



The "Konselo" Application: A mobile-based counseling app for managing students' academic stress

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Abstract—

Due to the Covid-19 pandemic, students were required to be highly adaptive to a variety of changes in educational approaches and methods of instruction. Since the global pandemic has spread, mental health disorders in the form of high academic stress levels have become a recurring manifestation among students and as such they require appropriate treatment. However, no online counseling application focuses on handling mental health problems for students affected by the pandemic in Indonesia. In this study, the researchers developed an online counseling application, called the "Konselo" which serves as a platform for providing counseling to students on academic stress management. This study involved 826 students spread throughout Indonesia, experts in counseling, mobile software development experts and counselors/counseling practitioners in Indonesia. Based on development needs, the data analysis techniques used includes Aiken's V coefficient testing, Confirmatory Factor Analysis (CFA), Rasch Model Analysis and Single Subject Method Analysis. The study results indicate that the Konselo application is a valid, practicable and effective mobile app for providing online counseling to reduce students' academic stress. Some limitations in the development of prospective mobile-based online counseling applications may result from the focus of the problem and the counseling approach that is being used. Nevertheless, the use of this application is not limited to dealing with the problems of students who are affected by the pandemic, but rather it can be used for broader problems, in any condition, and anywhere.

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Keywords— Academic stress; Covid-19 pandemic; Konselo App; Mobile-based application; Online counseling

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I. INTRODUCTION

Following the Covid-19 pandemic, fundamental changes in learning systems and methods emerged at all levels of education [1-3]. For instance, a number of distance learning patterns emerged to enable lecturers and students to conduct web-based lectures by using internet media platforms such as

the Learning Management System, Zoom Meeting, Google Meet, and others [2, 4]. Another aspect of this change is the increasingly massive digital transformation that is affecting a variety of segments of people's lives [3, 5, 6]. Education in Indonesia faced a big challenge as a result of these changes.



The massive changes in learning approach in higher education can affect the psychological condition of students [7]. Thus, the ability to adapt to changing educational approaches and methods is an extremely valuable skill that students need to possess [8, 9]. Since the face-to-face lecture process evolved into a distance meeting because of the Covid-19 pandemic restrictions, along with an experimental component as students work independently on specific courses [10-12], the ability to adapt to the demands of lectures and the very different workloads from before placed a great deal of pressure on students [12].

Interestingly, the findings of a study on academic stress reported by Indonesian students between 2020 and 2021 are consistent with this condition. It was reported in the survey results that students in Indonesia are experiencing high levels of academic stress, as much as 28.8% of the 826 respondents spread throughout the province experience high levels of academic stress, while only 8.01% of the total respondents experience low levels of academic stress [13]. The analysis of stress indicators suggests that there are several factors that trigger students' academic stress including distance learning activities, an increase in workloads, especially in project courses, concern about grades and an uncertain future, heightened expectations towards self-accomplishment and the condition of despondency [13]. The stressor factors appear as a manifestation of limited resources during the pandemic.

There is a need for a platform that can accommodate the counseling service process in universities, especially in those universities with limited facilities for and access to counseling services for students [7]. One of the efforts to alleviate students' mental health problems is the development of an online counseling service application that can be accessed through mobile devices. The reason for this is because mobile-based online counseling applications can help to overcome a variety of barriers that are associated with in-person counseling services such as geographical constraints [14, 15], user/client barriers [16] and obstacles that demand a pro-active response from the counselor [14, 17]. Also, online counseling is recognized as one of the official protocols in counseling services in Indonesia by the Indonesian Counseling Association (IKI).

There have been many global applications for mental health services since the early 2000s, each with its own characteristics and approaches [18-21]. There are, however, no applications that focus on providing academic stress counseling to students during a pandemic that have a high level of credentialing. Additionally, counseling applications

with licensed counselors are scarce. Indonesia still lacks a network of counselor partners despite the existence of a diverse variety of online counseling methods and techniques [7]. It is for these reasons that the researchers aimed to develop a mobile application called "Konselo" to enable licensed counselors to offer online counseling services aimed at reducing academic stress among a sample of Indonesian students. The study hypothesized that through testing its effectiveness, this application will prove to be an effective counseling tool for reducing academic stress among these students.

II. MATERIALS AND METHOD

A. Research Design

By implementing the ADDIE model [22], it was possible to develop the Konselo application. Therefore, the development of the application was based on the need for validation, effectiveness, and practicality by involving a variety of assessors, including experts and practitioners in counseling and psychotherapy, mobile software developers as well as purposively sampled users. The model selection is also based on the focus of the application development which is aiming to create an online counseling platform that can be accessed by students at anytime and anywhere.

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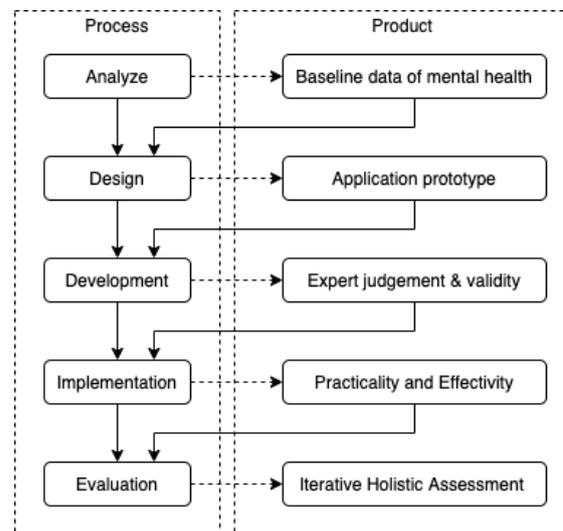


Fig. 1 The development process of Konselo App

As the first step in the development of the application, we carried out a needs analysis process to obtain empirical data regarding the user's/student's needs in terms of the application. This process involves a series of tests and initial data collection initiated from 2013 to 2021 [7, 14-17, 23-28]. The search for basic concepts and initial empirical studies were carried out to obtain patterns and models of online counseling platforms implemented in mobile applications. Testing and analysis were also carried out initially to ensure



that the main features that will be developed in the application will be as specified in the requirements. Konselo application design involves the preparation of User Interface (UI) and User Experience (UX) using design support applications. The preparation of UI and UX was carried out by considering the results of the initial empirical studies that had been carried out. The results of data analysis were processed since the initiation of product development (since 2013) and consideration of Focus Group Discussions (FGD), which were carried out by involving experts in the field of counseling and counseling practitioners in Indonesia. Compilation of the final results of UI and UX design led to the online counseling service application.

As part of the development process, users and counseling practitioners were also contacted to participate in pilot testing to determine the practicality of the development. The Konselo application incorporates a pre-counseling assessment feature, which allows for practical testing to be conducted. The application is also tested by mobile software development experts in order to ensure its resilience. A thorough evaluation and maintenance of the application takes place at the end of the process.

B. Participants

The data were collected from respondents who came from various segments and according to the type of test being conducted. At the development stage, this research involved five experts in the field of counseling and five experts in mobile software development in order to design application features according to the goals and needs of online counseling. Then at the experimental stage, this research involved 826 respondents spread throughout Indonesia to ascertain academic stress conditions. The selected respondents then participated in online counseling sessions with licensed counselors on the Konselo application for as many as five respondents per counselor. Effectiveness testing was also carried out by obtaining assessments from counseling practitioners who have conducted counseling sessions with clients.

The respondents were first asked for approval for data collection and publication through a consent form to ensure the integrity of the research and the use of the respondents' data following research ethics. Counselors also provided informed consent prior to counseling sessions with clients. This process was thoroughly carried out through mobile and remote technology following health protocols related to the spread of the Covid-19 that were in effect in Indonesia. Data collection and the counseling process were wholly carried out using the Konselo application which was first downloaded and installed by respondents and counselors.

C. Measurement

Several instruments were developed and tested during the development process of this application. The development of each instrument is linked to the type of testing and research stage. The instruments used in this study were content validation sheets by experts, the Student Academic Stress Scale (SASS) and the Acceptability of Mental-Health Mobile App Survey (AMMS) [7, 14, 29], and the scale of testing the effectiveness of the application by counseling practitioners/counselors.

Tests using Rasch Model Analysis were carried out to obtain data on the validity and reliability of the instrument, measurement accuracy, missing data conditions, and measurements of outlier's data. Confirmatory Factor Analysis (CFA) was carried out to measure the instrument's acceptability. CFA analysis was also used to measure the strength of the items in constructing a robust measurement construct. The instrument's accuracy would assist in finding suitable respondents to be tested at the practical and effective stage of the Konselo application.

Testing the SASS instrument through Rasch Model Analysis resulted in a Cronbach Alpha value of 0.95. Testing on the unidimensionality of the instrument was carried out to show that the instrument was able to explain more than half of the variable units in the measuring construct with good precision. The unidimensionality test got a raw variance explained measure of 56.7% with a total unexplained variable of 8.4%, and this result proves that the instrument has good measuring precision on variable constructs.

TABLE 1
 THE FACTOR LOADINGS OF SASS MEASURE

Factor	Indic ator	Estima te	S.E	z-value	p
Study Pressure	T1	0.705	0.023	30.668	< .001
	T2	0.753	0.026	25.266	< .001
	T3	0.706	0.023	30.629	< .001
	T4	0.794	0.018	43.317	< .001
	T5	0.721	0.023	31.058	< .001
Workload	B1	0.799	0.018	43.571	< .001
	B2	0.852	0.014	60.058	< .001
	B3	0.892	0.013	67.423	< .001
	B4	0.764	0.019	41.265	< .001
Grade Worriness	K1	0.904	0.014	64.204	< .001
	K2	0.925	0.016	57.95	< .001
	K3	0.797	0.018	43.246	< .001
	K4	0.813	0.019	43.034	< .001
Self-Expectation	H1	0.868	0.012	75.357	< .001
	H2	0.869	0.013	67.598	< .001
	H3	0.893	0.011	81.234	< .001
	H4	0.711	0.021	33.786	< .001
	H5	0.782	0.026	29.592	< .001
Despondency	P1	0.805	0.024	32.996	< .001
	P2	0.75	0.024	30.891	< .001
	P3	0.912	0.015	60.982	< .001
	P4	0.889	0.014	63.464	< .001



Testing and analysis on SASS using CFA proves that each indicator in the instrument contributes to the construct it measures. All items on the SASS instrument have a factor loading of more than 0.7 with a p-value of <0.001 and an estimated correlation coefficient that is strong enough to be excellent. This finding proves that the measuring instrument used to obtain data on students' academic stress conditions during the pandemic can be good. Testing the validity and strength of the AMMS instrument has been carried out in previous research and publications [7].

D. Development process

The application development process involves software development according to the stage and research process. To develop the User Interface (UI), the software used is Adobe Illustrator 2020 version 24.0.0 to obtain the unique design features, icons, and characteristics of the Konselo application [30]. User Experience (UX) development was carried out using Sketch software version 58 to ascertain practical experience of users and counselors [31, 32]. The coding process in application development uses Visual Code Studio version 1.56.0 with the React Native framework. The research data processing and instrument validation was completed using the Winstep 5.2.3.0 application and Jeffreys's Amazing Statistics Program (JASP) version 0.16.2.

E. Data Analysis

Data on the validity and practicality of the Konselo application were obtained based on an assessment by counseling experts and mobile software developers; besides, the assessment also involved counselors as practitioners of online counseling. This test was analyzed using Aiken's V formulation. This formula produces an index that will describe whether the application prototype can be said to be valid and practicable in providing counseling media to reduce students' academic stress conditions during the pandemic. In addition, practicality testing is also given to counselors to determine whether the application has been able to become a counselor's representative in the remote service scheme.

Meanwhile, a Single Subject Design Analysis was carried out to obtain practical values and changes in academic stress conditions experienced by respondents through the Konselo application. This analysis highlight changes in students' academic stress conditions in four online counseling interventions and eight academic stress assessments. In addition, the measurement of the developed instruments (SASS and AMMS) used the Rasch Model Analysis and Confirmatory Factor Analysis (CFA) approaches.

III. RESULTS AND DISCUSSION

A. Main Features of Application

The development of the application's main features has gone through a research and publication

process since 2013. The analysis of these features considers the purpose, pattern, and process of online counseling following service rules and code of ethics. In the early feature development phase, an analysis of respondents' acceptance of counseling services was carried out using the AMMS instrument. This test results show that respondents tend to receive online counseling services well, especially with the availability of counselors when the client is difficult to meet or when the client feels not ready to meet face-to-face at the beginning of the session. This condition increased after students entered the pandemic period, where respondents experienced higher levels of academic stress, but mental health service personnel were difficult to find, so through the Konselo application, respondents felt it was straightforward to get services.

After the needs analysis was carried out, the main features were designed to get the User Interface (UI) and User Experience (UX) of the application. The UI development was carried out by considering the characteristics of the application and the representation of the application that provides mental health services online. In addition, the UI design of the Konselo application was presented with a dynamic and responsive theme. Meanwhile, UX development was carried out to provide users (clients and counselors) convenience of connecting in a counseling atmosphere. UX development was also presented to create a counseling experience similar to the face-to-face (offline) process.

This application consists of three primary roles: a user role, a counselor role, and one super administrator role. The user and counselor roles have the same UI, but the difference lies in the absence of a counselor's selection menu on the counselor login side. The Konselo application has a home menu that contains active counseling sessions and mental health articles on the home screen page. A chat feature allows clients to choose an active counselor to start online counseling sessions via text-based or video-based modes. There is also a profile feature on the home screen page that the user can update.

Clients can filter according to the counselor's expertise in the chat feature and choose available counselors or make counseling appointments at certain hours, as described in Figure 5. The scheme/type of communication between the user and the counselor can be done via text chat or video call. The Konselo application accommodates the counseling process with a session count consisting of 45 minutes each session and can be extended according to the agreement between the client and the counselor. This online counseling process first involved a pre-counseling assessment process which requires the user to answer several questions regarding his mental health condition. The



counselor can use the assessment results as material for consideration during the counseling session. When the session starts, the counselor must also follow the online counseling code of ethics rules by providing informed consent regarding the rights and obligations of users and counselors. Once approved, the counselor can start the session. The client can decide to end the session and complete the assessment to follow up on changes in the client's condition after the session ends.

In the "choose counselor" or "counseling now" menu, the user can choose/consider a counselor based on work experience, expertise, graduate, and bio. Each counselor registered with Konselo is a counselor with a license certificate and registered with the national licensing agency and the Indonesian Counselor Association, as described in Figure 2. In addition, the Konselo application also provides various mental health articles, which are constantly updated and can be accessed free of charge by the user, as shown in Figure 3.

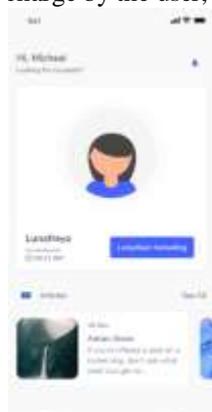


Fig. 2 Konselo App home screen display



Fig. 3 Counselor Profile features on Konselo App



Fig. 4 Mental Health Article Feature on Konselo App



Fig. 5 Filter Feature based on Counselor's Skill and Expertise

B. Validity

The relevance, accuracy and validity of each component in the Konselo application were tested through expert judgment. This assessment was

carried out to obtain theoretical and empirical application data that is indeed capable of being a medium for online counseling services to reduce various psychological disorders experienced by users. Experts involved consist of experts in counseling who have experience in research and development of counseling theory, who are academics or professors in the field of counseling services. Then this assessment also involves expert mobile software developers who already have more than five widely used applications in Indonesia.

Both counseling experts and mobile software development experts were given application blueprints and user guides and asked to study the references first. Experts were also given access to the application, both from the user side, counselor and administrator sides. The assessment data was then obtained from the expert judgment process through the assessment instrument. The data was then analyzed using the Aiken's V formulation. This process produces a coefficient that describes the level of expert agreement on the assessed application. The coefficient value of the counseling expert assessment is presented in Table 2.

TABLE 2
 AIKEN'S V COEFFICIENT OF KONSELO APP BY COUNSELING EXPERTS

Dimensions	Aiken's V Coefficient	Validity Interpretation
Relevance	0.96	Valid
Efficiency	0.92	Valid
Effectiveness	0.95	Valid
Impact	0.89	Valid
Attractiveness	0.90	Valid
Mean	0.92	Valid

In general, the acquisition of Aiken's V coefficient on all dimensions measured from the application based on the assessment of counseling experts is a valid condition (> 0.8). One dimension is at a level below 0.9, namely the impact dimension. Overall, counseling experts assess that the application consistently meets the validity requirements as an online counseling service medium in reducing students' psychological disorders, both in content, and appearance.

In addition, to determine the strength and validity of the Konselo application from the technical side of the software, validation was also carried out by experts in mobile software development. Measurement by mobile software development experts involves the dimensions of User Interface (UI), User Experience (UX), efficiency, effectiveness, security issues, and app endurance.

TABLE 3
 AIKEN'S V COEFFICIENT OF KONSELO APP BY MOBILE SOFTWARE DEVELOPMENT EXPERTS

Dimensions	Aiken's V Coefficient	Validity Interpretation
User Interface (UI)	0.95	Valid
User Experience	0.92	Valid



(UX)		
Efficiency	0.91	Valid
Effectiveness	0.94	Valid
Security Issues	0.90	Valid
Apps Endurance	0.88	Valid
Mean	0.91	Valid

Assessments from mobile software development experts also indicate that the application is considered valid on each dimension in general. There is still one dimension below the value of 0.9, namely the app's endurance dimension with conditions related to server resilience in providing fast connections in user and counselor communication. This condition can be overcome by improving server services to accommodate the needs of more significant users throughout Indonesia. The findings from the validation value by the mobile software development experts indicate that the Konselo application can be categorized as valid from various testing dimensions. Experts judge that Konselo can become a counseling service medium for users, especially when clients cannot meet directly with counselors due to various limitations such as the pandemic.

C. Practicality

The practical assessment of the Konselo application in reducing psychological disorders, mainly students' academic stress, is measured through practical instruments by counselors. The counselors involved in this study were first selected according to their expertise and experience in providing remote services and fully licensed as counselors. Counselors are first asked to provide online counseling services through Konselo app in four sessions to clients/users who experience academic stress during the pandemic.

The assessment of the practicality of the Konselo application involves the dimensions of content, the dimensions of the counseling service format, the dimensions of the counseling approach, the dimensions of efficiency, the dimensions of language use, and the dimensions of feedback as described in Table 4.

TABLE 4
AIKEN'S V COEFFICIENT OF KONSELO APP PRACTICALITY BY COUNSELOR

Dimensions	Aiken's V Coefficient	Validity Interpretation
Content	0.97	Practicable
Counseling Format	0.90	Practicable
Counseling Approach	0.87	Practicable
Efficiency	0.95	Practicable
Language Usage	0.92	Practicable
Feedback	0.85	Quite Practicable
Mean	0.91	Practicable

Based on an assessment of the practicality of the application, counselors who have conducted counseling using Konselo to reduce students' academic stress conditions generally assess the practical usefulness of the application. Although

there is still one dimension at the coefficient value of 0.85 (feedback dimension), this is related to feedback from users that the counselor only gets after the session ends, so it is better if feedback related to overall service satisfaction can be given before the session ends.

D. Effectivity

The effectiveness testing of the Konselo application in reducing students' academic stress conditions during the pandemic was carried out through the Single Subject Method involving five respondents and a counselor. Respondents were first screened using the SASS instrument and filled out a letter of consent to take part in online counseling sessions in the context of research. Counselors involved in the counseling process were also selected based on counseling service experience (more than 800 hours), have a full license as a counselor, have certification in online counseling in Indonesia and can operate the Konselo application.

Before the session, the client underwent pre-session counseling by filling out an assessment of the students' academic stress conditions during the pandemic. The score and assessment report were then entered into the counselor's account and became one of the primary data in providing counseling interventions. Measurements were carried out eight times, with details of three times in the baseline phase (not yet provided online counseling services via Konselo), and five times in the intervention phase. The counseling process lasted three sessions with an average counseling duration of 45-60 minutes.

TABLE 5
ACADEMIC STRESS MEASUREMENT IN THE ONLINE COUNSELING BASELINE AND INTERVENTION PHASES BY KONSELO APP

	Baseline (A)		Intervention (B)					
	Pre-session Data Point	Ses. 1 Data Point	Ses. 1 Data Point	Ses. 2 Data Point	Ses. 2 Data Point	Ses. 3 Data Point	Ses. 3 Data Point	
	1	2	3	1	2	3	4	5
Subject 1 (AP)	3.45	3.41	3.36	2.95	2.55	2.18	2.05	1.95
Subject 2 (NS)	3.36	3.45	3.77	3.09	2.91	2.86	2.68	2.64
Subject 3 (DAN)	3.41	3.36	3.00	2.89	2.86	2.82	2.64	2.50
Subject 4 (N)	3.27	3.55	3.5	3.27	3.59	2.86	2.59	1.95
Subject 5 (DSF)	3.27	3.09	3.23	2.73	2.68	2.45	2.41	1.91

*4: Extremely high academic stress level, 3: High academic stress level, 2: Low academic stress level, 1: Extremely low academic stress level

Based on the analysis of the Single Subject Method applied to the online counseling process using the Konselo application, all research subjects initially experienced a high level of academic stress that decreased as the online counseling session progressed. The most significant decrease was in the phase of change from baseline to intervention,



where the entire sample experienced a change in the form of a decrease in academic stress levels. Although some samples experienced a slight increase in stress levels in the second session, all samples managed to reduce their academic stress levels at the end of the session. The visual analysis also shows empirically that there was a decline in academic stress following the online counseling sessions through Konselo App as described in Figure 6.

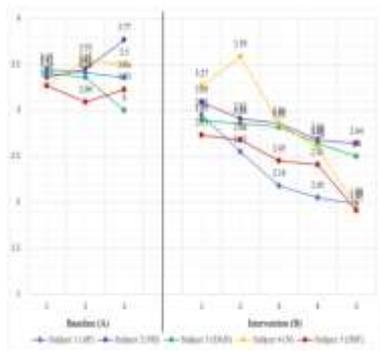


Fig. 6 Visual analysis of the subject's academic stress condition via Konselo App

IV. CONCLUSION

Significant changes in the learning process during the Covid-19 pandemic until the current active case have impacted students psychologically [33-35]. The pressure of learning activities, workload, worrying about grades, and despondency, which is a stressor in academic stress, is prevalent among students, especially during a pandemic. Increasing learning difficulties, declining literacy levels and dropout rates in Indonesia indicate a psychological disorder that needs serious treatment. The low level of psychological services due to Covid-19 pandemic restrictions exacerbates these situations. For this reason, an online counseling application was developed that can become a service medium for counselors in reducing students' academic stress levels [36, 37].

The results of the testing and development of the Konselo application demonstrated its potential for reducing students' academic stress. This application is considered valid and practicable by counseling experts and mobile software development experts and can be used as a medium for remote counseling services. Some limitations in terms of developing prospective mobile-based online counseling applications may be related to the focus of the problem and the counseling approach used. However, the use of this application is not limited to dealing with students' problems during the pandemic but can be used for broader problems in all conditions and user problems.

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