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Research paper

A Preliminary Study for Blended Learning Simulation Based Model on Aerodrome Flight Information Course

Sri Rahayu Surtiningtyas[1]*

[1]Educational Technology Department – Postgraduate Program of Universitas Negeri Jakarta, Jakarta, Indonesia
**Corresponding author E-mail: yayuk_tarmoe@yahoo.com*

Abstract

The purpose of this study was to conduct preliminary study for an instructional model research and development which will be developed for Aerodrome Flight Information course in Indonesia Civil Aviation Institute. This preliminary study use step 3a blended learning decision matrix from Hew and Cheung 2014 that adapted from Foo 2014. The preliminary study was consisted systematic analysis of institutional support, infrastructure readiness, content readiness, instructor readiness, and student readiness. This preliminary research was carried out at Indonesia Civil Aviation Institute from February until April 2016. The data were collected through interview and field observation. The data analysis and interpretation indicates that (1) the briefing should be done instensively prior to role-play simulation, (2)according to time constraint, briefing should be held in online learning, (3)infrastucture, instructor, and learner suitable with blended learning simulation based model. The finding lead to the recommendation to develop a blended-learning simulation based model for Aerodrome Flight Information course. The model should be developed in supplemental model which is retain face-to-face learning time and add some online learning activities.

Keywords: *Blended Learning; Simulation; Aerodrome Flight Information*

1. Introduction

The long history of education and training in the civil aviation world spawned four generations of training that continue to enrich previous generations. The first generation was Apprenticeship (1903-1929) started when the Wright brothers first completed a heavy and controlled flight on December 17, 1903 and began teaching others about the art of powered heavier-than-air flight. The second generation is Simulation (1929-1979). The Link was discovered in 1929 which is the first simulator for pilot training in the world. The third generation is Safety (1979 - now). The fourth generation is Customized Training (1). The history of aviation education and training is not only pilot training. With the growing number of aircraft causing airspace congestion at some of the world's major airports in 1920-1930s demanded an arrangement of the use of runways for the benefit of aviation safety. In 1922, following a minor collision at Croydon Airport - London, the UK aviation authority issued NOTAM 62/1922 which contained notice to pilots who would depart for a departure order and signal a red flag as a take-off permit (2). In America, Archie W. League in 1929 first arranged the aircraft using a red and green flag on the runway edge of St.Louis Airport. But communication using this flag was useless at night so it was replaced with red and green lights. Further it was developed into radio communication (3).

Eurocontrol state that Aerodrome Flight Information Service (AFIS) is the term used to describe the provision of information useful for the safe and efficient conduct of aerodrome traffic at those aerodromes where the appropriate authority determines that the provision of aerodrome control service is not justified, or is not justified on a 24-hour basis (4). According to International Civil Aviation Organization (ICAO), "There was a definite need for a service between aerodrome control service and no service at all." ICAO stated that the motivation to build AFIS considered to AFIS's operational cost is lower than aerodrome control's. But, the safety of AFIS must as high as the safety of aerodrome control service (5).

AFI course used role-play simulation for taining and its scenario was given by the institution (non-adaptive training system). Learner was doing a simulation by following the exercise scenarios which started from the easiest up to the most complicated one. This simulation was relevant with Social Learning Theory by Albert Bandura in Spector which emphasize the idea that human learn from others by observation process, imitating, and exhibiting. Social Learning Theory is a bridge between behaviorism and cognitivism. Based on the former because the focus of observation process is seeing the other learners exhibiting or demonstrating things they learned. Demonstration as a learning method needs some attention from learners, memory about anything what have been observed in internal cognitive form, an ability to reproduce observed activities with a level of precision that others can judge, and motivation to keep connected with the three prevoius processes (6).

Learners are also linked to cognitive activities when simulating, paying attention to their peers, reflecting on their own performance as well as their friends, collaborating with colleagues, and referring to existing documents or guidelines. In each simulation, there are three stages of activity, namely: 1) briefings by the instructor about the material to be simulated; 2) implementation of the simulation by learners; 3) debriefing or giving feedback by the instructor about the simulation that has been implemented (7). Briefing is an information or orientation session conducted prior to a role-play simulation which instructions and information related to the preparation are given to the students. The purpose of briefing is to explain the scenario and help the learner in achieving

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the goal of scenario (8). The better briefing will be done, the greater learning benefits that will be received by learner during simulation. This was particularly when a new exercise scenario was introduced. Implementation of briefing on AFI course at Indonesia Civil Aviation Institute was using face-to-face method, which the instructor gave general direction to the learners in a simulator room. Briefing about material to be simulated by learners, such as: new phraseology to be used, airspace conditions, theory or procedures for advice and information, and coordination with related ATS units. In addition, aeronautical handling techniques were also provided in accordance with the simulation scenarios to be simulated. Aerodrome traffic handling techniques were not necessarily the same between one instructor and another because they were strongly influenced by their experiences and the understanding level of standards or procedures. Milanovski state that during the briefing learners should be able to distinguish what is meant by ***standard, common practice, or personal preference (9)***. ***Standard*** is a government standard procedure or regulation on AFI services, ***common practice*** is a frequent air traffic service in the field, and ***personal preferences*** are the personal choice of each AFI officer when making decisions to provide air traffic services at AFIS aerodrome. Other learning difficulties faced by learners were instructors who were grouped into a teaching team. Teaching team consist of some instructors who had different personal preferences depend on their experience and understanding of existing procedures, rules, and common practice. This distinction raised learners' confusion about how to handle the best emergency situations according to the situation. Briefing on the AFI simulation was conducted only once before entering the new subject. After briefing, learners performed role play simulation. There was no chance for learners to discuss the difficulties that might be encountered in preparation before the simulation. This was because the availability learning time did not sufficient for a briefing before simulation in the simulator, especially in more complex emergency handling scenarios. In addition, instructors did not have an opportunity to make an open discussion when giving their personal preferences that fitted with a problem which learners need to solve. This condition indicated a gap between the briefing that should be done before a role play simulation with a briefing that was only done once at the beginning of the new subject. Then, a new instructional model should be developed by a research and development in educational. Consider to learning time constraint, a proposed instructional model was blended learning that could be characterized as a complex problem-solving activity. Therefore some important steps or procedures were taken when an instructional designer designed a course by using blended learning in simulation. This research, the first step of an educational research and development, was conducting a preliminary study for making decision of the suitability of using blended learning for Indonesia Civil Aviation Institute.

2. Literature Review

According to Kaye Thorne, blended learning is the most logical and natural evolution of our learning agenda. It suggests an elegant solution to the challenges of tailoring learning and development to the needs of individuals. It represents an opportunity to integrate the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning. It can be supported and enhanced by using the wisdom and one-to-one contact of personal coaches. Blended learning is a mix of multimedia technology; CD ROM video streaming; virtual classrooms; voicemail, email and conference calls; online text animation and video streaming. All these are combined with traditional forms of classroom training and one-to-one coaching (10).

Josh Bersin defines that blended learning is the combination of different training "media" (technologies, activities, and type of events) to create an optimum training program for a specific audience. The term "blended" means that traditional instructor-led training is being supplemented with other electronic formats (11).

Hew and Cheung state that blended learning design can be characterized as a complex problem-solving activity. Therefore some important steps or procedures are taken when a designer designs a course by using blended learning. They believe that blended learning should be viewed as a pedagogical approach that combines the opportunities of face-to-face learning with opportunities of the online environment such as increasing the interaction between learners and learners, as well as learners and instructors, rather than a mere ratio of delivery modalities (12).

Garrison and Vaughan point out that learning activities which take advantage of listening and talking should be considered for the face-to-face context. For example, lecturing, brainstorming, role playing, and debate are interesting and powerful learning activities in a face-to-face environment. They rely on rapid verbal and visual exchanges. Activities for online learning experiences use discussion forums, case studies, or article critiques (13).

Doolan states that the educator role shifts from a didactic, instructive approach which sees the educator as an expert possessing and imparting knowledge; to one of a facilitator of learning. In this way, the educator and learners together engage in a dialogue and in partnership in the social construction of knowledge guided by the educator (14).

Joyce, Weil, and Calhoun state that simulations are constructed from descriptions of real-life situations. A less-than-real-life environment is created for the instructional situation. Sometimes the renditions are elaborate (for example, flight and spaceflight simulators or simulations of international relations). The learner engages in activity to achieve the goal of simulation (to get aircraft off the ground, perhaps, or to redevelop an urban area) and has to deal with realistic factors until the goal is matered (15).

3. Methodology/Materials

Characteristics of blended learning simulation based model on Aerodrome Flight Information course are as follows:

1. It is a blend of e-briefing model (online learning) with role-play simulation and debriefing (face to face learning).
2. Requires participation and interaction between students with students, students with instructors, and students with learning materials.
3. The instructor acts as a facilitator, mentor, and feedback giver.

Table 1: Some Key Issues for Consideration (Hew and Cheung, 2014)

Key pre-condition	Issues to consider
Institutional support	• *Adequate technical support?* • *Resources (e.g. time, money) for faculty to plan, design, and develop blended learning*
Infrastructural readiness	• *Availability of a reliable and robust online platform system, broadband access?*
Content readiness	• *Starting from scratch (and hence can be quite expensive in terms of time and money to be invested)?* • *Adapting from open educational resources?*
Instructor readiness	• *Ability to facilitate student discussion online?* • *Willingness to contact students who are not participating?* • *Ability to deal effectively with disruptive online students?* • *Ability to promote online collaborative learning?* • *Ability to set up a well-organized course website?*
Learner readiness	• *IT skills of the learners?* • *Internet experience of the learners?*

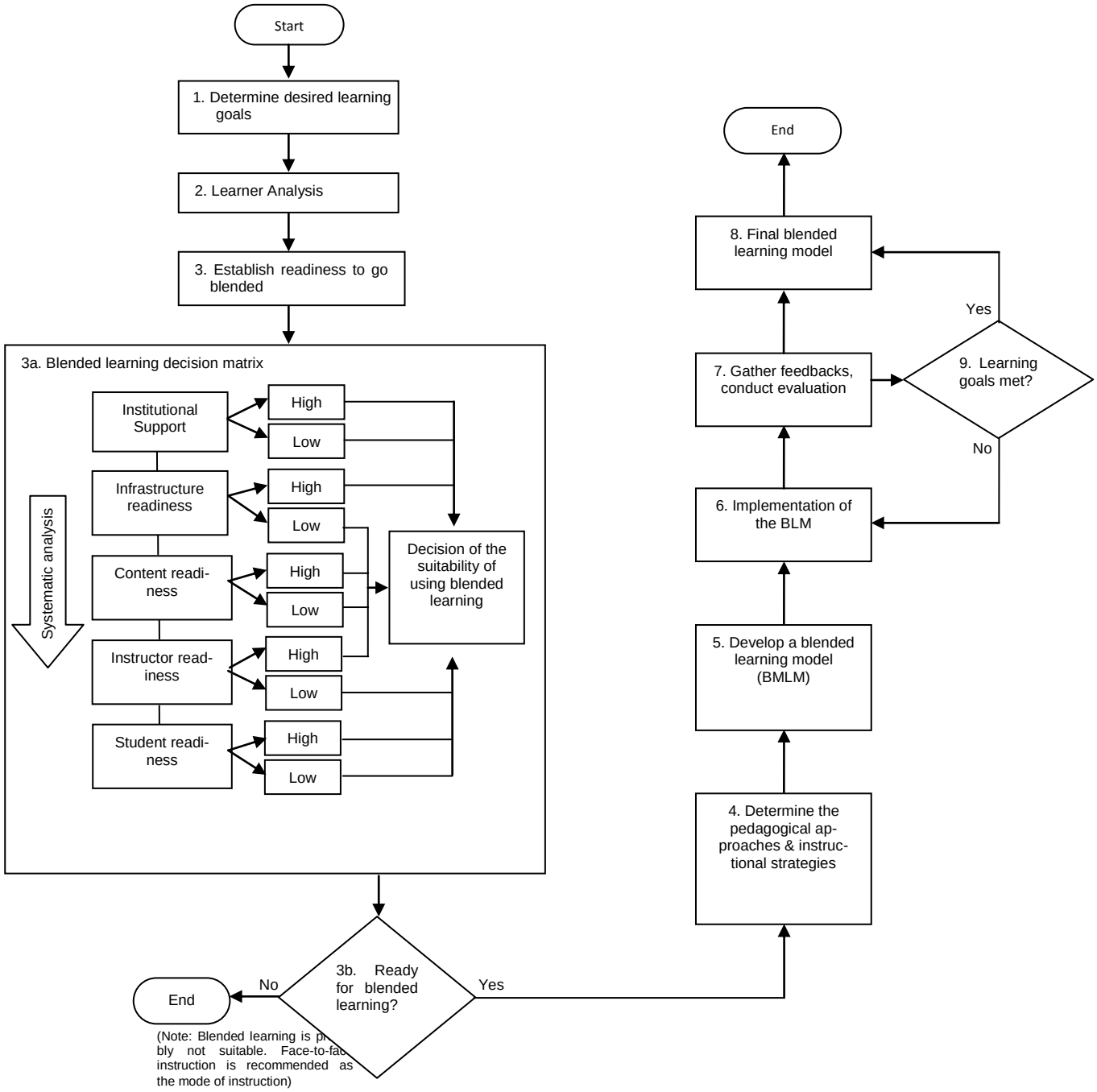

Fig. 1: A bleended Learning Design Framework (Adapted from (12)

Table 2: Preliminary Study Instrument Blueprint

Dimension	Indicator	Data Source	Data Criteria	Instrument Type
Learning Com-ponents	Instructional Objectives	Student Instructor Document Study	Clarity of learning objectives for students	Interview guidance Observation guidance
	Instructional Material		Relevance of material with learning objectives	Interview guidance Observation guidance
	Instructional Method		The accuracy of learning method with learning material	Interview guidance Observation guidance
	Instructional Media		Relevance of learning media with learning objectives	Interview guidance Observation guidance
	Assessment of Learning Outcome		Relevance of assessment with learning objectives	Interview guidance Observation guidance
	Learning Time		The need for the amount of time to achieve learning objectives	Interview guidance Observation guidance
	Reference Material	Document Study	Relevance of reference material to the needs of learners to achieve goals	Observation guidance
	Learning Difficulties Factor	Student	Factors that cause learner difficulties in learning	Interview guidance Observation guidance

	Learning Implementation Difficulties Factor	Instructor	Difficulties in implementation of learning activities	Interview guidance Observation guidance
Implementation Readiness of Blended Learning Simulation Based	Institutional Support	Chief of Aeronautical Communication Program	Adequate technical support? Resources (e.g time, money) for faculty to plan, design, and develop blended learning?	Interview guidance
	Infrastructure Readiness	Chief of Aeronautical Communication Program	Availability of a reliable and robust online platform system, broadband access?	Interview guidance
	Content Readiness	Chief of Aeronautical Communication Program Instructor	Starting from scratch? Adapting from open educational resources? Using existing learning material?	Interview guidance
	Instructor Readiness	Chief of Aeronautical Communication Program Instructor	Ability to facilitate student discussion online? Willingness to contact students who are not participating? Ability to deal effectively with disruptive online students? Ability to promote online collaborative learning? Ability to set up a well-organized course website?	Interview guidance
	Student Readiness	Chief of Aeronautical Communication Program Student	IT skills of the students? Internet experience of the students?	Interview guidance

Creswell states that preliminary study might include interviews with a couple of individuals or field observations of short duration (16).

The subjects of this research and development are students of Aeronautical Communication Program which follow Aerodrome Flight Information course. Participants in this study were instructors involved in Aerodrome Flight Information course. The instructor is fully engaged in this research and development, both as a facilitator, mentor, and feeder to learners as well as collaborating partners with researchers in educational research and development. The aim of this preliminary study is to see the possibility of blended learning simulation-based model implementation can be done in Aeronautical Communication Program. Then it is necessary to get information about institutional support, infrastructure readiness, material readiness, readiness of instructor, and readiness of learners. Figure 1 depicts the steps of a blended learning design framework. This preliminary study use step 3a blended learning decision matrix to see the posibility of blended learning implementation.

For institutional support and infrastructure readiness, we gathered data from chief of Aeronautical Communicaton Program. Content readiness and instructor readiness data were gathered from chief of Aeronautical Communication program and instructors. Student readiness data were gathered from chief of Aeronautical Communication program and students. All data were gathered by interview and field observation. Table 1 gives an explanation that Hew and Cheung summarizes some of the relevant issues to consider in each of the five key pre-condition. Table 2 depicts preliminary study instrument blueprint.

4. Results and Findings

The overall picture of the learning conditions that have been implemented and the possibility of the implementation of blended learning can be known from interviews with the Chief of Aeronautical Communication, AFI instructor and learner. Based on an interview with the Chief obtained information on the readiness of simulation-based blended learning implementation. Simulation based of blended learning model is expected to be a solution to the problems faced in AFI course. The implementation of the plan is possible to conduct with the existing resources.

Aeronautical Communication Program has had the comprehensive learning material, but need to be improved to be more efficient in helping students achieving learning objectives. The ability of AFI's instructors is sufficient to implement simulated blended learning.

The results of interviews with two instructors obtained information about existing condition of AFI course. The course is conducting well but there are need some improvements, such as:

a. Simulator facilities need to be more equipped with some equipment that similar with those used in the AFIS aerodrome. For example: gun light that is only in the lab. AFI Manual but not in the AFI 360 simulator yet.
b. Briefing is still given once when introducing new scenario to learners.
c. The new simulation assessment rubric includes assessment of controller positions, for feeder and pilot has not been assessed.
d. The difficulty faced by the instructor is equating the perception between learners and instructors regarding circuit patterns. In addition, the instructor also has little difficulty regarding the operation of the AFIS 360 simulator in case of any unusual exercise.

The results of interviews with five learners obtained information some improvements which are needed, such as:

a. Briefing is done simultaneously before starting a new scenario.
b. The AFIS manual is too thick, so learners are reluctant to bring from campus to dormitory.
c. Although placed in the learner log book, but learners do not understand the assessment component clearly.
d. The time is not sufficient to dig the simulation material deeper.
e. The difficulties faced by learners are less time, instructors who are teaching team so that each instructor has different experience and understand, and if there is a short course of Aerodrome Flight Information then the Aerodrome Flight Information lab is used interchangeably.

Based on the observations on the syllabus, the sequence of simulation scenarios, the assessment sheet on the learner logbook, Aerodrome Flight Information Manual, Aerodrome Flight Information learning results for five batches, and simulator facility, the following information is obtained:

a. General Instructional Objectives and Special Instructional Goals have not been poured into the syllabus.
b. Rubric of assessment sheet needs to be added feeder and pilot assessment.
c. In the Aerodrome Flight Information Manual it is necessary to add a report format in case of an abnormal situation.
d. Guidance book for instructors and learners are needed for the implementation of blended learning simulation based instruction.
e. The average acquisition value of Aerodrome Flight Information in five batches is: 81,26. This indicates that the learn-

ing outcomes are good, but there needs to be an increase in some things that have not gone as expected.

From the overall data and information obtained either through interviews with chief, instructors, and students about the learning conditions that have been implemented can be seen that the gap between the existing learning model is with the expected model is:

a. General Instructional Objectives and Special Instructional Goals have not been written in the syllabus. The syllabus contains the name of the course and the subject of the course. However, learners claim to have understood what the objectives of Aerodrome Flight Information learning are from the instructor's explanation so that they know what to achieve during the learning activities.
b. Briefing is only done once when introducing simulation scenarios to all learners in the classroom. This is done to manage the time available so there is still time to carry out role-play simulation and debriefing activities. If each meeting has a briefing before the role play simulation, the available time is not sufficient for all learners to do a role-play simulation for three special competencies. So general instructional goals cannot be achieved. As a result of a one-time briefing at the introduction of a new scenario that students cannot ask about the difficulties encountered in preparation for a role play simulation or confirmation of their understanding to increase confidence when performing role simulation.
c. Time. Allocation of time has been set nine hours per week for 16 meetings for 24 students can complete three special competencies. In theory this calculation is sufficient for learning activities. However, unlike the implementation in the simulator. With the increasingly complex traffic variations on Aerodrome Flight Information and more complicated emergency situations, the debriefing time may take longer to explain the implementation of the simulation, the procedures to be implemented, the mistakes made to avoid reoccurrence, and motivate learners to make it even better. If the briefing can be done intensively before the implementation of the simulation, of course learners can be better prepared to do the simulation with a better understanding of procedures so that errors when simulating can be minimized. As a result the time required for the implementation of debriefing can be shortened.
d. The instructor consists of several people from both AFIS practitioners and instructors from Aeronautical Communication Program Division who have extensive experience and knowledge. The instructor's understanding of the simulation scenarios and the actions to be taken by AFIS officers is strongly influenced by their knowledge, field experience, and personal decisions in decision-making. This resulted in a personal briefing that instructors delivered different from each other. Although there is an Aerodrome Flight Information Manual as a guide, however, learners have difficulty in understanding these opinions.
e. The textbooks used are the Aerodrome Flight Information Training Manual which contains imaginary aerodrome procedures and data used for role play simulations and some ICAO related documents. The Aerodrome Flight Information Training Manual is designed to be comprehensive and detailed so that the manual thickness is approximately 10 centimeters containing the material for Aerodrome Flight Information. Learners often keep this manual in the classroom locker and are not taken to the dormitory as it is relatively heavy. To study in the dormitory they rely on book notes.

From interviews with chief of Aeronautical Communication Program, instructors, and students obtained the following data:

- Institutional support: 4 of 5 scale (high)
- Infrastructure readiness: 4 of 5 scale (high)
- Content readiness: 4 of 5 scale (high)
- Instructor readiness: 4 of 5 scale (high)
- Student readiness: 4 of 5 scale (high).

5. Conclusion

Based on step 3a blended learning matrix, this preliminary study obtained the result that institutional support was high, infrastructure readiness was high, content readiness was high, instructor readiness was high, and student readiness was high. From these data could be decided the suitability of using blended learning simulation based model for Aerodrome Flight Information course in Indonesia Civil Aviation Institute. The model should be developed in supplemental model which is retain face-to-face learning time and add some online learning activities. From this finding, instructional designer would continue to the next step of the educational research and development.

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