DOI: 10.14421/ijid.2019.08208 IJID (International Journal on Informatics for Development), *e-ISSN:2549-7448*
Vol. 8, No. 2, 2019, Pp. 99-107

Implementation of Asynchronous Online Competency-based Learning: English for Informatics

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Article History
Received April 3rd, 2020
Revised May 3rd, 2020
Accepted May 3rd, 2020
Published Dec, 2019

***Abstract*— English for Informatics is a compulsory subject that facilitates students' listening, reading, speaking and writing skills in English. Previously, this course was held in a full face-to-face meeting with a large number of students in a class, which brought some weaknesses, such as difficulty in meeting the learning needs of students with varying abilities and levels of speed resulting in the lack of personal interaction between lecturers and students. This paper describes the implementation of a full asynchronous online learning aimed at building a more personal and creative learning environment. The research model used is an ADDIE development model (Analyse, Design, Development, Implementation, and Evaluation). In preliminary analysis, students' self-assessment and students expectations shows that students need to strengthen their English communication skills both verbally and in writing. Based on the need of students in the study program and the needs after graduation, this course is designed to achieve four competencies, namely English for daily communication, English in the IT field, English for academic purposes, and English for the workplace. Each competency will have an outcome that requires students to study more personally and have a thorough learning experience. Course content is designed to support the competencies needed by fourth-year Informatics students, i.e. research study, student exchange, student internships, and student entrepreneur or community services. The asynchronous online course has been implemented by using the Google Classrooms as the main learning platform and a number of supporting applications, such as Padlet to organize students' exhibition virtually, Quizlet as virtual flashcards to help students get familiar with important terms, and several interactive tools, such as Google Forms, Quizizz, Mentimeter and Quizlet. The learning evaluation shows that students get improved communication skills in English as well as readiness to choose a concentration in the fourth-year of study.**

Keywords- Online Learning; Competency; English; Informatics; Digital Portfolio

I. INTRODUCTION

English learning in higher education is essential to be conducted in flexible and less restricted in learning process because it needs leeway in transferring knowledge, drilling, and achieving target learning. Face-to-face learning or conventional learning gives less solution to create more activities in limited study time. At present, online learning gives an alternative to have learning productivity more interesting [1]. Online learning is a means to increase flexibility in term of time, place and pace [2].

Synchronous and asynchronous learning, the possible ways in online learning, have different basic procedure in practice. Asynchronous learning is more interesting to be applied because it has less restriction [3]. More media are flexibly used such as reading article, power point, audio, and video. Those media combined with other online learning activities can be accessed freely and at many times. It is different with synchronous learning that should be done directly at the present time. Moreover, synchronous learning is similar with face-to-face meeting, only the technology separates the two. Some learners find technical problem on internet connection and sound quality [4]. Apparently, this method is easy but not the best for online learning. Designing online learning, which is delivered simultaneously can be very tedious and tiring for teachers and students [5]. Students also have greater interest in synchronous leaning when they had recognition in terms of marks [6].

English in Informatics Engineering of Universitas Islam Indonesia is a compulsory course that facilitates students to learn global languages by adjusting their areas of expertise. This subject is important to be held as a full online course because it will provide wider opportunities for students to explore English language skills. Students can also learn from the lowest level or learn with the aim of enrichment. Learning experiences can be accessed from native speakers through the videos provided. This allows students to experience study like in a foreign speaking country.

In the previous held, this course was conducted in a classical learning model. The lecturer came to class for a face-to-face meeting, gave the lectures by showing slides of presentation, then students were given a number of worksheets that can be done individually and/or in groups. At the end of the semester, students were asked to work on a mini project by presenting some topics in the IT field and make a poster to publish their thoughts.

In this regard, the lecture notes are mostly related to reading activities where students were asked to read a number of articles related to the IT field and answer some questions to assess their level of understanding. Activities to assess the speaking, writing and listening skills are also given but in a lesser portion compared to the reading ones.

To support a dynamic and flexible learning environment, eventually the university has asked every lecturer to utilize some services under online platform (Google Classrooms). The services that enable lecturers to distribute teaching materials, organize online quizzes and assignments, and organize online classes asynchronously. It also assists students to have reflective learning using rubrics of peer assessment to increase understanding [7]. In addition, learning in higher education has not been entirely designed for more personal and creative learning. Equally important is the learning approach that adapts to the demands of more creative and superior graduates, namely competency- based learning. An approach that focuses on the results to be achieved at the end of learning. This means it must start with a clear picture of what is important for students to be able to do [8].

This paper describes the implementation of a full asynchronous online learning aimed at building a more personal and creative learning environment. The chosen subject is English for Informatics where full and structured online learning can facilitate students' listening, reading, speaking and writing skills in English. There are four themes that are carried out by considering the needs of students in the study program and their needs after graduation, namely English for daily communication, English for needs in the IT world, English in the academic world, and English in the workplace. Each theme will have outcomes that require students to learn more personally and have a comprehensive learning experience.

II. LITERATURE REVIEW

A. Asynchronous Learning

Asynchronous means not at the same time, unlike synchronous delivery methods, students can complete learning activities anytime and anywhere. Online learning, discussion forums, material source links, blogs, wikis, etc. Component of the asynchronous delivery environment. Most of the content for online learning is usually delivered using asynchronous technology [9].

Asynchronous learning (see Fig. 1) provides course material, post deadlines, and provides links to online sources and libraries, and so on. Learners want to have all the subject matter available at all times so they can print and read or reread the material anytime. However, it should be noted not to give too much information in printed format, especially if students also have text (or a series of texts) to read in class. Often in online learning, students are expected to read texts and / or articles, lesson notes, bulletin discussions, etc., but can be combined with video and / or audio clips with printed notes to emphasize certain points.

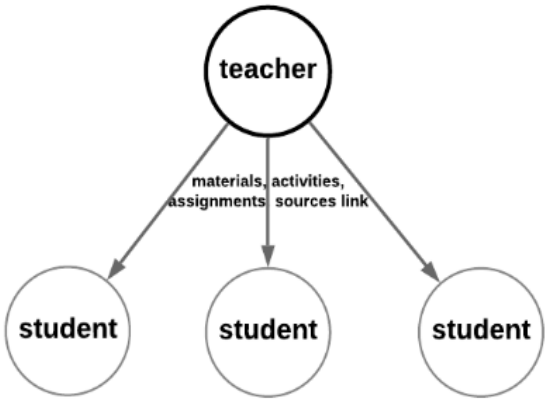

Figure 1. Asynchronous Learning Process

Asynchronous devices allow communication and collaboration over a period through the "different place-time" mode [9]. These devices allow people to connect together and schedule themselves for each person. Asynchronous devices are useful for maintaining dialogue and collaboration for a certain period and provide resources and information, which can be accessed directly by the people, both day and night. Asynchronous devices have the advantage of being able to involve people from various time zones. In addition, the device asynchronous is very helpful in capturing the history of an interaction group, allowing collective knowledge to be more easily shared and distributed.

B. Design of Competency-based Learning

CBL is the application principle of CBE (Competency-Based Education) for language teaching. Work-related and survival- oriented language programs were adopted in the late 1970s [8]. CBL focuses on language learning outcomes that emphasize what students are expected to achieve with the target language. In other words, this approach looks at the output rather than the learning process. This means, starting with a clear picture of what is important for students to do, then the design of learning, teaching and learning, and assessment.

The key to have a competency-based system includes developing clear learning outcomes where all components of the system can be focused, and building conditions and opportunities in the system that enable and encourage all students to achieve these essential results. CBL is based on a functional perspective on language teaching and the framework is adjusted to meet the needs of students and the language skills they need can be quite accurately predicted or determined. That is, learning must be adjusted to the learning objectives by accurately reviewing a series of learning activities so that students are expected to meet standards framed around the objectives described by the descriptors, a sample of progress indicators. The definition of a series of short-term goals is clearly given and each one builds on the previous one so that students advance in knowledge and skills [10].

C. Measurement of Digital Learning Outcomes

Online learning is carried out in order to develop an educational revolution 4.0, demanding digital measurement of learning outcomes. This assessment is a collection of information about student work to see the progress of the learning process. This measurement can be used for assessment and evaluation. The assessment results can see whether the learning outcomes have been achieved in accordance with the learning design, and the evaluation results can evaluate whether students meet the requirements to be considered qualified or not.

Measurements on online learning should use more measurements that are formative where the results can be used for consideration in continuous learning. However, summative measurements also need to be carried out as a measurement of whether students have met the learning outcomes requirements or not. According to [11] there are 17 digital learning measurement tools used in online learning such as Google Forms, Plickers, Poll Everywhere, Socrative.com, Nearpod, Classflow, Formative, Class Kick, Padlet, Seesaw, Recap, Kahoot, Quizizz, Quizlet, Quizalize, Triventy, and SketchParty TV.

III. RESEARCH METHODOLOGY

The design of the learning framework began with adaptation from previous lectures and gradually reshaping it into something new [12]. As seen in Fig. 2, the conceptual framework for designing and implementing an asynchronous online competency-based learning consists of five parts, i.e. *Analysis, Design, Development, Implementation and Evaluation* (ADDIE). This learning model is a systematic learning, which is organized in planned sequences activities related to sources that meet the needs and learner characteristics [13].

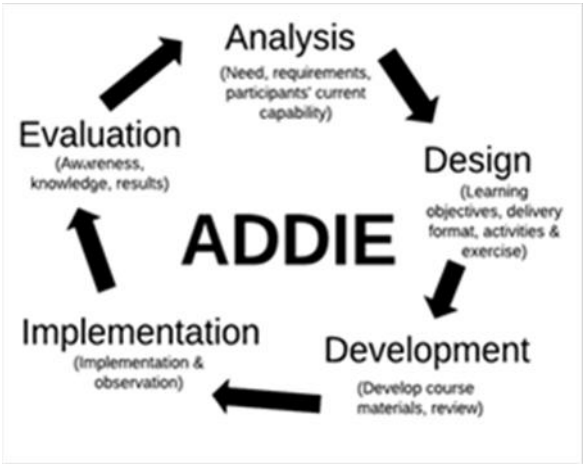

Figure 2. Conceptual framework of learning design

Similar stories within this research based on ADDIE working framework, we define the step of this research as seen in Fig. 3. On the needs analysis, we evaluate the implementation of this course in the previous held, analyzing the character needs of students, and also gathering students'

opinions regarding their expectations of this course. On course design, development and implementation, we consider the main learning achievement that has been set in the curriculum in accordance with the students' needs in the study program and after graduation. In this stage, four communication skills, i.e. reading, listening, writing and speaking will be proportionally distributed into the main competencies that are defined in this course. Finally, an evaluation was done by requesting some feedback on the learning activities that students went through and measuring students' self-reflection based on their learning achievements.

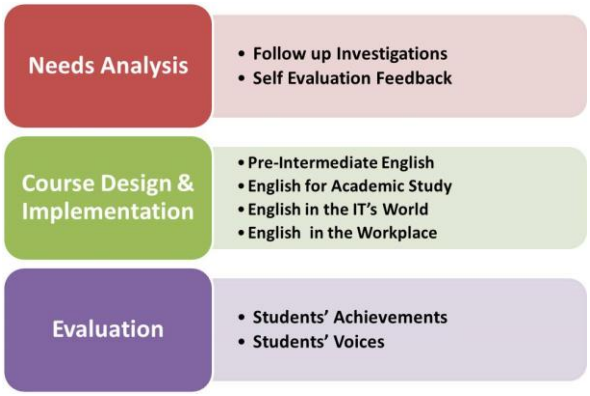

Figure 3. Steps in conducting research

IV. Results and Discussions

A. Preliminary Analysis

The needs analysis as a prior step in learning design can be done through several methods, such as follow up investigation, self-evaluation and feedback from previous learning [12], and propose the course model that should be implemented. The needs analysis was done in two approaches as shown in Fig. 4.

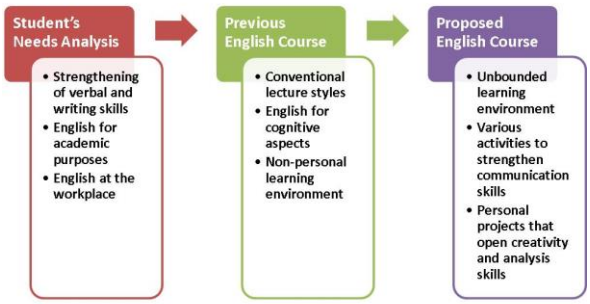

Figure 4. Steps in preliminary analysis

On the first approach, we gathered students' opinions regarding their expectations of this course by filling a questionnaire. The questionnaire consists of students' self-assessment on their English proficiency and students expectations on this course. There were 34 students that participated in this questionnaire.

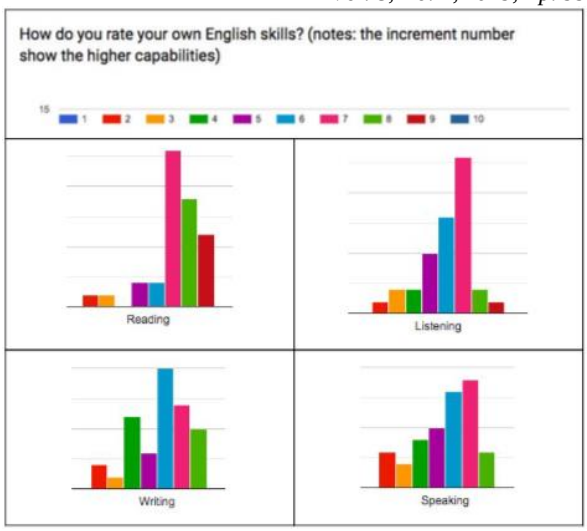

Figure 5. Pre-course students self assessment

On the self-assessment, in scale of 1-10 (poorest to the best), we found that most of the students rate their English proficiency below eight (green light bar), especially in listening, writing, and speaking skills. This means that students need to strengthen their English communication skills both verbally and in writing. The summary of prior self-assessment can be seen in Fig. 5.

On the course expectations, we have asked the students to write openly of their hopes on this subject. The results of writing are collected as a word cloud as shown in Fig. 6. This figure shows that the most common words that appear are *improvement, skills, speaking and writing*. Similar to the previous results, in quality students have eagerness to improve their speaking and writing skills.

Figure 6. Word cloud of students' expectations

On the second approach, the lecturer as the organizer and content provider analyzed the character needs of students and evaluated the implementation of this course in the previous held. We analyze that Informatics students should have some skills in reading, especially to understand articles that describe the latest developments in ITs fields, which are mostly written in English. Furthermore, students should also be able to write research reports in a proper academic writing style. For that reason, academic reading and writing is necessary. In addition, for the need after graduation, students should have some knowledge of English in the workplace, such as making job applications and interview tips in English.

Following these needs analysis, we also investigated some of the weaknesses of English courses previously held. It was held in a face to face meeting as we realized that this method emphasizes more on one-way communication between lecturers and students, the provision of cognitive knowledge only revolves on English in the IT's world, and the learning method is impersonal which results in limited interaction between lecturer and students.

Referring to the needs analysis and self-evaluation, we propose English course is designed with asynchronous online class with diverse activities facilitating the strengthening of competencies to be achieved. This can produce work products with high creativity and a more personalized learning process.

B. Implementation of Asynchronous Online Learning

1) General Structure

The English course for Informatics is intended for the third-year students (5th or 6th semester), so the course content is designed as a preparation step before enrolling in the final year of the study program. In accordance with the Informatics Curriculum, fourth year students are required to choose one of the five concentrations available, consisting of Research Study, Student Exchange, Student Internships, Student Entrepreneur (Digital Business Start-up), or Student Community Services.

Furthermore, this course has the main Learning Achievement to improve students' verbal and written communication skills in English. To combine this LA with the needs analysis, English for Informatics has been implemented in a full asynchronous online environment with four competencies or learning outcomes, namely:

1. Competency 1 (Block 1): English for daily activities.
2. Competency 2 (Block 2): English for academic purposes.
3. Competency 3 (Block 3): English in the ITs worlds.
4. Competency 4 (Block 4): English in the workplaces.

With regard to the Informatics Curriculum in the fourth year, we have mapped these competencies with the concentrations of studies. In this regard, block 1 and block 3 are intended to support the general needs of non-English-speaking students, block 2 is intended to support the research study and student exchange program, and block 4 is intended to support the student internships, entrepreneurship, and community services program.

In terms of the course contents, the first block is designed as the basic concept for the other blocks. However, these four blocks conceptually are independent; it can be implemented not necessarily in a certain order. On each block, there are four topics discussed with one mini project within four weeks. In total, this course has 16 topics and four mini projects. The distribution of topics and mini projects of each block can be seen in Table 1.

TABLE I. LIST OF TOPICS AND MINI PROJECTS

Topic #	**Block #**			
	1	***2***	***3***	***4***
1	Schedule and time	What does a successful student look like?	Software application	What do you want from a job?
2	Asking and giving direction	Academic writing and essay writing	IT acronyms and slang words	Talking about job
3	Shopping electronic goods	Academic language	Cryptocurrencies and types of computer	CV and cover letter
4	Being an international student	Preparing your essay	Computer ethics and IT career	Preparing for job interview
Mini Project	My experience and study plan as Informatics student	Academic essay	My dream career in ITs field	Making a CV and job application letter

In each topic, a number of teaching materials are available in the form of video, audio and reading material. Four communication activities, namely reading, listening, writing, and speaking are attached in many activities. We applied Google Classroom as the main platform to manage the learning activities as seen in Fig.7.

To assess students' performance, we provide two types of assessment. First is formative assessment, which is attached in each topic and is given as closed questions, such as multiple choices, checkboxes, or short answers. We applied several interactive tools, such as Google Forms, Quizizz, Mentimeter and Quizlet. Second is summative assessment, which are given as open-ended questions that require students' critical thinking, analytical skills and creativity. Mainly these assessments are delivered in the topics' discussion forums and are attached to the end of each block as mini-project. Especially for the mini project, mostly it is related to writing and speaking activities. To assist in evaluating this qualitative assignment, the lecturer has prepared an assessment rubric for each mini project.

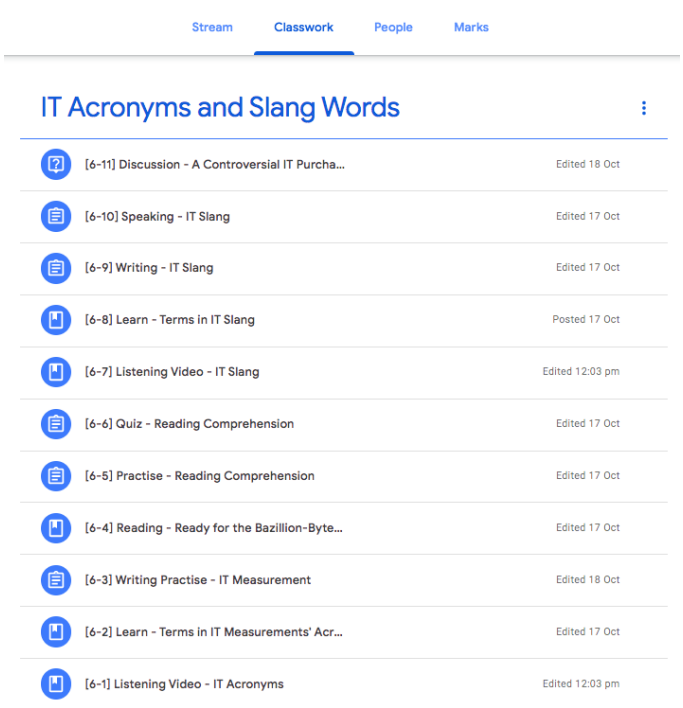

Figure 7. Learning activities management using Google Classroom in Google Classroom platform

2) Implementation of Core Competencies

On block one; the main competency goal is to enable students to communicate in English for daily needs. In these, students are able to communicate in situations that are commonly faced, such as telling the schedule of activities, giving and asking directions, shopping for electronic goods, and being an international student. The mini project in this block is to create a profile video that requires students to speak and describe their own experience while studying at the Informatics Department and their study plan in the fourth year. To assist in making this profile video, there are some open questions, prepared by the lecturer, to direct the content of student talks in their video.

This video assignment is an approach to encourage students to have a digital portfolio. Students are required to post their video on a video sharing website such as YouTube Channel and paste the link on a virtual wall, such as Padlet. By using Padlet, it allows lecturers to organize exhibitions or display student work virtually and enables students to view, rate and comment on videos of their peers (see Fig. 8).

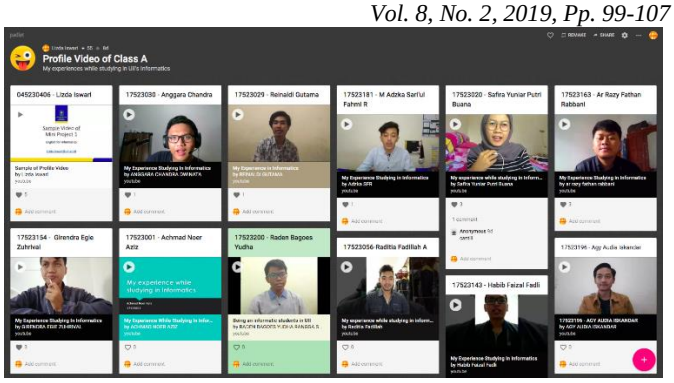

Figure 8. Virtual expo of student digital portfolio using Padlet

On block two, the main competency goal is to enable students to communicate in English for academic purposes. In these, students are able to recognize the character of students who are academically successful, to develop vocabulary insights using dictionaries, convey stages / procedures of activities scientifically, use images and diagrams appropriately, and present data properly. Successful students can be expressed by their competencies to use dictionaries to enhance good comprehension in reading and listening, and note important things from English audio / video. This skill is also needed for other subjects with similar tips in different languages. The mini project in this block is to write a simple essay that is applicable as forerunners of writing the research report or thesis. In these, students are able to write paragraphs and essays properly based on the academic writing guidelines.

On block three, the main competency goal is to enable students to communicate in English in the world of Information Technology. In these, students are able to describe some vocabularies and information necessary and frequently used in the domain of Informatics. To support the learning activities, we apply Quizlet as a learning media that use some flash cards that enable students to get acquainted and familiar with a number of important terms in Informatics. In addition to being familiar with the terms, students can also be tested for their writing and listening skills over the given terms. Through this research, ten sets of Quizlet flashcards have been produced which can be used by students to learn a number of important terms of English in the IT's world, such as software applications, IT acronyms, IT slang words, cryptocurrency, computer ethics and IT careers. One sample of a flash card is shown in Fig. 9.

Figure 9. Utilization of Quizlet digital flash card as learning media

The mini project in this block is speaking about students' dream career in IT. Similar to the mini project in block one, students are also required to make a short video and post it on the video sharing website. There are some open questions to encourage students to have an overview of the world of work, which are wanted and what preparation is needed to achieve that dream. These questions are:

1. What is the first job or position that you think is the most suitable for you once you graduate from Informatics?
2. What is your career plan in IT in the next five years? Explain briefly, why you want to have that job. Is that related with your passion, your interest, the salary, the pension guarantee, or any other ideas?
3. Will the job still be relevant to the IT needs of your area? I.e. What are the IT aspects in your area that still need to be developed?
4. What are the requirements that you have to fulfil to get your dream job?
5. What are the responsibilities that you have to do once you get your dream job?

On block four, the main competency goal is to enable students to communicate in English for the needs in the workplace. In these, students are able to communicate for the career needs, such as making curriculum vitae and job application letters, and preparing for interviews when entering the workforce. The mini project that is attached to this block is writing a curriculum vitae and job application letter.

C. Learning Evaluation

1) Students' Performance Results

To measure the success of the implementation of this model, we conducted a performance measurement program as shown in Table 2. There are four performance indicators adjusted for the formulation of learning competencies. To calculate the achievement of each performance indicator is determined based on the percentage of students who have worked on all the quizzes on the topic of learning with an accuracy of 70% and working on four mini projects.

In general, all performance indicators have exceeded the target. We have set the baseline target of 70%. This value was derived from the assessment rubric that we have set, in these, the value of C is equivalent from 70 to 80, the value of B is equivalent from 80 to 90, and the value of A is equivalent from 90 to 100. In accordance with the university regulations, a student is declared to pass the course if he/she has a minimum English grade of C, hence the baseline target is set to 70%.

As seen in Table 2, three of the four indicators scored above 80%. The highest level of achievement is CP2 and the lowest level is CP 4. The total number of participants of this course is 39 students. In four competencies, more than 30 students have met the conditions set out in this course.

TABLE II. COURSE PERFORMANCE INDICATOR

Performance Indicator	**Target**	**Achievement**
Percentage of students with an accuracy rate of 70% on the quiz and are able to produce a self-profile video about college experience and a fourth year study plan in Informatics Engineering.	70%	84,62% (33 of 39 students)
Percentage of students with an accuracy rate of 70% on the quiz and are able to write a simple essay in accordance with the standard essay structure.	70%	87% (34 of 39 students)
Percentage of students with an accuracy rate of 70% on the quiz and are able to make a video about a dream career in ITs field and activity plans to realize that dream.	70%	84,62% (33 of 39 students)
Percentage of students on the quiz with an accuracy rate of 70% on the quiz and are able to make a CV and job application letter in English.	70%	79% (31 of 39 students)

2) Students Perceptions of the Learning Process

In order to get feedback on the implementation of competency based online learning, students have been asked to provide their opinions through questionnaires related to online courses. The number of respondents was 37 of the 39 registered participants. There are three aspects of evaluation related to general opinion, course assessment style, course content, and student self-reflections.

The first aspect of evaluation is basic questions that aim to find out the general opinion of students, including preferred learning methods and types of courses that are suitable to be held as a full online course. The result shows that the majority of students, namely 57%, prefer to have a blended learning method and about 35% of students prefer to have a full online course instead of a conventional lecture (face-to-face). There are also some opinions to have a full online course blended with group assignment methods. Furthermore, we found that almost 90% of students promote non-programming subjects, such as language, to be the most appropriate subject to be held as an online course.

The second aspect of evaluation is course assessment style, which aims to find out the preferences of questions type to measure students' understanding and student involvement and enthusiasm in variations in the use of learning platforms. The result shows that the type of assessment questions that are preferred to measure the level of student understanding are multiple choices, such as checkboxes, and true false answers.

Next is to choose only one answer and a short essay. Regarding the involvement and enthusiasm of students in various types of use of learning platforms such as Google Classroom, Padlet, Quizziz, and/or Quizlet, students stated that they were very enthusiastic in using them as learning media and assessments. The use of the platform also increases student

involvement in the learning process. Compared to offline learning, student involvement is quite limited and the learning experience is not optimal.

The third aspect of evaluation is the course content, which aims to find out the suitability level of course contents, the content complexity level, and the suitability to the concentration of study in the fourth year. The result shows that for the level of appropriateness of lecture material divided into four blocks, the majority of respondents (86.5%) rated that it was quite appropriate.

For the course content complexity, in general, students assess that the lecture material has a level of difficulty that is quite complicated. This can be seen in Fig. 10, which shows the predominance of green or the second trunk from the right, which states the level of fairly advanced for all four blocks of teaching material.

For the level of appropriateness of lecture contents to the needs of the fourth year of study in Informatics Engineering, the majority of students assess that the material is appropriate. This can be seen in Fig. 11, which is dominated by green and purple colors, which state it is suitable and very appropriate. In the picture, you can also see the objectives of each block of topic towards the fourth-year concentration of study. I.e. block 2 for student exchange and scientific research project, block 3 for business pioneering, industry internships, or community service, and block 4 for business pioneering or industry internship.

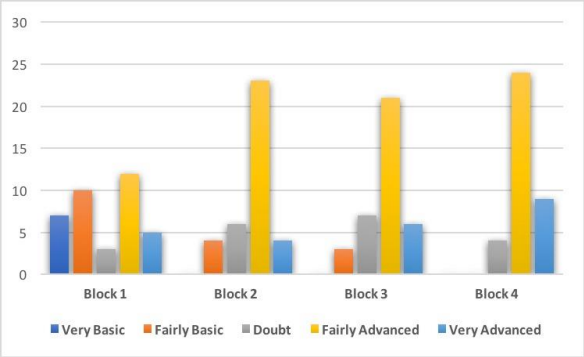

Figure 10. The course content complexity level

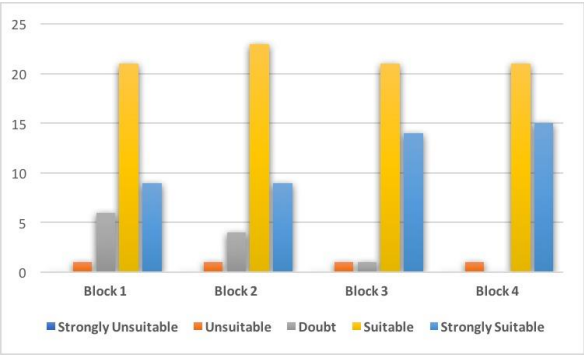

Figure 11. The content suitability level to the fourth-year concentration study

V. CONCLUSIONS

The application of full asynchronous online learning in English courses designed for fourth-year students in Information Engineering can be declared successful. In its implementation, students participated in all learning with a variety of English language skills activities. Based on the learning outcomes seen from the course outputs, students can improve their written and oral communication skills as well as the increased literacy skills.

ACKNOWLEDGMENT

Thank you to Directorate of Academic Development, Universitas Islam Indonesia that support this research under the grant Pilot Project of Online Course.

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