of IT experts. The usability of the app was evaluated using two standard questionnaires. The following sections provide an in-depth examination of each phase of the app's development.

Figure 1. Graphical abstract of the research phases. First, we conducted a review of the literature to identify the data requirements for an app. With the data obtained, we designed a researcher-made questionnaire and used that to identify the most appropriate features and requirements. Expert university librarians provided support during this phase. Our second phase involved designing the user interface and user experience of the mobile app with the help of IT experts. We used the heuristic method as well as Jakob Nielsen's 10 general principles to evaluate the prototype. In the next phase, we developed the mobile app using the data obtained from the first and second phases. We released the mobile app to students after it had been developed. Using SUS and QUIS tools, we evaluate the usability of the mobile app in the final phase.



First Phase: Identifying the Data Requirements

The first phase of the study involved identifying the key features of a mobile app for information access and library finding. To do this, a review approach was used, partially following the PRISMA-ScR guidelines.[24] A search of various databases was conducted using keywords and keyphrases such as "academic libraries," "mobile service," "smartlibrary," "library services," "library," "application," "app," "smartphone," "mobile-based application," "mobile-based app," "mobile library service," "mobile technology," "mobile devices," "mobile library," and "m-library app." Inclusion criteria for the publications reviewed required that articles or reviews be original, available in full text, written in English, and about the subject of mobile-based information access and finding for academic libraries. Based on the results of the review, a questionnaire was designed to validate the selected application options and features (see appendix A).[25] The reliability and validity of the questionnaire were calculated and confirmed by experts in the field of librarianship and information science. The questionnaire was distributed to 16 participants via email and Google Forms, with the options scored on a scale of 1 to 5. IBM SPSS Statistics software, Version 19.0 was used to complete all statistical analyses.

Second Phase: Designing and Evaluating the User Experience

In the design phase, the focus was on enhancing the user experience and feature list of the mobile app through online workshops with experts in information technology, informatics, user experience design, and Android mobile app development. Participants were invited to participate via social networks (e.g., Instagram, Facebook, and LinkedIn) from October 20–28, 2021, with the goal of enrolling as many experts as possible. Ultimately, 14 experts participated in the design phase. To better understand the user experience flow, we used the Balsamiq Mockups tool (https://balsamiq.com/), a low-fidelity wireframing tool that is industry standard.[26] The Figma web application (https://figma.com/) was also used for prototyping the mobile app, a collaborative interface design tool that emphasizes user experience and interface design.[27] Once an alpha version of the prototype was accepted by the experts, it was evaluated using the heuristic method to identify areas for improvement before the development phase. Five experts in user experience design and mobile app development were asked to evaluate the prototype using Jakob Nielsen's 10 general principles of Nielsen's severity ranking scale, based on a five-point scale (see appendix B).[28]

Third Phase: Developing and Implementing

The results obtained from the first and second phases of planning provided the knowledge to be used in the development phase, in which we developed a database using My Structured Query Language (MySQL) and a mobile app to assist with information access and finding using Android Studio. During this phase, students were recruited for our study through purposive sampling, and interested candidates contacted us through online registration after seeing the recruitment posts on Tarbiat Modares University's social networks. Twenty-seven participants registered and used the app from November 10 to December 25, 2021, for at least 20 minutes per day. The app contained an initial guide and an About Us section with a WhatsApp group created for participants to ask the app's creators any questions related to the study and the app. The app was updatable to resolve any technical issues.

Fourth Phase: Evaluating Usability

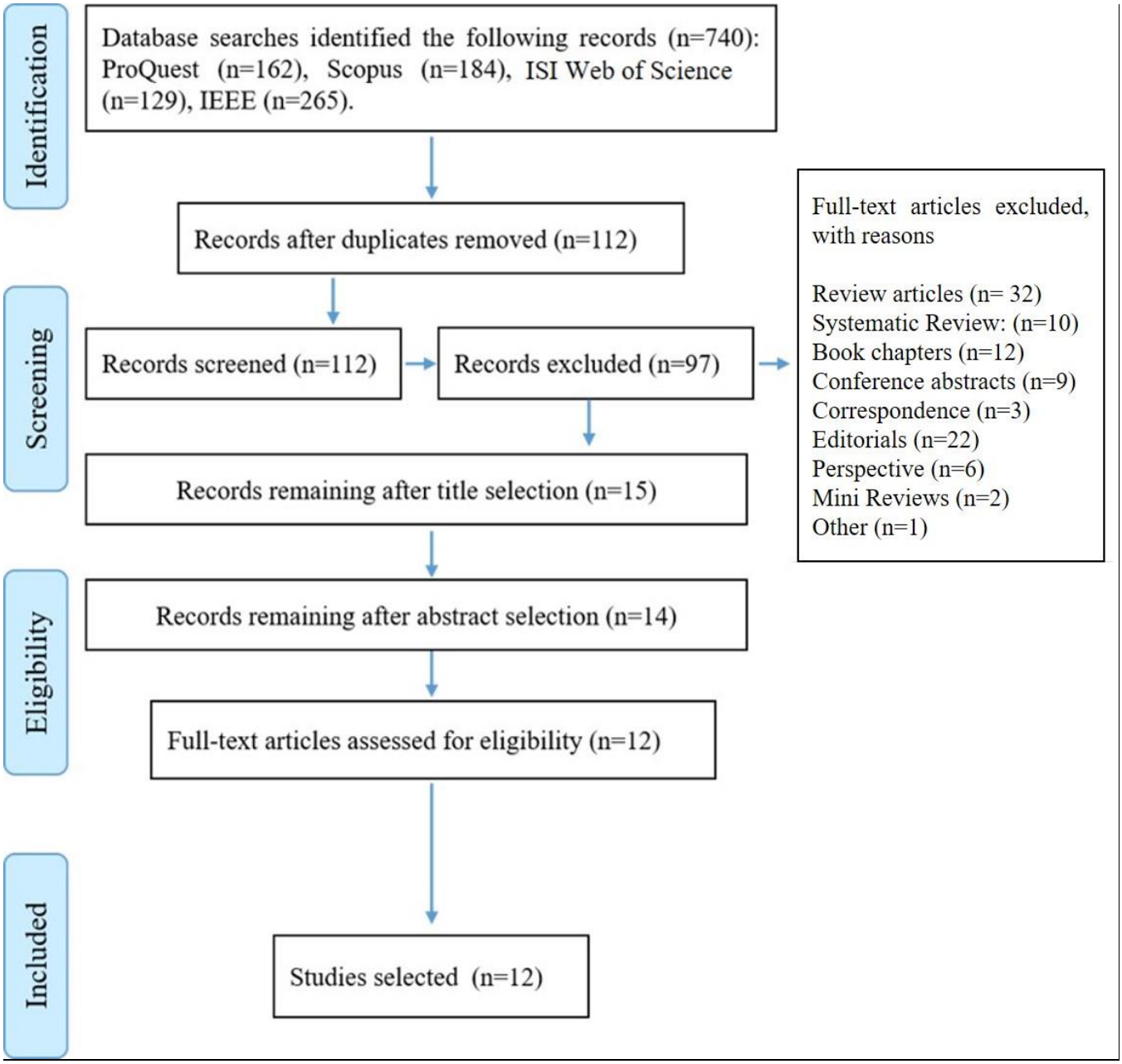
After the implementation phase, which ended on December 26, 2021, the usability of the information access and library finding app was evaluated using two standard questionnaires: the System Usability Scale (SUS) and the Questionnaire for User Interaction Satisfaction (QUIS).[29] The QUIS, which contains six sections, was used to evaluate user satisfaction with specific aspects of the human-computer interface, while the SUS, which includes 10 questions rated on a five-point Likert scale, was used to obtain an overall impression of users' subjective evaluations of the app (see appendix C). The data was analyzed using SPSS software version 22.

RESULTS

General Characteristics

This study identified the features of a mobile-based app for library finding and information access for an academic library in Iran. The objective was achieved by retrieving 1,074 documents, eliminating duplicate records (n=193), and screening 881 records. Using the inclusion and exclusion criteria, 12 articles were selected for further analysis (see appendix D for the twelve articles and the features chosen from each). Figure 2 depicts how articles were chosen.

Figure 2. The procedure for inclusion and exclusion of publications.



Sort and Rate Features

A set of 65 features of a mobile-based SDI app for the academic library were identified and were divided into six categories: access (6 items), search (8 items), recommend (8 items), notification (10 items), sending (6 items), and other (27 items). Academic librarians and information science experts scored the identified features (table 1).

Table 1. The mean of the selected features

#	**Access feature**	**Mean**
1	Access 24/7	4.71 +
2	Access to books to read and information on many topics	4.41 +
3	Access to appropriate educational websites	4.31 +

#	**Access feature**	**Mean**
4	Access to the other library website	3.92 +
5	Access to collaboration map and contact information	3.43 +
6	Access to the library website which contains book reviews by students	3.25 +
#	**Search feature**	**Mean**
1	Catalog searches	4.33 +
2	Metasearch	4.12 +
3	Searching databases	4 +
4	Search by QR code scan	3.78 +
5	Search by barcode scan	3.74 +
6	Search bibliographic	3.42 +
7	Journal search	3.12 +
8	OPAC	3 +
#	**Sending feature**	**Mean**
1	Sending files (text and Image)	4.65 +
2	Hyperlinks	4.32 +
3	E-resources	4.12 +
4	Video	3.45 +
5	Voice	2.75 +
6	Podcasts	1.85 -
#	**Recommend feature**	**Mean**
1	Electronic journals	4.91 +
2	Learning resources	4.89 +
3	Course reserves	4.56 +
4	Recommended books and information on academic library	4.32 +
5	Events	3.94 +
6	Tutorials	3.84 +
7	Recommend new books	3.14 +
8	News	2.32 -
#	**Notification feature**	**Mean**
1	Due date reminder	4.47 +
2	Renewal request	4.42 +
3	New arrival notification	4.38 +
4	Information about seminars and workshops	3.8 +
5	Overdue notification	3.5 +
6	RSS	3.2 +
7	Change of library hours/holiday	3.1 +
8	News and events	2.7 +
9	New information on products and services	2.3 -
10	Text alerts	1.2 -
#	**Other feature**	**Mean**
1	Optical character recognition (OCR)	4.81 +
2	Research guides	4.72 +
3	Citation management	4.68 +
4	Ask a librarian reference services	4.63 +

#	**Access feature**	**Mean**
5	Borrowing record	4.52 +
6	Library rules	4.41 +
7	Favorites	4.38 +
8	View your record	4.23 +
9	Floor information	4.12 +
10	Ask a librarian	4.4 +
11	Library locator	4.1 +
12	Question board	4 +
13	Reference collection	4 +
14	Created group	3.91 +
15	Library maps	3.82 +
16	Audiobooks	3.71 +
17	Reserve	3.42 +
18	Return	3 +
19	Feedback	2.9 +
20	Full-text article finder	2.7 +
21	Book circulation	2.5 +
22	Virtual tours	2.4 -
23	FAQ	2.3 -
24	Library history	2 -
25	Audio tours	1.9 -
26	Library hours	1.8 -
27	Contact us	1.3 -

+ = selected items; - = removed items

Designing the User Experience

The mobile application's user experience flow includes features for easy ordering and tracking of orders for resources from other libraries (e.g., books, articles, etc.), as well as access to library news and recommendations. It starts with a registration and login process, where users must provide an email address, username, and password to create an account. Once logged in, the user is taken to a menu page with options for ordering and tracking, search, recommendations, and library news. The user can then proceed to the order completion page and fill out the necessary fields to submit the order or access the order tracking page. The tracking page includes a progress bar that displays the status of the user's order and an online chat section where the user can communicate with a librarian. The menu page also includes a search option and a suggestions feature to help users find information quickly. There are also two action bars on the menu page, one at the top and one at the bottom of the screen, which provide access to additional features such as messages, bookmarks, help, last read, notifications, and settings (see fig. 3).

Figure 3. User experience flow of the prototype.

User Experience Evaluation (Heuristic Method)

During the heuristic evaluation of the app's prototype, these features each earned zero to two points, meaning that the prototype received a rejection or an acceptable score. Table 2 presents the results: ΣA represents the total number of points for each item from Jakob Nielsen's 10 general principles; ΣB is the same as ΣA after eliminating duplicated points, which finally leads to a total ΣA = 45 and ΣB = 23.[30]

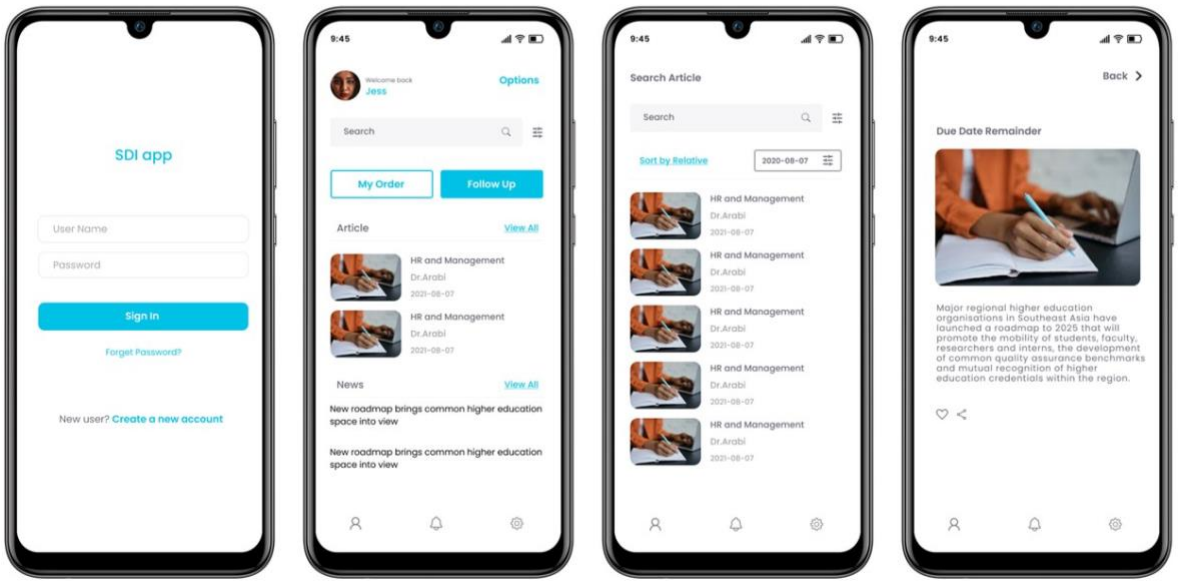
Table 2. SDI mobile app prototype scoring according to Jakob Nielsen's 10 general principles of heuristic evaluation: (1) A: number of point scale; (2) B: number of point scale after removing duplicates

			Expert identification number				
Heuristic principle	**ΣA(1)**	**ΣB(2)**	**#1**	**#2**	**#3**	**#4**	**#5**
Visibility of system status	4	3	0	1	2	1	0
Match between system and the real world	2	2	0	0	0	0	2
User control and freedom	4	3	1	1	0	2	0
Consistency and standards	2	1	0	1	0	0	1
Error prevention	6	3	2	2	1	1	0
Recognition rather than recall	3	1	0	0	1	1	1
Flexibility and efficiency of use	9	3	2	2	2	2	1
Aesthetic and minimalist design	6	3	1	0	1	2	2
Error identification, diagnosis, and recovery	3	1	0	1	0	1	1
Help and documentation	6	3	2	2	1	1	0
Total	45	23	8	10	8	11	8

Developing the Mobile App

In the development phase, functional requirements, user interface screens, and software database designs were created. The interface design is a process that involves installing specialized software on smartphones and connecting them to the Internet so that the users can register their accounts in the app. Thus, the users were registered on the server and their registration IDs were stored on the app server. MySQL was used to design and develop the database, and Android Studio was used to develop the app. Eventually, after a thorough consultation with librarian specialists and experienced IT, a beta version of the SDI mobile app was developed (see fig. 4 and appendix E).

Figure 4. Examples of pages from the mobile app SDI.



Usability Evaluation of the SDI Mobile App

High scores indicate higher satisfaction with the product. In the SDI mobile app, the average QUIS rating was 6.86, and a score of less than five indicates an unacceptable level of satisfaction. Of the 27 sections, 9 (33.3%) were higher than seven. Nearly all response items scored higher than five (see table 3).

Table 3. User satisfaction ratings for SDI mobile app

Category	Section	Range	Mean
1. Overall reactions to the software	Overall reactions: Terrible-wonderful	7–9	7.13
	Overall reactions: Difficult-easy	7–9	7.11
	Overall reactions: Frustrating-satisfying	5–9	6.85
	Overall Reactions: Inadequate power-adequate power	5–9	6.82
	Overall reactions: Dull-stimulating	5–9	7.00
	Overall reactions: Rigid-flexible	5–9	6.83
2. Screen factors	Reading characters on the computer screen	7–9	7.12
	Highlighting on the screen simplifies the task	7–9	7.10
	Organization of information on the screen	7–9	7.04
	Sequence of screens	7–9	7.01
3. Terminology and system information	Use of terms throughout the system	5–9	5.89
	Computer terminology is related to the task	4–9	5.85
	Position of messages on screen	4–9	5.55
	Messages on the screen that prompt the user to input	5–9	6.40
	The computer keeps you informed about what it is doing	4–9	5.90
	Error messages	5–9	6.20
4. Learning	Learning to operate the system	4–9	6.90
	Exploring new features by trial and error	5–9	6.65
	Remembering names and using commands	5–9	6.75
	Tasks can be performed in a straight-forward manner	5–9	6.19
	Help messages on the screen	4–9	5.93
	Supplemental reference materials	5–9	6.15
5. System Capability	System speed	7–9	7.12
	System reliability	7–9	7.12
	Designed for all levels of users	7–9	7.13
	Correcting mistakes	5–9	6.81
	System sounds tend to be	5–9	6.90

Based on the results obtained from the users through the SUS questionnaire, the overall usability score of the mobile app for information access and library finding was 89 out of 100. This score is higher than 83 (> 80.3), so based on the SUS formula, we can describe the usability of the mobile app as: Average SUS score = 89 = Excellent = Grade A.

DISCUSSION

The results of the first phase of our study indicate that 55 out of 65 identified items received a mean of 2.5 or higher from the statistical population's perspective. In the "access feature" category, items such as 24/7 access (4.71 mean) and access to books/information (4.41 mean) were highly rated. The "search feature" category saw high usage of the catalog search (4.33 mean) and metasearch (4.12 mean) features. A well-designed application allows for easy catalog searches, as evidenced by a survey of university students who had a positive understanding of using mobile-based apps to access the library catalog.[31] The catalog search feature was identified as one of the most important features of library applications.[32] In the "sending feature" category, the highest means were received by the ability to send files (text and image) and hyperlinks (4.65 and 4.32, respectively). These features are considered practical and important for academic use, as discussed in previous studies on the use of WeChat and other social media in academic libraries.[33]

Academic library applications often feature a recommender system, which utilizes user behavior to suggest appropriate items such as journals, books, and tutorials.[34] Studies on designing and evaluating academic library applications have also incorporated features such as new book, e-journal, and event recommendations.[35] The "recommend feature" category saw the highest mean for e-journals (4.91). Other methods, such as SMS, have been used by academic libraries to send messages such as news announcements and event reminders, but in-app notification systems are considered more efficient and cost-effective.[36] Our study also found that participants gave the highest ratings to item due date reminders and renewal requests in the "notification feature" category (4.47 and 4.42 mean, respectively).[37] Finally, the "other features" category saw high ratings for the ability to use optical character recognition (OCR) to automatically detect text in document images and convert them into searchable and editable text (4.81 mean).[38] This capability can assist students in discovering library resources through scanning, as shown in a study aimed at designing an OCR-capable app for students.[39]

Based on the findings from the second phase, the experts determined that the design of the user flow for the library mobile app should prioritize simplicity and ease of use. The online workshop discussed the technical and data requirements for the app and used the Balsamiq Mockups software to create a user experience flow. These findings are crucial for the prototype design and user interface of the app. Additionally, the study addressed the importance of considering user experience and social justice in the design of software services, which has been recognized as a human rights issue by some scholars.[40]

Users generally had a positive opinion of the library mobile app, finding it easy to use and well organized. The app received high scores in screen factors and display organization with a mean of six or above. The "Terminology and System Information" section of the app also received positive evaluations with a median higher than five in its options range of 4–9. Additionally, features such as the ability to adapt to changing conditions, remember and take shortcuts, and provide helpful messages were positively evaluated, with means above six in the range of 5–9. Error prevention and rectification were also considered important and positively evaluated.

This study has some limitations, such as limited database access for the developers and the app being available only for Android users, which excluded iOS users. Additionally, while the search for data elements and requirements in the first phase was broad, it was not as comprehensive as desired, which may have limited the scope of the study. Furthermore, the sample size of the statistical population may not be representative of the entire population of university students

and their perceptions of library mobile apps. Despite these limitations, the study presents a comprehensive and realistic approach to the development of a mobile app for university libraries. This could be useful for app developers and managers of university libraries in creating a mobile app for their own libraries.

CONCLUSION

This study aimed to design, develop, implement, and evaluate a mobile application for academic library services at Tarbiat Modares University in Tehran, Iran. Through a methodological design, the research team reviewed relevant literature, surveyed expert librarians on data requirements, designed the user interface and user experience, developed the app using the Android Studio environment and Java programming language, made it available to the user community, and finally evaluated it using a questionnaire tool. The results showed that the app was able to effectively provide a range of academic library services to users, such as access to resources and information, as well as tools for searching and navigating the library's collections. Furthermore, the study highlights the importance of involving experts in the design and evaluation process of a mobile app, as well as the use of software related to user interface design and user experience to ensure a more professional design. This app will be a unique offering in Tarbiat Modares University's information environment, which will be beneficial for student and faculty's academic and information needs.

APPENDIX A. QUESTIONNAIRE

	In your opinion, to what extent are the following features effective for use in a mobile-based Selective Dissemination of Information (SDI) app in academic libraries?	***1***	***2***	***3***	***4***	***5***
Access feature	Access 24/7					
	Access to books to read and information on many topics					
	Access to appropriate educational websites					
	Access to the other library website					
	Access to collaboration map and contact information.					
	Access to the library website which contains book reviews by students					
Search feature	Catalog searches					
	Metasearch					
	Searching databases					
	Search by QR code scan					
	Search by barcode scan					
	Search bibliographic					
	Journal search					
	OPAC					
Sending feature	Sending files (text and image)					
	Hyperlinks					
	E-resources					
	Video					
	Voice					
	Podcasts					
Recommend feature	Electronic journals					
	Learning resources					
	Course reserves					
	Recommended books and information on academic library					
	Events					
	Tutorials					
	Recommend new books					
	News					
Notification feature	Due date reminder					
	Renewal request					
	New arrival notification					
	News					
	Information about seminars and workshops					
	Overdue notification					
	RSS					
	Change of library hours/holiday					
	News and events					
	New information on products and services					
	Text alerts					
Other feature	Optical character recognition (OCR)					
	Research guides					
	Citation management					
	Ask a librarian reference services					
	Borrowing record					
	Library rules					

	In your opinion, to what extent are the following features effective for use in a mobile-based Selective Dissemination of Information (SDI) app in academic libraries?	***1***	***2***	***3***	***4***	***5***
	Favorites					
	View your record					
	Floor information					
	Ask a librarian					
	Library locator					
	Question board					
	Reference collection					
	Created group					
	Library maps					
	Audiobooks					
	Reserve					
	Return					
	Feedback					
	Full-text article finder					
	Book circulation					
	Virtual tours					
	FAQ					
	Library history					
	Audio tours					
	Library hours					
	Contact us					

APPENDIX B. NIELSEN'S SEVERITY RANKING SCALE, BASED ON A FIVE-POINT SCALE

0 = I do not agree that this is a usability issue.

1 = Not to be fixed unless extra time is available for the project.

2 = This should be fixed at the lowest priority.

3 = Must be fixed, so it should be given high priority.

4 = This must be fixed before the product can be released.

APPENDIX C. THE SYSTEM USABILITY SCALE

The System Usability Scale (SUS) has a proprietary formula that determined the app's usability in the form of grade and adjective ratings.[41]

SUS Score	Grade	Adjective Rating
> 80.3	A	Excellent
68 – 80.3	B	Good
68	C	Okay
51 – 68	D	Poor
< 51	F	Awful

APPENDIX D. IDENTIFIED FEATURES BASED ON THE LITERATURE REVIEW

#	First author	Year	Features
1	Chen[42]	2019	Search catalogs, databases, and other resources of the library, Metasearch
2	Mansouri[43]	2019	Search by barcode scan, Search by QR code scan, Renew and circulation Audio tours, Virtual tours, Audiobooks, Library maps, Events, Contact us, FAQ, Feedback
3	Dar[44]	2019	Contact/feedback from users, Ask a librarian reference services, OPAC, Downloads (podcasts, videos, mobile apps, etc.), Circulation, Book circulation, return, reserve, ILL, Hyperlinks to e-resources, Notification (Due date reminder, Renewal request, New arrival notification, Information about seminars and workshops, Overdue notification, Change of library hours/holiday, News and events, New information on products and services)
4	Boller[45]	2017	Access 24/7, Access to books to read and information on many topics Links to appropriate educational websites, A link to the other library website, A link to the library website which contains book reviews by students, recommended books, and information on academic library events such as author visits
5	Hahn[46]	2017	Favorites, journal search, library hours, course reserves, Question board
6	Pun[47]	2015	Send files, support video-chat, and group and voice messaging
7	Canuel[48]	2015	Search bibliographic, citation management
8	Pu[49]	2015	News, Recommend new books, Floor information, New book notice, Library rules, View your record, Library history
9	Hahn[50]	2014	Optical character recognition (OCR)
10	Pianos[51]	2012	Collaboration map and contact information Catalog, borrowing record, reference collection, electronic journals, databases, books, Text alerts
11	Johnstone[52]	2011	Learning resources, Ask a librarian, Library Locator, RSS, Research guides, Tutorials
12	Canuel[53]	2011	Full-text article finder

APPENDIX E: PAGES FROM MOBILE APP SDI

Figure 5. Registration pages mobile app SDI.

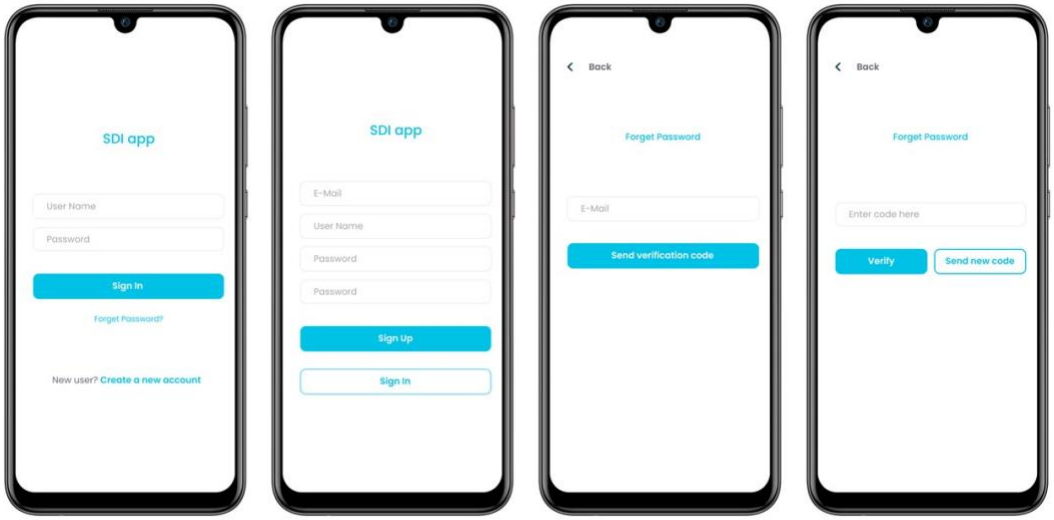


Figure 6. Pages registration, my order, and notification of mobile app SDI.

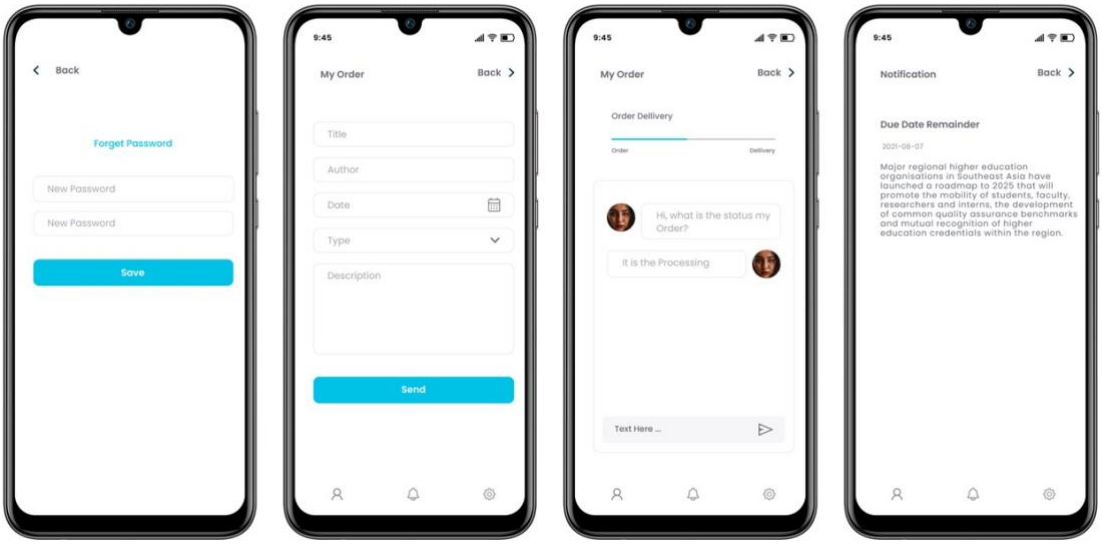


Figure 7. Pages notification and options of mobile app SDI.

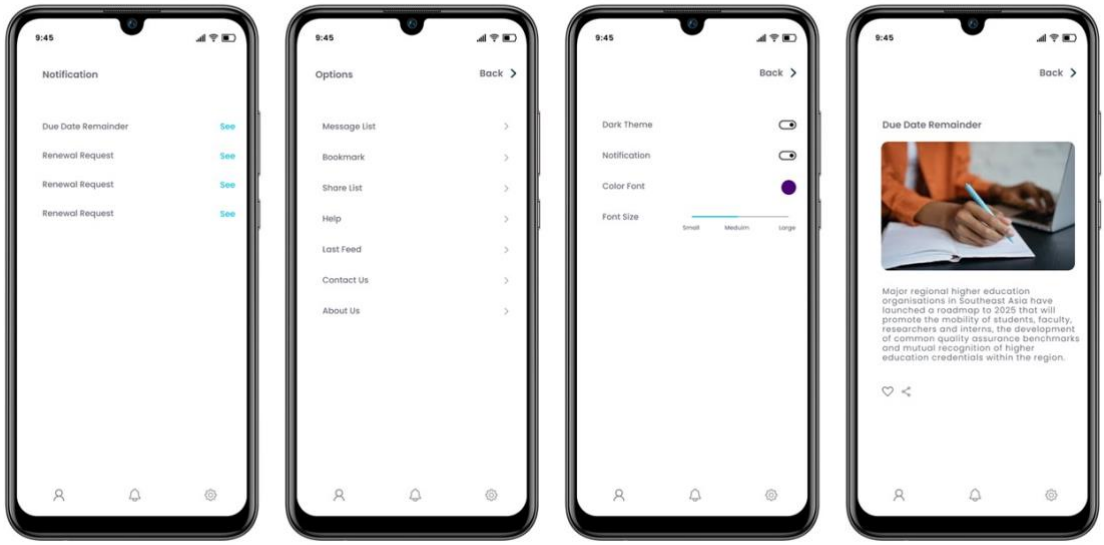
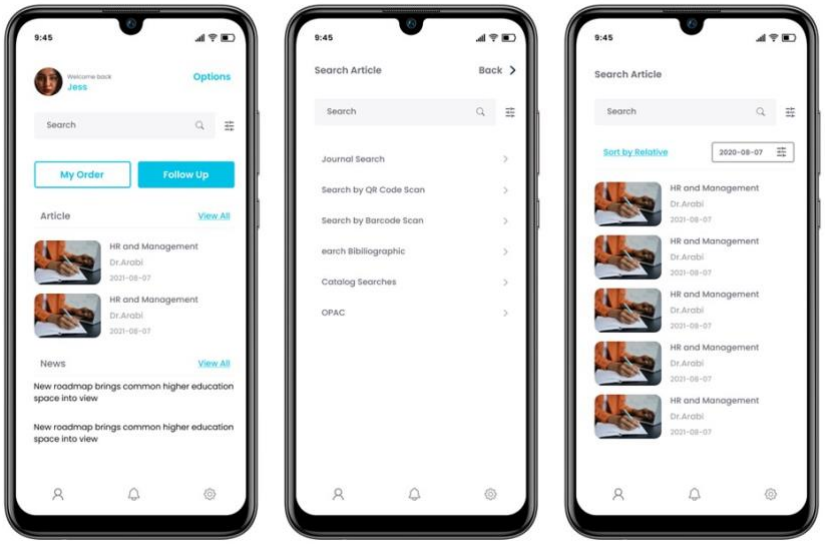


Figure 8. Pages options and search articles of mobile app SDI.



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