Analysis and design of “LENTERA” information system to create a smart society environment using OOAD method (Case study: Universitas PGRI madiun)

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Analysis And Design Of "LENTERA" Information System To Create A Smart Society Environment Using OOAD Method (Case Study: Universitas PGRI Madiun)

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Abstract — The development of technology and information systems is growing rapidly and Indonesia's development direction is leading to the formation of smart cities (Smart City). To build a smart city we need a smart society ecosystem. That ecosystem can be formed in the campus environment, by analyzing and designing an information system's model such us LENTERA (Learn Technology and Entrepreneur Character) using the OOAD (Object-Oriented Analysis and Design). That method is can be expected to produce documentation we will be used as a basic foundation in the development of systems in the future. Finally, that document can be used to form a smart campus ecosystem in the UNIPMA environment.

1. Introduction

The movement towards 100 Smart Cities initiated by KOMINFO, MOHA, Ministry of PUPR, and Bappenas has made various cities, districts and provinces competing to maximize the use of information technology and systems in various fields, including education. The city of Madiun itself was declared to have passed the selection and chosen to participate in the Movement to 100 Smart City Program based on Letter number B-11 / DJAI / AI.01.05 / 02/2019, on 28 February 2019 [1].

According to Kominfo in 2017, Smart City itself is divided into 6 dimensions including smart governance, smart branding, smart economy, smart living, smart society, and smart environment [2]. Universitas PGRI Madiun is one of the universities in the city of Madiun, which has a vision of producing graduates who are smart, competitive, and have the ability to entrepreneurship [3], has the right to contribute and participate in supporting the creation of a good Smart City in Madiun. One of them is by forming a Smart Society in the environment. campus. The realization of the Smart Society in the campus environment can be done with various efforts that lead to the formation of the Smart Campus ecosystem, one of which is by building various educational platforms that maximize the use of technology and information systems in the campus environment. Smart Society itself aims to form a humanistic, productive, dynamic, communicative and interactive community ecosystem with a high level of digital literacy. Smart Campus is to make full use of the Internet of Things technology to realize campus management intellectualization. Through the Internet of Things, building a campus for all people and objects, all carriers of information, all the time, all sites can become connectivity platforms, large amounts of information in it polymerizing to produce new information on network platforms, up to a large number of teachers and students to provide services of wisdom and needs. comfortable management pattern [4].

To create a technology-based educational platform that leads to the Smart Society and in accordance with the vision of Unipma, of course, various studies on the analysis and design of the

system modeling needs are needed. The solution offered in this study is the result of analysis and design of the LENTERA (Learn Technology and Entrepeneur Character) information system modeling using the OOAD (Object-Oriented Analysis and Design) method. The current popular method in the analysis and design stage is object-oriented analysis (OOAD) design. The OOAD method aims to identify the objects that are responsible for their own objects [5]. This information system is an educational platform and interaction media that will be designed to accommodate lecturers and students in the process of interaction and knowledge transfer in the field of digital literacy and entrepreneurship, so that efforts to shape the Smart Society conditioning within the scope of the PGRI Madiun University campus can be achieved.

It is expected that with the results of the analysis and design of the LENTERA (Learn Technology and Entrepeneur Character) information system modeling it can become a basic foothold in developing Smart Society-based information systems in the campus environment in the future.

2. Methodology

2.1. Problem identification

At this stage there are observations of general problems (Smart City) on specific issues (Smart Society in the campus environment) which will be used as research objects.

2.2. Literature search / Literature search

At this stage there are literature search activities in the form of books, scientific articles, journals and seminar results relating to research that will be discussed regarding the concepts, models and technologies of Smart City and Smart Society, as well as the use of the OOAD (Object-Oriented Analysis and Design) method with UML 2.0 modeling standard.

2.2.1. UML THEORY

The Unified Modeling Language (UML) is a relatively open standard controlled by the Object Management Group (OMG), an open consortium of many companies. OMG was formed to create standards that support interoperability, specifically object-oriented system interoperability. OMG may be better known by COBRA (Common Object Request Broker Architecture) standards [6].

Unified Modeling Language (UML) is a tool for visualizing and documenting analysis and design results that contain syntax in modeling a system visually. UML is also a collection of modeling conventions that are used to determine or describe a software system that is associated with an object.

The history of UML is divided into 2 phases, namely before and after the emergence of UML. In the previous phase, UML had actually been introduced since the 1990s, but the notation developed by the analysis and design experts was different, so that it could be said to have no standardization. The second phase was driven by the Object Management Group (OMG) in late 1994 by Grady Booch with the OOD (Object-Oriented Design) method, Jim Rumbaugh with the OMT (Object Modeling Technique) method and Ivar Jacobson with the OOSE (Object-Oriented Software Engineering) method). All three created an integrated modeling language with the release of UML 0.9, released by OMF. Companies such as IBM, ObjecTime, Platinum Technolgies, Ptech, Taskon, Reich Technologies and Softeam joined to contribute ideas and jointly issue revised UML 1.1. Until now the latest version of UML is 2.5 beta. However, in this study, the UML used is UML 2.0.UML is used with the primary purpose of helping project teams communicate, explore design potentials, and validate software architecture designs or create programs.

2.2.2. OOAD METHOD

Object-Oriented Analysis and Design (OOAD) is a method used in designing Social e-Learning systems. This method is one of the design methods systems that approach the

problem from the perspective of the object, not on the perspective of functionality as in structured programming.

Object-oriented technology is increasingly popular in the industrial software development environment. This technology helps in the development of high quality software and lower maintenance costs. Because traditional software metrics are aimed at developing procedure oriented software so they cannot meet the requirements of object oriented software [7].

Object Oriented Analysis and Design (OOAD) is a method for analyzing and designing systems with an object oriented approach. Object is defined as an entity that has a state identity and behavior. In the analysis of object identity, it explains how the user distinguishes it from other objects and the behavior of the object is described through the events that are performed. In design, the identity of an object by how other objects recognize it so that it can be accessed and behavior by the operations performed. So that one object can affect other objects in the system. The technique for designing OOAD (Object Oriented Analysis Design) uses Unified Modeling Language (UML).

OOAD concepts include the analysis and design of a system with an object approach, namely object-oriented analysis (OOA) and object-oriented design (OOD). OOA is a method of analysis that examines the requirements (requirements / requirements) that must be met by a system from the point of view of classes and objects found within the scope of the agency. Whereas OOD is a method for directing software architecture based on manipulation of system objects or subsystems.

OOAD METHOD is the development of a system that prioritizes objects, compared to data and processes. This method has 3 approaches namely Object, Object Class, Inheritance. This research emphasizes the approach to Object & Object Class, which: Object: Objects in the system are attributes within the system that represent behavior in objects in the real world, for example Lecturers, Students, News Study Programs, KRS, KHS etc. Object Class: Object grouping based on the same treatment, for example Student lecturers fall into the Object Class group "System Users".

2.3. Formulation of the problem

At this stage there are activities outlining the problems that are general to more specific problems (specific). In this study the problem formulation is obtained in the form of "How to make a model of information systems LENTERA (Learn Technology and Entrepreneur Character) using the method of Object Oriented Analysis and Design?".

2.4. Make a research design

At this stage there are activities to determine the research flow and methodology used to conduct research, to prepare instruments and tools used for research, for example software used for modeling systems using UML 2.0 software.

2.5. Data Collection

The stages of data collection are done by conducting a literature study, and interviewing several subjects involved in the research object.

2.6. Data processing

At this stage there are data analysis & system modeling design activities. The method used to design the system is the OOAD (Object-Oriented Analysis and Design) method, where this method is a system design method by approaching the problem from the perspective of the object, so as to produce a system modeling form in the form of UML (Unified Model Language).

2.7. Conclusion of results

At this stage there are activities to conclude the results of data processing, and from the results of these conclusions can be taken suggestions and policies for further research.

3. Results and Discussion

3.1 Functional Requirements Analysis

The stages of data collection are done by conducting a literature study, and interviewing several subjects involved in the research object. As for the results of the data collection, there is an overview of the expectations of the LENTERA Information System Application development where:

1. The "LENTERA" Information System developed has two main objectives, namely:
2. Forming an online Social Learning Ecosystem wherein it discusses specific matters about Technology in various fields that can be accessed by students and lecturers in various study programs who want to provide insight and learn the development of technology in various fields.
3. Forming an Online Social Learning Ecosystem to shape the character of Entrepreneurs in the academic community of the Universitas PGRI Madiun.

The LENTERA Information System is expected to have several features:

1. Each user has a profile page, gallery, and access to upload content in the form of text or video.
2. Specific users Lecturers can create a kind of online course / class that can be attended by various students registered in the system.
3. Users can interact using text, voice or video messages.
4. Users can create discussion forums that can be followed by all users in the system
5. There is an Event or Quiz that can be followed by all users in the system.

3.2 Logical Design

Because this research uses the Object approach, in determining the actors and activities involved in the system, it needs a Functional System requirements analysis based on the objectives and features expected to be present in the LENTERA Information system. The results of data processing can be seen Functional Requirements Analysis as follows:

1. The system can be used to upload content both in the form of text and video relating to the discussion of Technology and Entrepreneurs.
2. The system can be used openly for the entire academic community of the Universitas PGRI Madiun as a means of socializing, discussing, and learning about Technology and Entrepreneurship.
3. With the Event and Quiz on the System can be used to foster a competitive climate among system users

Based on the functional requirements that have been made, the Actor and his activities can be determined for the system to be made:

Table 1. Object and object class

NO	ACTOR / OBJECT	OBJECT CLASS	ACTIVITY
1	ADMIN	ADMIN	Membership Management System Overall Forum / Group Management Overall Management of the Course Overall management of access rights Management of all Events & Quiz
2	LECTURER	USER & MEMBER	Profile Management Create content

			Creating Online Courses / Classes Course Management Create Event & Quiz Create a Forum / Group Interaction between Users
3	STUDENT	USER & MEMBER	Profile Management Create content Take Online Courses / Classes Create a Forum / Group Join the Event & Quiz Interaction between Users

Based on the results of the system analysis above, a system design model is made using several documents, one of the system modeling is from the UML diagram, Use Case Diagram.

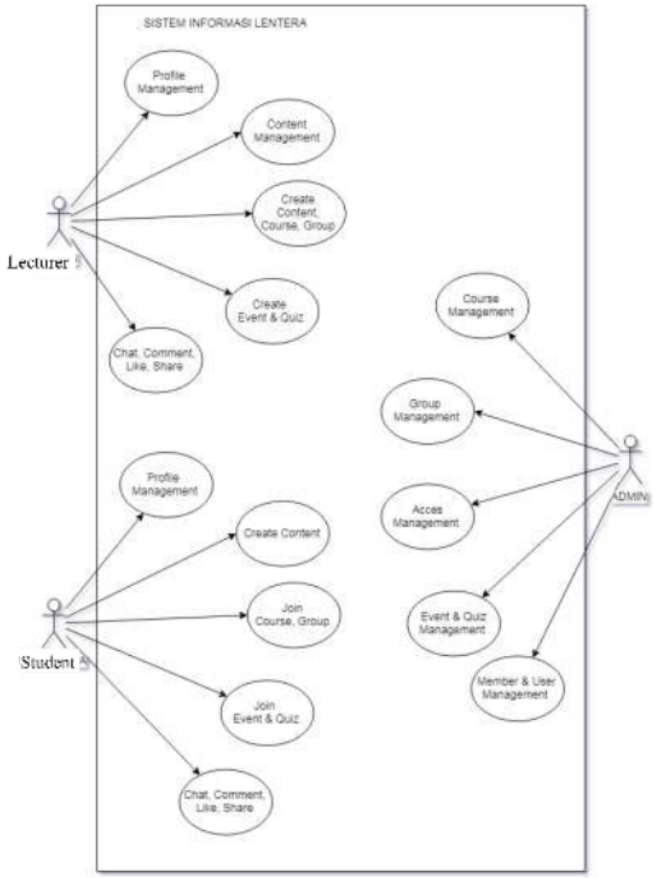

Figure 1. Use case information system

Based on the picture from the Use Case diagram, it can be seen that the LENTERA Information System features are as follows:

1. Profile Management : Function to manage personal profile and biodata
2. Content Management : Serves to manage content
3. Access Management : Serves to manage the access rights of system users
4. Group Management : Serves to manage forums / groups / that have been created by system users.
5. Member & User Management : functions to manage the membership of the System
6. Create Content Course : Group functions to create content, courses, and discussion groups.
7. Join Course : Group functions to join a course or group.
8. Create Event & Quiz : functions to create events and quizzes in the system.
9. Chat, Comment, Like : Share function for interaction between system users.

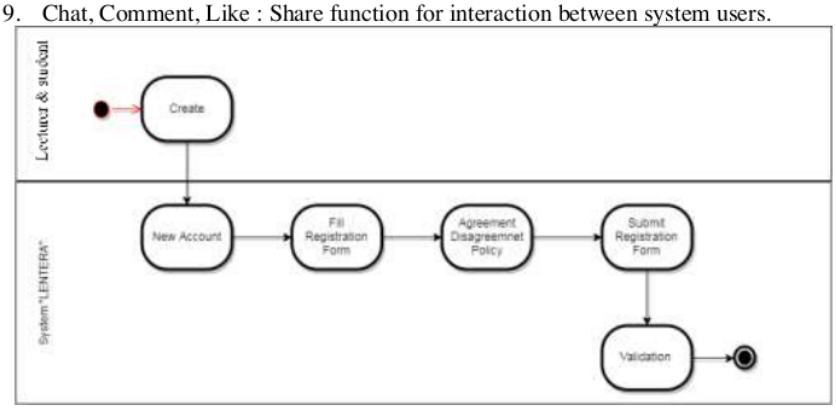

Figure 2. Activity diagram create account

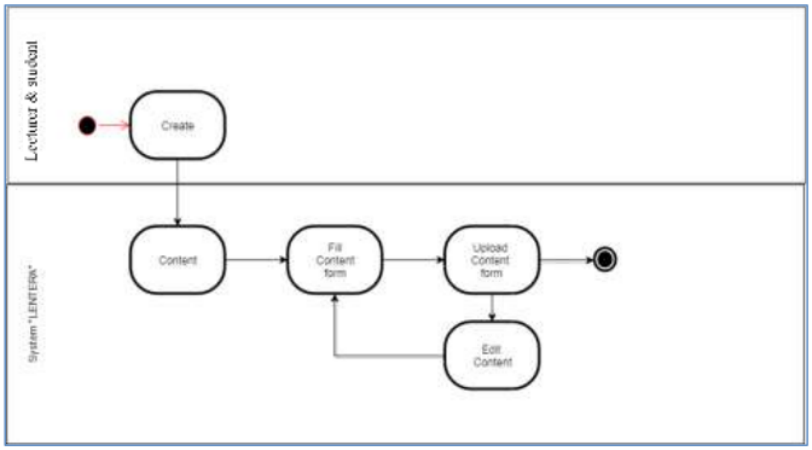

Figure 3. Activity diagram create content

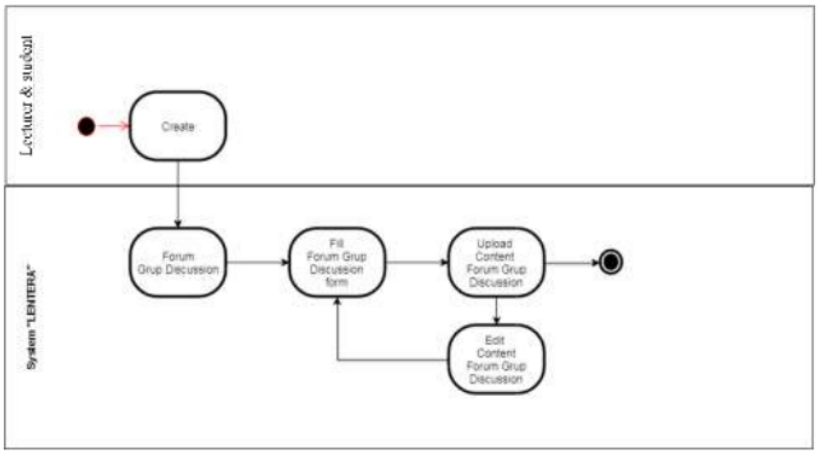

Figure 4. Activity diagram create forum group discussion

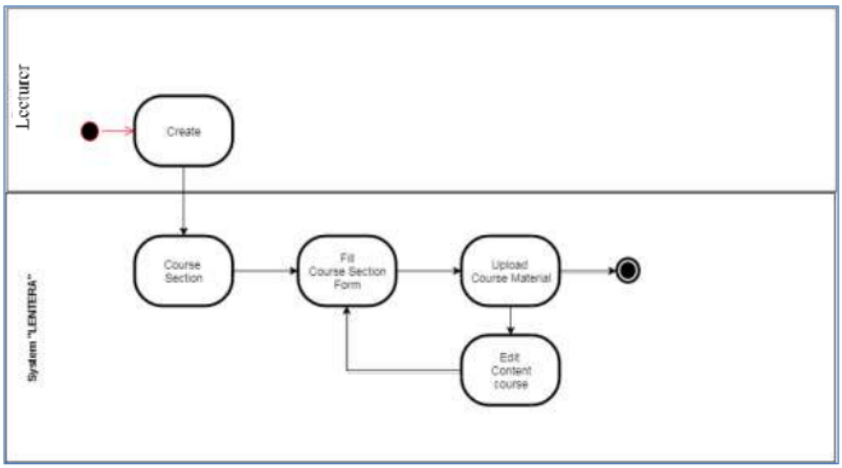

Figure 5. Activity diagram create course section

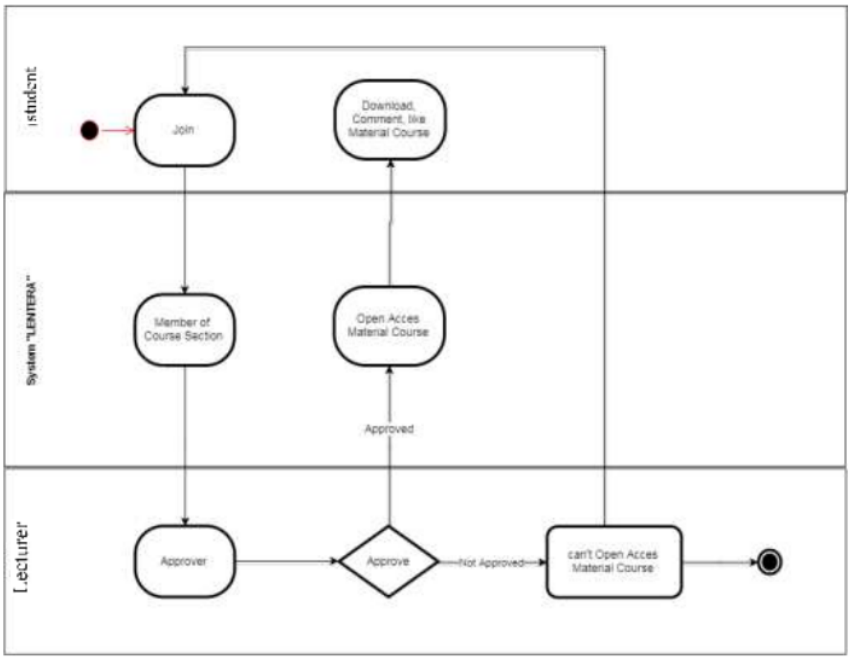

Figure 6. Activity diagram join course

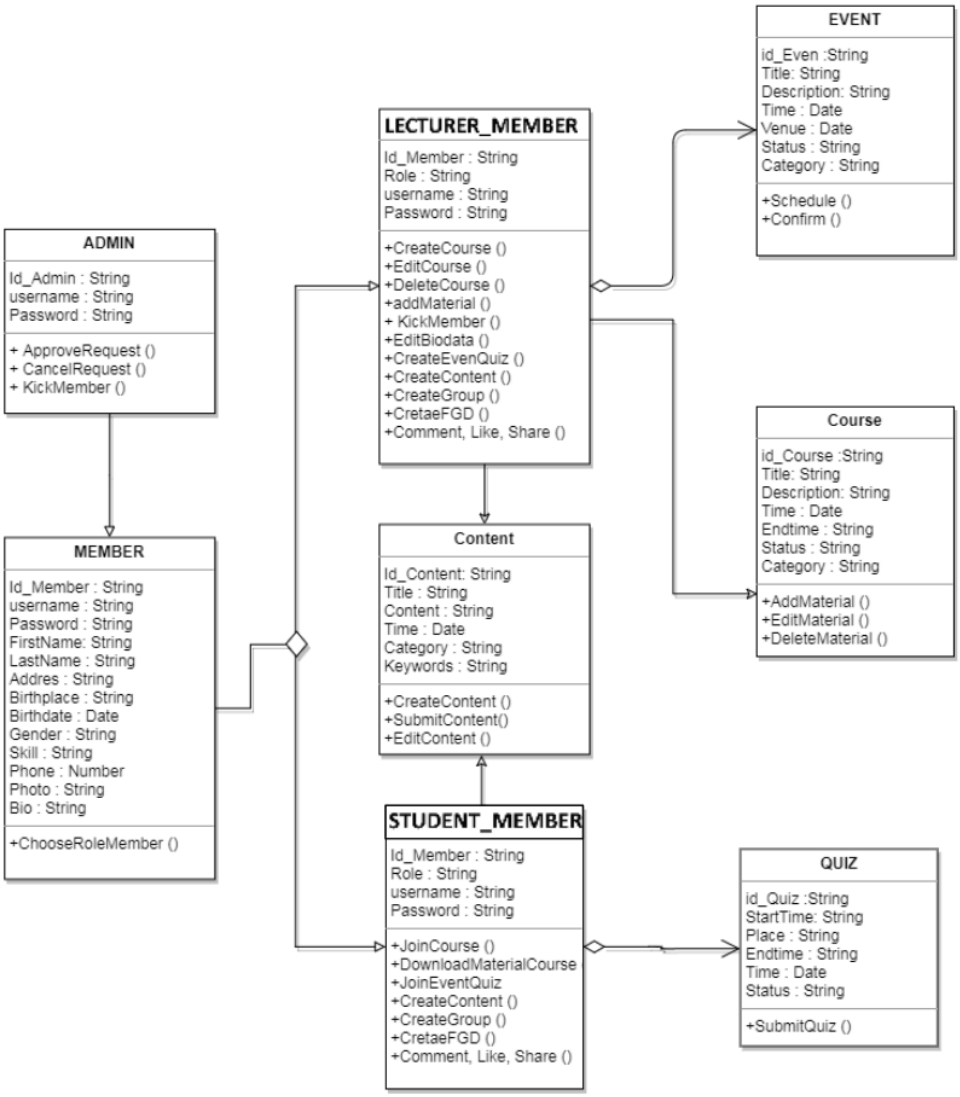

Figure 6. Class diagram

3.3 Phisycal Design

Figures 7 to 17 are a wireframe design of the system consisting of a Log in page, an Agreement and Disagreemnet page, a profile page, a blog page, a chat page, and course section.

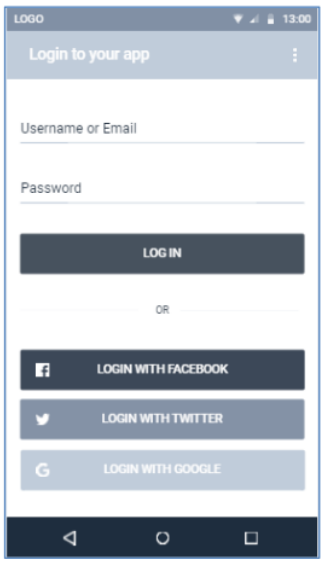

Figure 7. "Log in"

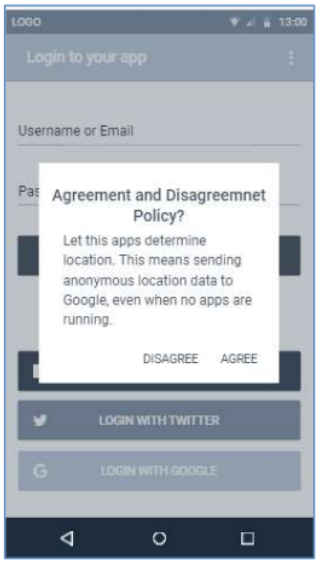

Figure 8. "Policy"

Figure 9. "Profile"

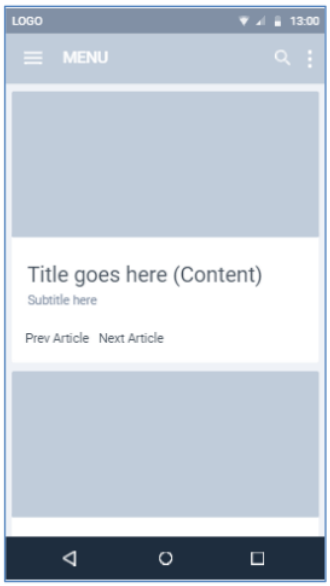

Figure 10. "Blog"

Figure 11. "chat"

Figure 12. "course Section"

4. Conclussion

The "LENTERA" information system was designed with the aim of forming an online Social Learning Ecosystem, with an emphasis on the quality of the content of the system about learning technology and the formation of entrepreneurial character. The "LENTERA" Information System Modeling can be developed by the OOAD method by using an Object-based approach involved in the system, which produces 3 actors involved namely Admin, Lecturer, and Students, as well as several features such as profile management, personal blogs, content management, rights management access, and other features.

5. References

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