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ON-SR UII: AN ONLINE SELF-REGULATED LEARNING WEB APPLICATION TO ASSIST INDEPENDENT COLLEGE LEARNERS

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Abstract

Self-regulated Learning (SRL) is a learning method that strongly emphasizes the importance of self-learning skills. Unfortunately, many existing educational technologies employed by colleges and universities continue to place a premium on technical support for the learning process within the classroom that does not provide the same level of support for SRL. This study aims to close this gap by developing the ON-SR UII, a new SRL platform that can assist college students in their quest to become independent learners. Using the design thinking approach, ON-SR UII is developed as a responsive web app that can be accessed by college students through the Internet anywhere at any time at their own pace using any computing device of varying screen sizes. This article describes how ON-SR UII was designed before its Prototype was developed, deployed, and evaluated by stakeholders for functionality, usability, and responsiveness. The encouraging results indicate that ON-SR UII has the potential to be widely implemented, allowing for the measurement of its implications in future research.

Keywords: self-regulated learning; online learning; web app; independent learners; college students

Abstrak

Self-regulated Learning (SRL) adalah metode pembelajaran yang sangat menekankan pentingnya keterampilan belajar mandiri. Sayangnya, banyak teknologi pendidikan yang digunakan oleh perguruan tinggi lebih menekankan pada dukungan teknis untuk proses pembelajaran di dalam kelas, sehingga tidak dapat memberikan tingkat dukungan yang sama untuk SRL. Studi ini bertujuan untuk menutup celah ini dengan mengembangkan ON-SR UII, sebuah platform SRL baru yang dapat membantu mahasiswa dalam upaya mereka untuk menjadi pembelajar mandiri. Dengan menggunakan pendekatan pemikiran desain, ON-SR UII dikembangkan sebagai aplikasi web responsif yang dapat diakses melalui Internet di mana saja dan kapan saja menggunakan berbagai perangkat yang memiliki beragam ukuran layar sehingga mahasiswa dapat menggunakannya dengan kecepatan belajarnya masing-masing. Artikel ini menjelaskan bagaimana ON-SR UII dirancang untuk kemudian sebuah purwarupa berbasis web pertamanya dikembangkan, diimplementasikan, dan dievaluasi oleh penggunanya dalam hal fungsionalitas, usabilitas, dan responsivitas. Hasil menggembirakan yang didapatkan menunjukkan bahwa ON-SR UII memiliki potensi untuk diimplementasikan secara luas, serta memungkinkan untuk dilakukan pengukuran atas dampaknya di penelitian lanjutan ke depannya.

Kata kunci self-regulated learning; perkuliahan daring; aplikasi web; pembelajar mandiri; mahasiswa

INTRODUCTION

Education is one of the sectors most affected by the COVID-19 pandemic, and information technology's role in supporting various learning activities has been enormous. Whether through e-learning, online learning, or mobile learning, many educational institutions have embraced educational technology as part of their strategies for delivering educational programs.

Most educational programs have emphasized the importance of self-learning skills, as it is assumed that self-learners possess the necessary characteristics for lifelong learning. One of the methods that strongly emphasizes this is self-regulated learning (SRL) (Scott & Meeussen, 2017; Moos & Stewart, 2013; Okubo, Shimada, Yamashita, & Ogata, 2017; Schunk & Greene, 2017). In SRL, learners engage in an active and constructive process in which they establish their learning objectives, which are then monitored and controlled throughout the learning process (cognitive or metacognitive) until the objectives are attained (Azevedo, Johnson, Chauncey, & Graesser, 2011; Quigley, Muijs, & Stringer, 2018; Scott & Meeussen, 2017; Winne, 2017; Zhang & Zhang, 2019).

Among the numerous SRL models that exist, Winne and Hadwin's four-phase model dominates the field of SRL research (Matcha, Uzir, Gasevic, & Pardo, 2020; Panadero, 2017; Winne & Hadwin, 2012). This model encapsulates the four phases of the learning process. 1) perception of the task, 2) goal setting and planning, 3) tactic acquisition, and 4) adaptation. The first phase of task perception requires students to scan their environment, which includes the task itself, book exercises, prior knowledge, and their affective perceptions (Winne & Hadwin, 2012). Each learner is assigned a personalized and unique task profile due to this process.

Additionally, the personalized task profile influences the second phase's goal setting and lesson planning. The learner will take note of both the class-wide goals and the learner's personal goals. In this regard, each learner's personal goals are likely to be distinct and distinct from one another. It also pertains to the provision of prior knowledge that varies by the learner and potential impediments to completing the available tasks. This personal objective will dictate the third phase's learning tactics. The appropriate tactic selection will enable the content knowledge gap and a lack of adequate support to be bridged to accomplish goals, where the priority may be on addressing affective factors rather than knowledge acquisition. The following stage is an adaptation, allowing changes in learning methods and task completion to close the gap between current work results and established standards.

Meanwhile, e-learning and online learning are not new concepts for many Indonesian universities, even before COVID-19 compelled everyone to embrace online learning in place of traditional face-to-face settings fully. There are various types of IT solutions adopted by Indonesian universities to support online learning (Sudrajat et al., 2019). Several of these technologies include collaboration services (e.g., Google Workspace and Microsoft Office 365), communication services (e.g., Gmail, Zoom, Google Meet, Microsoft Teams), online class management services (e.g., Google Classroom, Moodle), and scheduling (e.g., Google Calendar, Microsoft Outlook).

Despite this, these various educational technologies continue to place a premium on technical support for the classroom's learning process, whether in offline, synchronous online, asynchronous online, blended, or hybrid format. None of them provides the same support for SRL as they do for in-class online learning. There is a new SRL platform that can help students become independent learners. This study aims to avoid gaps.

Online Self-Regulated Learning at Universitas Islam Indonesia (ON-SR UII) is a progressive web app easily accessible from various computing devices (e.g., desktops, laptops, smartphones, tablets). Variation screen sizes, making it an ideal platform for college students to learn materials at their own pace from anywhere and at any time

RESEARCH METHODS

This research uses a design thinking approach in designing, developing, and evaluating ON-SR UII. Design thinking, a type of agile software development, has been widely adopted and advocated in recent years due to its superiority over traditional software development methods such as Waterfall (Darrin & Devereux, 2017; Pereira & Russo, 2018). Figure 1 illustrates the research flow elaborated further in this section.

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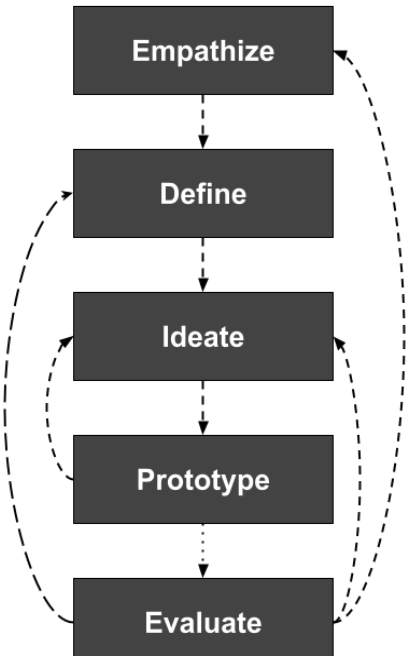

Figure 1. Design thinking research method

There are five major stages in design thinking as proposed by the Hasso-Plattner Institute of Design at Stanford University, USA (Plattner, Meinel, & Weinberg, 2009; Plattner, 2013). The first stage is Empathize, which is aimed to gain an empathic understanding of the problem that needs to be solved. Empathizing helps define the problem, which is what the second stage is. In this study, this stage is conducted through literature review, focus group discussion (FGD), and an in-depth interview.

In the second stage, Define, the focus is on using the requirement analysis based on the information gathered in the first stage to synthesize the problem statements to be addressed. This process helps formulate ideas for solutions to those problems, which is also what the third stage is called.

In the third stage, Ideate, the focus of the early part of it is on generating as many ideas as possible through brainstorming to serve as alternative ways to solve the problems that were identified in the previous stage. Each idea will be compared against the others to produce a better idea that sometimes borrows some parts from the other ideas. Software engineering techniques like use case diagrams, relational database diagrams, and user flow diagrams can be used to represent ideas in this stage.

This study's prototyping process was done in three phases: a wireframe prototype, a clickable prototype using Figma, and a complete web app using Laravel PHP framework and MySQL database for the back as HTML, CSS, and JavaScript for the front. The fourth stage, the Prototype, can be considered an experimental phase to identify the optimal solution to each problem in the previous stages. The Prototype is where users can see what kind of solutions are implemented to address those problems.

The fifth stage, Evaluate, is where the prototypes will be tested for functionality, usability, and responsiveness. While this is the final stage in a five-stage design thinking model, this is not necessarily the last step since the whole design thinking process is non-linear and iterative. This stage is used to identify any flaws or opportunities for improvement in the Prototype before it becomes the final product. For instance, a clickable prototype aids in refining and sparking new ideas for improving the system's user interface (UI) and user experience (UX). Usability and responsiveness tests provide insights that can be used to redefine the problem, whereas functionality and usability tests educate developers about how users interact with the system, allowing them to modify or redefine their solutions. This paper aims to have a responsive web application prototype ready as a minimum viable product (MVP) (Lenarduzzi & Taibi, 2016; Münch et al., 2013; Tripathi, Oivo, Liukkunen, & Markkula, 2019).

RESULTS AND DISCUSSION

System Design and Architecture

The system architecture of ON-SR UII, after multiple iterations of the five stages of design thinking, is depicted in Figure 2. Meanwhile, Figure 3 depicts the database schema employed by the system's backend.

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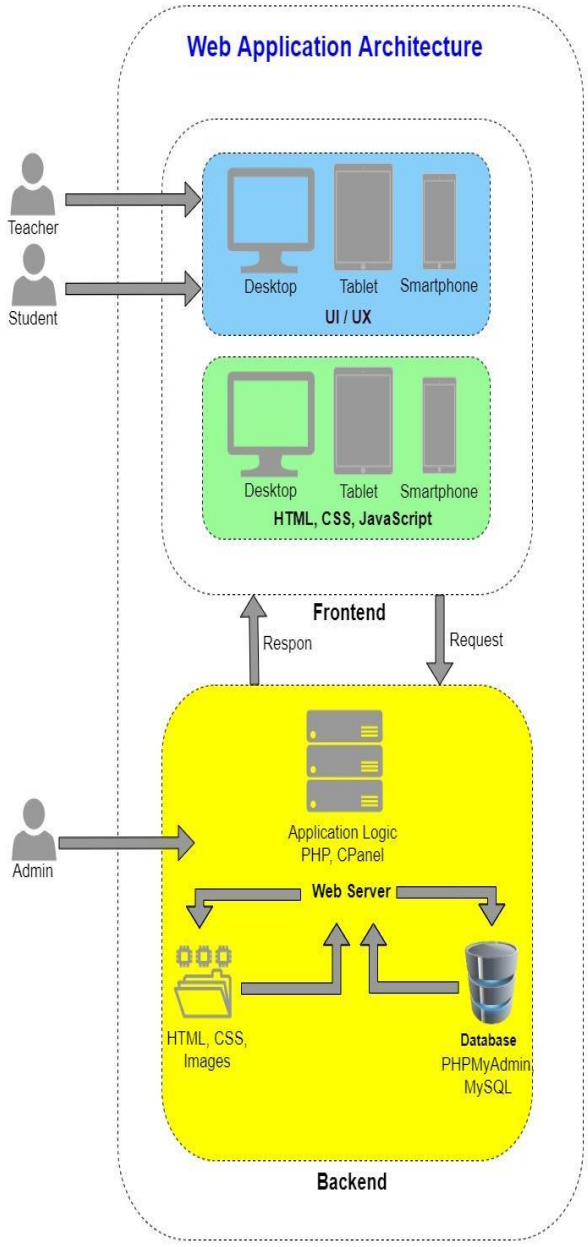

Figure 2. ON-SR UII system architecture

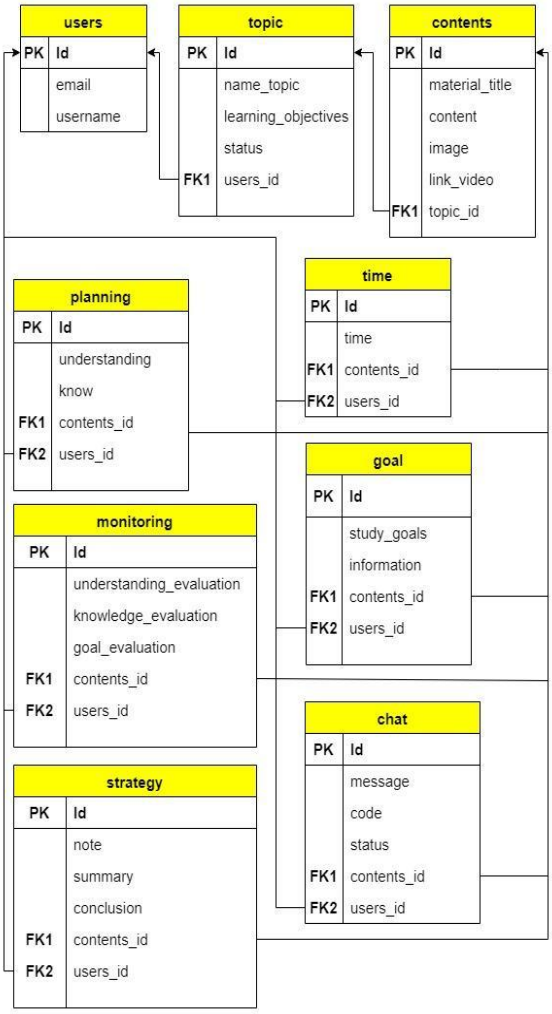

Figure 3. ON-SR UII database schematic

System User Interface (UI)

After multiple iterations of wireframing and clickable prototyping with Figma, the front end was developed with the approved UI and deployed on https://onsruii.com/. Figure 4 depicts the landing page of OS-SR UII, whereas Figure 5 depicts the login page integrated with the university's single-sign-on (SSO) infrastructure.

By integrating the authentication system in ON-SR UII with SSO UII, managing user accounts and access control in ON-SR UII becomes much simpler and more convenient for all stakeholders. All users of ON-SR UII, new and existing alike, do not need to create a new account to access this system; they can use their university account, just as they would for any other IT service within the university. Also, since SSO UII can tell the difference between student and instructor accounts by default, ON-SR UII can automatically send each user to the proper UI for their role.

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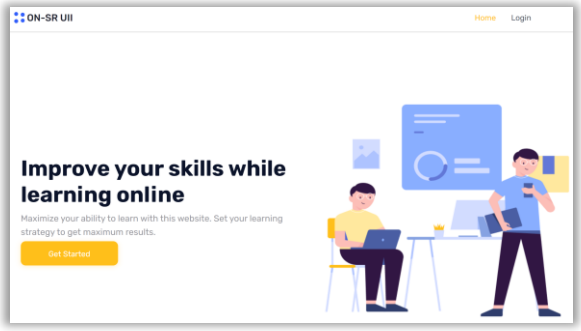

Figure 4. ON-SR UII landing page

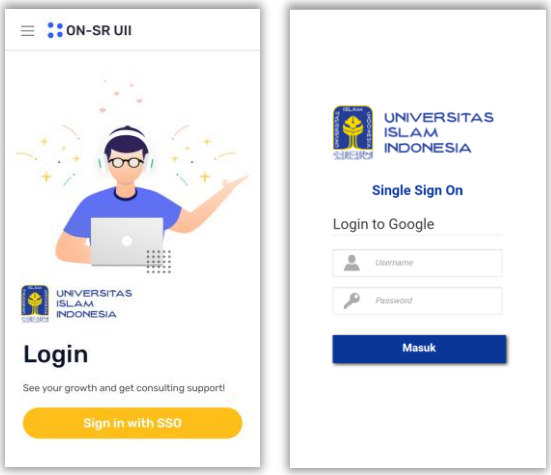

Figure 5. ON-SR UII login page (left) integrated with the UII SSO page (right)

Figure 6 depicts the subsequent UI that all students will see. On the homepage, students will find a list of all subjects they can choose, followed by a list of courses within each subject. Once they select a specific course, students can view a brief overview of all materials in that course, as well as the "start this course" button, which allows them to begin learning the course materials at their own pace.

Once the course has been initiated, students will see the main learning page, as depicted in Figure 7. Students can view the course learning objectives on this page and the table of contents and learning resources the instructor has provided. Before delving deeper into the learning materials, students must define their subgoals and monitor their progress using the two yellow buttons in the center of the top bar, next to the button for learning goals.

In the right sidebar, students are also provided with hints and tips to help them plan and monitor their learning progress, as well as suggestions for learning strategies they can employ to enhance their learning experience and learning outcome. Figure 8 demonstrates that students are encouraged to take notes as part of their learning plan. Students assess what they have learned from the materials, which can be summarized as a palette, as shown in Figure 9. These characteristics distinguish ON-SR UII from other learning applications supporting independent learners in SRL activities.

As for the instructor's UI, Figure 10 shows the homepage for the instructors. On this page, instructors can add new courses and materials or monitor their student's progress in each course, as illustrated further in Figure 11.

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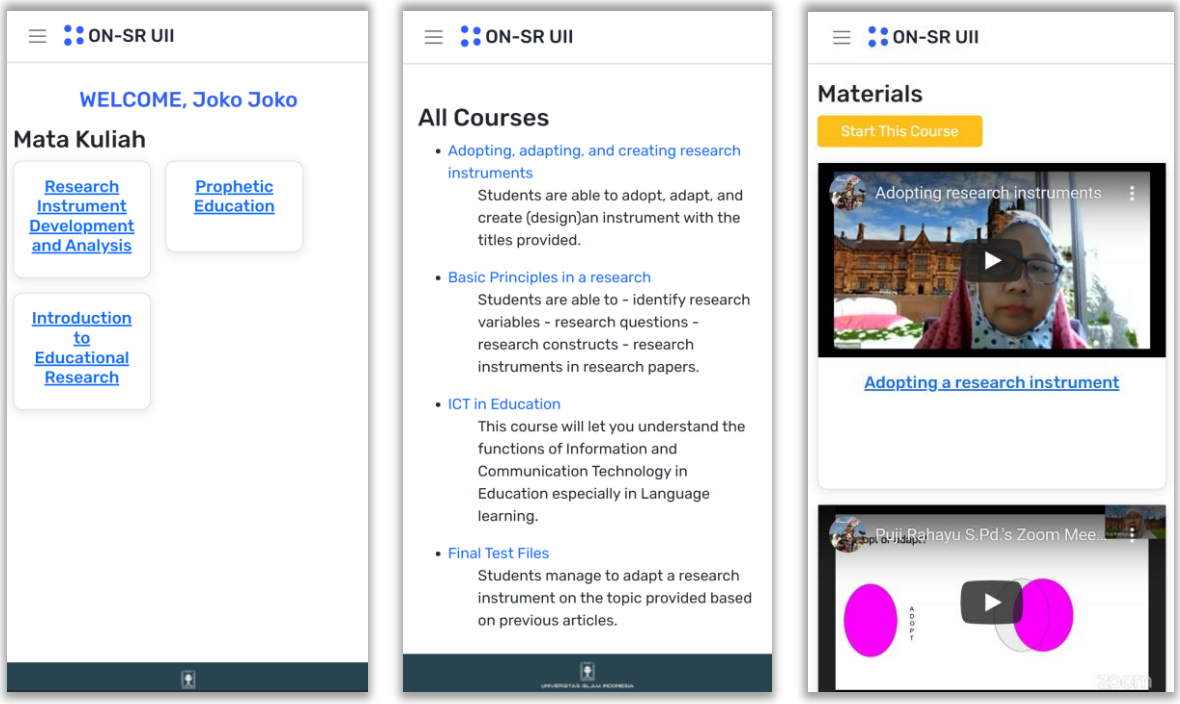

Figure 6. ON-SR UII student home page (left), courses page (middle), and materials page (right)

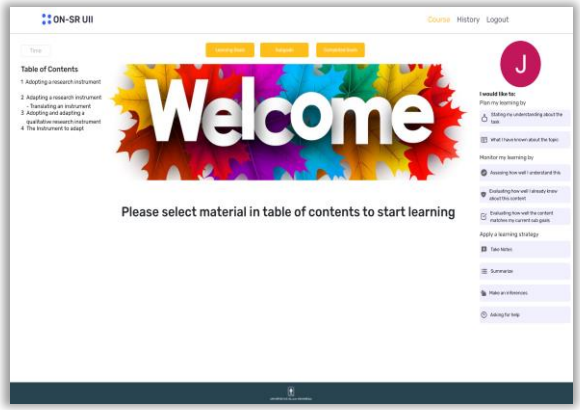

Figure 7. ON-SR UII main learning page for students

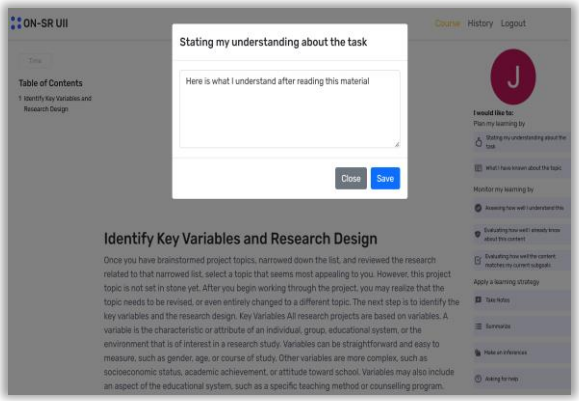

Figure 8. ON-SR UII main learning page for students

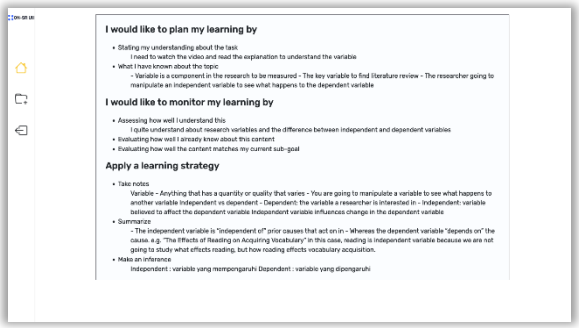

Figure 9. ON-SR UII learning palette page

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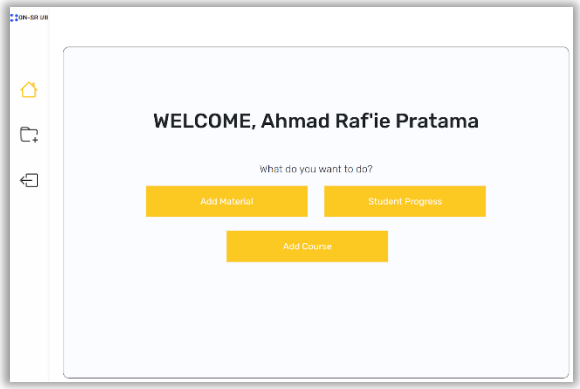

Figure 10. ON-SR UII instructor home page

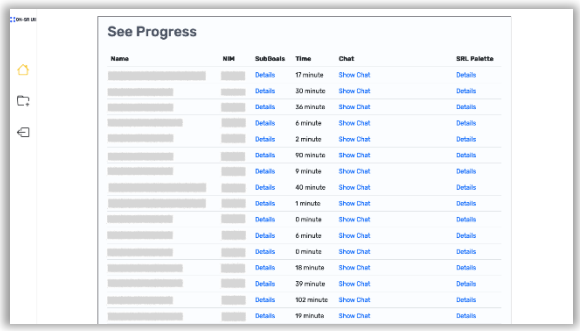

Figure 11. ON-SR UII student progress page for instructors

Prototype Evaluation

To ensure that the first web-based Prototype is sufficient to be declared MVP, the authors conducted web responsiveness, functionality, and usability tests, which results are summarized in Table 1, Table 2, and Table 3, respectively. The authors conducted the web responsiveness test independently using responsive design checker tools, such as the built-in feature within the Google Chrome web browser and the web https://responsivedesignchecker.com.

This Prototype was also used in the "Research Instruments Development and Analysis" course at the Department of English Language Education, Universitas Islam Indonesia, as a pilot study. A total of 27 students in the course took the functionality and usability test at the end of the semester. The score column within the functionality and usability test result indicates the percentage of students agreeing with the respective measurement item.

Table 1. Web responsiveness test results

No	Item	Score
1	Student UI on desktops	100.00
2	Instructor UI on desktops	100.00
3	Student UI on tablets	87.50
4	Instructor UI on tablets	93.64
5	Student UI on smartphones	93.00
6	Instructor UI on smartphones	89.09

Table 2. Functionality test results

No	Item	Score
1	All links are working	100.00
2	All pages have a navigational menu or link to other pages on the site.	92.86
3	All links open the page expected by users	89.29
4	There is navigation up and down within each page	92.86
5	There is navigation back to the home page on every page	92.86
6	A site map is available	85.71
7	The internal search provided is effective and works well	96.43
8	There is a help facility provided	89.29
9	ON-SR UII has a simple domain name	89.29
10	ON-SR UII works well on several different web browsers	75.00

Table 3. Usability test results

No	Item	Score
1	ON-SR UII facilitates individual learning goal formulation	96.30
2	ON-SR UII facilitates prior knowledge recognition	100.00
3	ON-SR UII facilitates help-seeking	92.59
4	ON-SR UII facilitates learning strategies application	100.00
5	ON-SR UII facilitates reflection on my learning path	92.59
6	ON-SR UII facilitates planning	100.00
7	ON-SR UII facilitates learning to monitor	96.30

All three tests gave positive results, but the usability test was the most encouraging. It is a clear indication that the Prototype of ON-SR UII meets the objective of supporting SRL to help college students become independent learners. In addition, they also helped identify some drawbacks and room for improvement on the current Prototype, which is primarily technical rather than substantial. It will be addressed in the next step of this research project before a more comprehensive implementation of ON-SR UII.

CONCLUSION

ON-SR UII is an educational technology designed to assist college students in becoming independent learners with SRL activities. Specifically, it is designed as a responsive web application that college students can access via the Internet from anywhere, at any time, at their own pace, using any computing device with a screen of varying dimensions. The ON-SR UII also provides a separate UI for instructors to add courses and materials and monitor their students' learning progress. This paper describes how ON-SR UII was designed before its Prototype was developed, deployed, and evaluated by stakeholders for functionality, usability, and responsiveness. The encouraging results indicate that OS-SR UII has the potential to be widely implemented, allowing for the measurement of its implications, which will be the focus of immediate future research.

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