

UI/UX Evaluation on Entrepreneurial Mindfulness Mobile Application

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Abstract: Entrepreneurship is a very important process to increase economic growth because it encourages innovation and creates new jobs. In entrepreneurship, mindfulness is required as it affects entrepreneurial practices and psychological well-being for entrepreneurs. With mindfulness, entrepreneurs become more aware of the current situation so that they can take advantage of the current situation to create better business solutions. The entrepreneurial mindfulness application is developed in the form of a mobile application with the aim that entrepreneurs can self diagnose anywhere and anytime so that they can easily find out the level of mindfulness they have. To fulfill this purpose, the application needs to get feedback from users. Therefore, this study aims to determine the UI/UX quality of the application through responses from users. UI/UX evaluation is conducted using Neuroresearch methods with an emphasis on explanatory research in the form of user surveys. The questions contained in the survey were made based on the Eight Golden Rules by Ben Shneiderman. The number of respondents who took the survey was 31 and the results of the survey provided some insight into the user experience when using the application. The results of this study show that the appearance and flow of the application have been able to provide a fairly good experience to users. However, there were also some suggestions and criticisms of the appearance and flow of the application. Therefore, some improvements were made and some displays were added to the application to increase user satisfaction in using the Entrepreneurial Mindfulness application.

1 INTRODUCTION

Entrepreneurship is the fundamental process of creating or starting a new venture to identify and develop opportunities for growth and success. Entrepreneurship plays an important role in the economy as it drives innovation, creates jobs, and promotes economic growth (Malecki, 2018). In recent years, technologies such as mobile computing, cloud computing, social media, data analytics, etc. have become various aspects of innovation in entrepreneurship. Entrepreneurship is also changing the nature of uncertainty inherent in the process and outcome of entrepreneurship and how to deal with such uncertainty (Nambisan, 2017).

Entrepreneurship is a strategic component in the world of practitioners and academics on a national

and international scale to build a competitive advantage. The concept of entrepreneurship is now not only owned by entrepreneurs but has begun to be introduced to students in schools. At the higher education level, students are equipped with entrepreneurial practices to prepare them to enter the world of work. Competition in the industry 4.0 era characterized by various technological advances and knowledge shifts has demanded new, more complex competencies (Indrianti et al., 2020), (Nowiński et al., 2019).

Entrepreneurial practice is synonymous with situations of uncertainty, high risk, uncertain roles and increasingly fierce competition. Entrepreneurs who are able to harmonize their thoughts and adjust themselves so that they are able to take concrete actions based on the right intentions, strategies and considerations are mindfulness entrepreneurs (Indrianti et al.,

2020).

Mindfulness is a human's awareness of events happening in the present moment and will influence how the human responds to those events. The effects that mindfulness plays in organizational and business settings have been considered using a sample of employees and principals, while the topic has been briefly explored in entrepreneurship and in family businesses. Family businesses represent single organizations that need to manage some emotional logic to survive in the long term. Mindfulness has emerged as an important concept as it stimulates the ability to focus on the present moment (Plana-Farran et al., 2022).

Mindfulness has an important role for each individual in facing difficulties and making decisions. Mindfulness of each individual needs to be developed from an early age, the role of parents is needed in educating their children because it will affect their motivation in entrepreneurship in the future. Mindfulness not only affects the health and life of individuals but also affects their work and career, including the formation of adolescents' human capital, sense of job success, work adaptability, and even attitude to change (Shan and Tian, 2022), (Liu et al., 2022).

The development of mindfulness in the practice of entrepreneurship is the basis for developing a mobile application. Mobile applications have an increasingly significant role in this day and age. Since November 2016, there is more network traffic created by mobile devices with a percentage of 48.19% than desktops or laptops which have a percentage of 47% (Tashildar et al., 2020). Google has also announced that every day there are 500,000 new android users (Hoehle and Venkatesh, 2015).

Therefore, it is necessary to develop a mobile application to increase the use of entrepreneurial mindfulness. Through the developed application, people can self-diagnose with the aim of measuring their level of mindfulness so that people can improve their mindfulness as needed in industry 4.0. The level of mindfulness contained in this application is divided into 7 levels. After taking the test, users can find out the position of mindfulness they have along with an explanation and some suggestions on how to improve mindfulness so as to achieve a balance between entrepreneurial pressure and having fun. This application uses a machine learning model to determine a person's entrepreneurial mindfulness level (Oktavius et al., 2022).

The Entrepreneurial Mindfulness app was developed not only to fulfill the purpose of allowing entrepreneurs to see their level of mindfulness but also to feel comfortable when using the app. A good

UI/UX in an application aims to ensure that the appearance and use of the application can be done easily and comfortably. With good UI/UX, app users can easily find important information according to their wants and needs and feel comfortable in using the app. In addition, the application must have good UI/UX because in this industry 4.0 era, people use mobile devices anywhere and anytime so that the ease of use of the application is important to fulfill the objectives of this research.

2 LITERATURE REVIEW

2.1 Mindfulness and Entrepreneurial

Mindfulness, defined as "receptive attention and awareness of present events and experiences" (Gelderen et al., 2019). "Mindfulness involves intentionally bringing one's attention to the internal and external experiences occurring in the present moment and is often taught through various meditation practices". Meditation is a formal expression of mindfulness and is one of the most researched self-help interventions to date. Mindfulness training has been shown to have many benefits. It not only reduces stress and improves well-being, but also increases awareness, empathy, compassion, and the ability to observe oneself, as well as providing cognitive and behavioral flexibility (Kelly and Dorian, 2017).

The definition of mindfulness describes non-judgment and openness. By cultivating non-judgment, we generate acceptance. Non-judgmental acceptance sets the stage for developing empathy, an important component of relationships. Empathy is one of the abilities to understand the feelings of others over time. Mindfulness-based practices enable one to realize this humanistic ideal, evident in all relationships, including business (Kelly and Dorian, 2017).

With a high level of mindfulness, it will help an entrepreneur to make the right decisions by taking into account the various conditions and problems that exist today (Gelderen et al., 2019), (Kelly and Dorian, 2017).

2.2 Mobile Application Development

The Entrepreneurial Mindfulness application was created using Flutter framework as the frontend and Flask framework as the backend. Flutter is used to create the application display where users will interact with the application. Flask is used to process data which is then stored in a MySQL database and process user answers when taking tests using Artificial

Intelligence to determine the results of the test.

Flutter is a cross-platform framework used to develop applications that can run on Android, iOS, and Google's next-generation operating system, Fuschia. Flutter itself was created by Google and published in 2016. Flutter uses the Dart programming language which is the successor to Javascript and incorporates many features in the Javascript ES7 standard, Dart also uses the concept of Object Oriented Programming (OOP) (Mamoun et al., 2020)(Kurnia and Aditya, 2022)(Hassan, 2022)

In developing applications using Flutter, an architecture called Model View View-Model (MVVM) is used to distribute roles and responsibilities strictly between objects. By using MVVM, all data logic preparation for the UI will be placed in the View-Model object which will be displayed in the View. The Model itself is used to organize the data that will be used in the form of objects (Aljamea and Alkandari, 2018).

Provider in Flutter is a library that works by wrapping multiple widgets and sending changing state information to the components or widgets inside. The Provider will notify the observer (Consumer) when data changes in the class that manages the state (ChangeNotifier). Later, Consumer and ChangeNotifier will communicate through ChangeNotifier-Provider (Mantik et al., 2021). In the development of this application, Provider will be used as a View-Model in MVVM architecture

2.3 Flask REST APIs

Flask is a lightweight python-based application framework designed for fast and easy application development, with capabilities that can serve millions of users or clients. Flask has 2 main components, Werkzeug and Jinja2. Werkzeug is responsible for providing routing, debugging, and Web Server Gateway Interface (WSGI). While Jinja2 is used as a template engine. Flask has a fairly large and active community with hundreds of open-source extensions (Relan, 2019).

Representational State Transfer (REST) is a software architecture style for web services that provides an Application Programming Interface (API) for data exchange between multiple systems. Web services or API is a web application that will interact with other applications to exchange data. REST architecture allows the requesting system or application to access and manipulate data using a uniform and predefined set of stateless operations (Relan, 2019).

2.4 Integration and Usability Testing

The integration testing method is the most frequent and important type of testing in software testing, where each unit or component is tested for connectivity with all existing units (Janaki, 2021). The main purpose of the test method is to place the units in the desired environment and exercise their complete interaction. This test method will evaluate how well the interface has performed. In this test method, there are 3 criteria, namely All-modules, All-multiplerelations, and All-call-sequences. All-modules will test each unit at least once. All-multiple-relations will test all relationships between units. All-call-sequences will test the flow or running order of the application (Delamaro et al., 2001).

The usability testing method will be carried out by giving some specific tasks to users who have never used the application before. With this approach, information will be obtained about the comfort and level of ease in using this application carried out by users with natural human thinking (Ahmad et al., 2014). Usability itself can be defined as "the extent to which a product can be used by specific users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specific context of use" (Weichbroth, 2020).

2.5 User Interface and User Experience

User interface (UI) in information technology refers to the symbol or command structure used in Human Computer Interaction (HCI). User interface can be defined as an interactive system display where users can interact with the system through the display on the smartphone screen. The user interface includes menus and various features contained in the application to control or do something according to the wishes and needs of the user (Joo et al., 2014). Creating an effective UI is one area that is always emphasized because an effective UI provides the potential to improve the overall performance of the system (Punchoojit and Hongwarittorn, 2017). There are also several studies related to the development of mobile applications by paying attention to the user interface during the process of making the application display design (Khairul et al., 2020), (Gkatzidou et al., 2015).

User experience (UX) refers to the perceptions and feelings of users resulting from the use of a system, product, or service, including emotions, beliefs, preferences, etc (Chen et al., 2020), (Sauer et al., 2020). UX can also be considered as the quality of interactive technology that focuses on people not products. In UX, we can see the emotions of the user when using the application which will be an indica-

tor to see whether the user is satisfied and comfortable with the appearance of the application (Dirin and Laine, 2018). Factors that influence UX are the driving factors that trigger user satisfaction and dissatisfaction. In addition, user satisfaction depends on the user's existing needs, expectations, and experiences (Chen et al., 2020).

Based on the importance of UI/UX in mobile application development, it is necessary to evaluate the appearance of the entrepreneurial mindfulness application to determine user satisfaction when using the application and get suggestions regarding the appearance of the application. Evaluation of UI/UX in this application uses the Eight Golden Rules of Interface Design by Ben Shneiderman which consists of:

1. Strive for consistency.
2. Cater to universal usability.
3. Offer informative feedback.
4. Design dialogs to yield closure.
5. Prevent errors.
6. Permit easy reversal of actions.
7. Support internal locus of control.
8. Reduce short-term memory load (Paryudi and Fenz, 16th).

Based on the Eight Golden Rules, a questionnaire was created as a survey that was distributed to get responses from users. The questionnaire uses a Likert scale where each number will be given a statement then users can respond by choosing between strongly disagree, disagree, undecided, agree, and strongly agree. The statements given in the questionnaire include:

1. The icons used in the application already describe the function of the feature
2. The localization feature (Indonesian and English) makes it easier for users to understand the explanations in the application.
3. The dark mode and light mode features provide comfort to the eyes of users in using this application.
4. The information provided by the application after you perform an action is clear and informative so that you know what steps you should take next.
5. The flow of the application when taking the test is clear, starting from the beginning of the test instructions to the release of the test results.
6. Error messages in the application such as on the registration / registration page are sufficient to explain the error so that you know what to fix.

7. Users can easily cancel the action performed by pressing the back button.
8. You feel comfortable with the appearance and flow of the application.
9. The structure of the application display makes it easy for you to understand the flow of the application.
10. The button placement is good and easy to reach by the user's hand.

Based on the explanation above, the main purpose of UI/UX evaluation is to improve the application to make it easier to use, efficient, and can make users feel comfortable when using the application. UI/UX has a very important role because the application is expected to be in accordance with user expectations in terms of appearance design and function of each feature in the application (Punchoojit and Hongwaritorn, 2017). Therefore, UI/UX evaluation of the entrepreneurial mindfulness application is needed to increase user satisfaction with the application so that the purpose of the application that will provide benefits to entrepreneurs can be achieved.

3 RESEARCH METHOD

The research method used is the Neuroresearch method with the explanatory research stage through a survey conducted to users of the Entrepreneurial Mindfulness application (Sasmoko et al., 2018). This research started with developing a survey by considering the Eight Golden Rules by Ben Shneiderman. After the survey questions were developed, the survey was distributed to Entrepreneurial Mindfulness users to get their feedback after using the Entrepreneurial Mindfulness app.

The survey involved 31 respondents with demographic data dominated by 73.3% male respondents and 27.3% female respondents. The survey results obtained were then analyzed and obtained some suggestions and criticisms which then became the basis for improving the quality of the appearance and flow of the application to increase user satisfaction and comfort when using the application.

4 RESULT AND DISCUSSION

In this research, the appearance of the features contained in the Entrepreneurial Mindfulness application is made by paying attention to the user interface and user experience so as to increase user satisfaction in

using the application. Some of the main features obtained in the Entrepreneurial Mindfulness application are as follows.

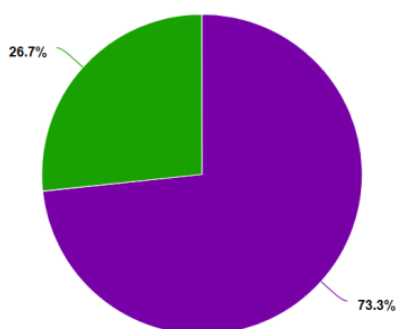


Figure 1: Percentage of respondents by gender.

1. Login and Register

Users need to log in first using an email and password to access several features such as taking tests, viewing test history, and viewing test results. If the user does not have an account, the user can register first by entering some personal data such as name, email, date of birth, address, and so on. After registering, the application will send an OTP code to the user’s email and then the user is asked to enter the OTP code into the application as shown in Figure 1 (c) to verify the email

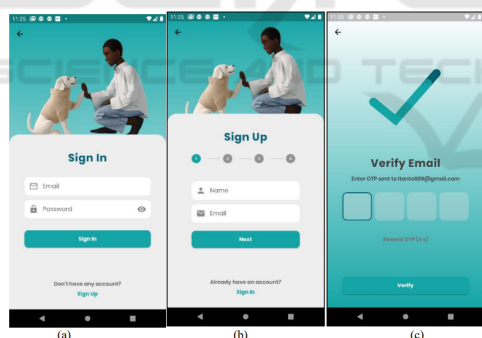


Figure 2: Login and Register.

2. Profile

In the profile page, users can view their personal data such as name, email, address, and so on. There are also several buttons that can be used for specific functions, namely Logout, Change Password, and Edit Profile. The Logout button is used to log out of the user account. The Change Password button is used to move to a page where users can change their password by entering their current password and new password. The Edit Profile button is used to move to a page where users can change some of their personal data such as name, address, and so on. There is also a toggle

to change the language between Indonesian and English, and a toggle to change the mode between dark and light

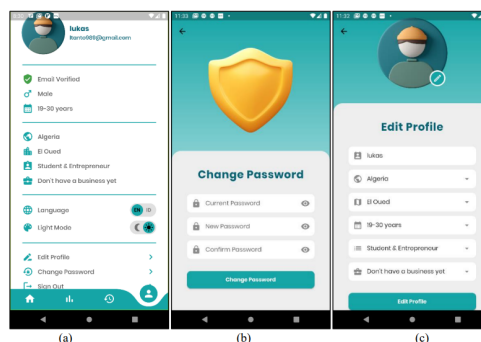


Figure 3: Profile, Change Password, and Edit Profile.

3. Take the Test

This feature can be accessed through the "Take the Test" button on the home page which will be directed to the test taking page. When the user accesses this feature, the user will be directed to a page that contains a brief briefing on how to take the test as shown in Figure 3 (a). After that, the user can start the test and the application will validate whether the user has taken the test before or not. If the user has taken the test before, the user must wait for 90 days before taking the test again, the application will display how long the user must wait before taking the test as shown in Figure 3 (b). If the user has never taken a test or has passed 90 days after the previous test, the user will be directed to the test taking page as shown in Figure 3 (c). In the test taking page, there are 10 sections where each section the application will display 2 statements and the user must choose which statement better describes themselves

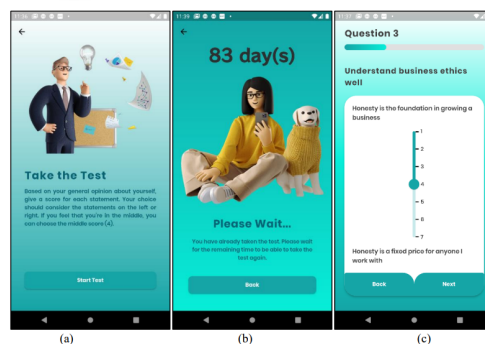


Figure 4: Take the Test.

4. Test Result and History

After the user has completed the test, the user will be directed to the test results page where the score obtained along with an explanation of the

score and a radar chart of the dimensions owned by the user based on the user's test answers are displayed. The test result display can be seen in Figure 4 (a) and (b). Each test taken by the user will be stored in the database, the user can review the results of the tests that have been taken on the test history page as shown in Figure 4 (c). In the test history, the user can select one of the histories which will then be redirected back to the test results page to view the test results in detail.

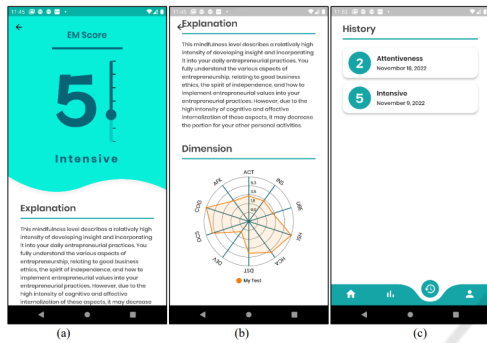


Figure 5: Test Result and History.

5. Statistic Data

In this page, statistical data of all user members will be displayed including radar charts of each dimension and charts of demographic data.



Figure 6: Statistic Data.

From the appearance of the application that has been developed, an evaluation of UI/UX is carried out to find out whether users feel comfortable and satisfied when using the Entrepreneurial Mindfulness application. The evaluation was also carried out with the aim of improving the UI/UX of the application based on suggestions and criticisms received from users. The UI/UX evaluation of the Entrepreneurial Mindfulness application was conducted by distributing a questionnaire containing 10 questions based on the Eight Golden Rules by Ben Shneiderman.

From the results of the survey obtained from 31 respondents, data normality testing was carried out

for the distribution of UIUX_EM variable data. The normality test was carried out by estimating the proportion through the Blom formula with the P-P Plot approach. The P-P Plot approach was chosen because the number of samples in this study was less than 200 users. The results can be seen in Figure 7.

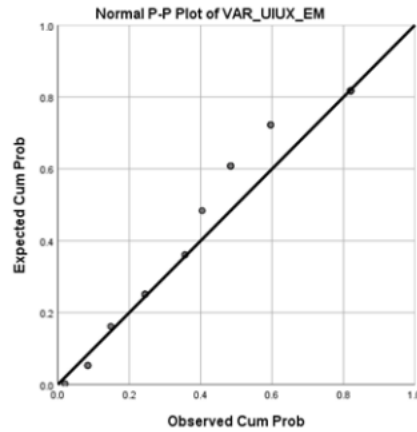


Figure 7: Normality Test of PP Plot Proportion Estimation Formula of Variable Blom UIUX_EM.

Based on the normality test results, it can be explained that the normal P-P Plot calculation shows that the UIUX_EM sample data is normal. The data distribution tends to point to the normal line, and the data distribution does not have outliers. Meanwhile, when viewed based on the Detrended Normal P-P Plot seen in Figure 8, it can be interpreted that the distribution of UIUX_EM variable data does not describe a sine or cosine curve. So it is concluded that all UIUX_EM variable data distributions have a normal distribution.

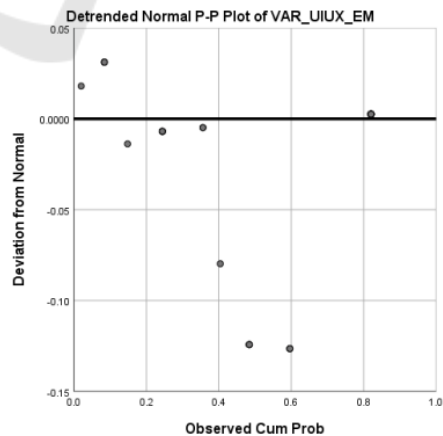


Figure 8: Detrended Normal PP Plot Distribution Variable UIUX_EM.

In proving this, the researcher analyzed the data from the survey results and determined 5 categories

of UIUX_EM, namely strongly disagree, disagree, undecided, agree, and strongly agree. The results can be seen in Table 1 below.

Table 1: Descriptive Inferential Variable UIUX_EM Results.

		Statistic	Std. Error
VAR UIUX EM	Mean	47.1290	.56936
	95% Confidence Interval for Mean	Lower Bound	45.9662
		Upper Bound	48.2918
	5% Trimmed Mean	47.3978	
	Median	48.0000	
	Variance	10.049	
	Std. Deviation	3.17009	
	Minimum	38.00	
	Maximum	50.00	
	Range	12.00	
	Interquartile Range	5.00	
	Skewness	-1.079	.421
	Kurtosis	.711	.821

The data analysis in Table 1 was carried out with confidence intervals at a significance level of 5%, and the resulting lower and upper bounds were between 45.9662 and 48.2918. Based on these results, it can be concluded that Entrepreneurial Mindfulness (EM) app users tend to be significantly interested at $\alpha < 0.05$.

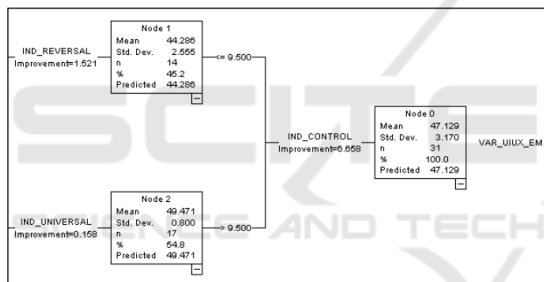


Figure 9: Results of Classification and Regression Trees (CART method) of each indicator against the UIUX_EM Variable.

To find the indicators of the Eight Golden Rules of UIUX_EM that must be improved, an analysis with Classification and Regression Trees (CART method) was conducted. From Figure 9, it can be interpreted that the most dominant in determining the EM application is responded by users who tend to agree with the attractiveness of the application display is determined by the Support Internal Locus of Control (CONTROL) indicator. If this indicator is developed, the EM application user response will increase 6.658 times from the current user response condition. Improving the Support Internal Locus of Control (CONTROL) indicator can only be realized through improving the Cater to Universal Usability (UNIVERSAL) indicator. Improving this indicator can increase user response to the Support Internal Locus of Control (CONTROL) indicator by 1.679 times from the current condition. Based on the results of the analy-

sis above, there are 6 indicators in the EM application that must be improved, namely: (1) Strive for Consistency (CONSISTENCY), (2) Offer Informative Feedback (INFORMATIVE), (3) Design Dialogs to Yield Closure (DESIGN), (4) Prevent Errors (PREVENT), (5) Permit Easy Reversal of Actions (REVERSAL), and (6) Reduce Short-Term Memory Load (SHORTCUT).

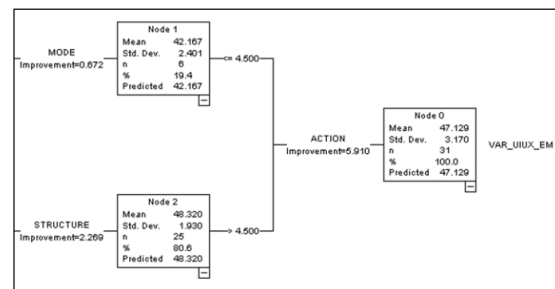


Figure 10: Results of Classification and Regression Trees (CART Method) for each item from the Eight Golden Rules indicator on the UIUX_EM Variable.

To find items from the Eight Golden Rules UIUX_EM indicator that must be improved, an analysis with Classification and Regression Trees (CART method) was conducted. The results can be seen in Figure 10. From Figure 10, it can be interpreted that the most dominant determines the EM Application responded by users who tend to agree with the attractiveness of the application display is determined by the Ease Reversal of Actions (ACTION) item. If the item is improved through 1 (one) program intervention, the EM application user response will increase 5.910 times from the current user response condition. Improving the Ease Reversal of Actions (ACTION) item can be realized through improving the Clarity of Application Design Structure (STRUCTURE) item which is able to increase the response to the Ease Reversal of Actions (ACTION) item by 2.269 times from the current condition. Based on the results of the above analysis, there are 8 items in the EM application that must be improved, namely: (1) Suitability of Icons in the Application (ICON), (2) Usability of Localization Feature (LOCALIZATION), (3) Usability of Dark and Light Mode Feature (MODE), (4) Clarity of the Information Given in the Application (INFORMATION), (4) Clarity of Application Flow (FLOW), (5) Clarity of Error Message in the Application (MESSAGE), (6) Ease of Reversal of Actions (ACTION), (7) Convenience of Application Flow and Design (CONVENIENCE), and (8) Accuracy of the Button Placement (BUTTON).

Based on the analysis results of the UI/UX evaluation survey of the Entrepreneurial Mindfulness application, it can be concluded that users tend to

agree on the attractiveness of the appearance of the Entrepreneurial Mindfulness application. However, there are several indicators and items that need to be improved and developed to increase user satisfaction with the appearance and flow of the application. Therefore, some improvements and developments were made to the appearance and flow of the application which are described as follows:

1. Improve the flow of the application where after the user finishes registration, the user immediately logs into his account so that there is no need to re-login. The flow of the application after being improved can be seen in Figure 11.

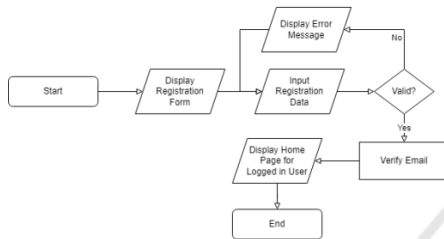


Figure 11: Update of Registration Flow.

2. Add a short tutorial on how to answer the test by using animation or pointing to the slider on the test page to inform users that the slider on the test page can be moved up and down.

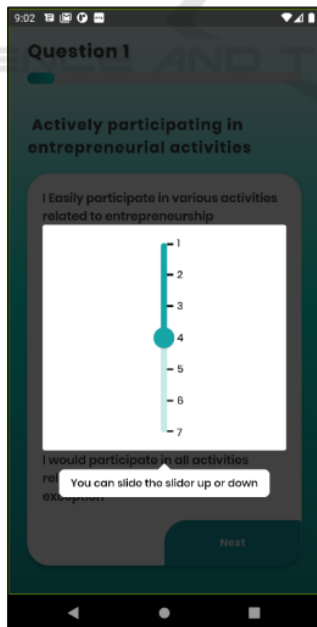


Figure 12: Simple tutorial about how to answer the test.

3. Direct the user to login when the app is first opened, but still provide a button to skip the directive and go straight to the home page

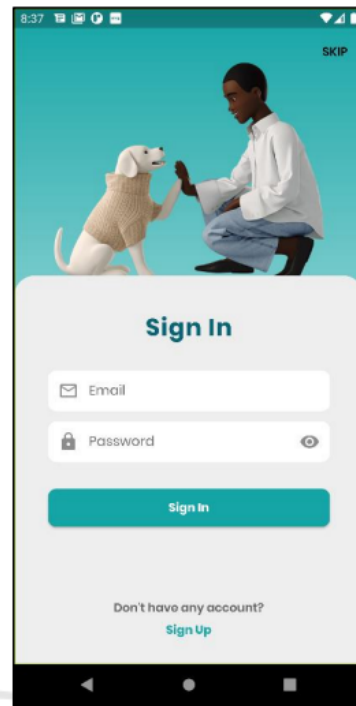


Figure 13: Login page when user just opened the app for the first time.

5 CONCLUSION

Entrepreneurial Mindfulness application is developed by paying attention to the quality of the appearance and function of each feature. With a good appearance and function in the Entrepreneurial Mindfulness application can help researchers in introducing the application more widely so that the application can be used in accordance with the purpose of the application development itself. By always improving the quality of the application's appearance, users will be more satisfied and comfortable in using the application and this will provide more benefits for the development of the Entrepreneurial Mindfulness application.

Based on the results of the UI/UX evaluation conducted on the Entrepreneurial Mindfulness application, several important aspects can be identified for further application development. Entrepreneurial Mindfulness application as a platform that helps entrepreneurs in assessing their level of mindfulness not only pays attention to the right function, but also a good appearance and easy-to-understand flow for users so that users feel comfortable and satisfied when using the application. From the survey results, it was concluded that the appearance and flow of the application were able to provide a fairly good experience to users. However, there were also some suggestions and

criticisms from the respondents so that some developments and improvements were made to improve the appearance and flow in the application. It is expected that the Entrepreneurial Mindfulness application can increase the number of users so that they want to be proactive in using the application to increase their capacity and competence as entrepreneurs

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