ISSN: 0215-9643 e-ISSN: 2442-8655

Web 2.0-based Aviation English: A Catalyst for English Mastery at Aviation Vocational School

Laila Rochmawati[a,1,*], Harunur Rosyid[b,]

[a]*Aeronautical Communication Department, Civil Aviation Polytechnic of Surabaya, Jl. Jemur Andayani I No.73, Surabaya, Jawa Timur 60236, Indonesia*
[b]*Informatics Department Muhammadiyah Gresik University, Jl. Sumatera No.101, Gn. Malang, Kabupaten Gresik, Jawa Timur 61121*
[1]*lailarochmawati@poltekbangsby.ac.id**
** corresponding author*

ARTICLE INFO

Article history
Received April 14, 2025
Revised June 02, 2025
Accepted June 28, 2025

Keywords
Aviation English
Project-based learning
Web 2. Vocational School
Aviation Cadets

ABSTRACT

ICAO English included complex phraseology that has been a learning obstacle for many aviation cadets. This study aimed to develop Aviation English based on Web 2.0 and unravel how effective the media was in elevating cadets' ICAO English Language Proficiency. The study used a multi-method research design comprising research and development and one-group pretest-posttest designs. There were 46 aviation cadets majoring in Air Communication enrolled in the fourth semester at one of the Aviation Polytechnics in Surabaya involved as the research participants. Data were collected using cadets' needs questionnaire, test, and interview. The interviews were undertaken as data triangulation. The obtained quantitative data were analysed using descriptive statistics and paired sample t-tests, whereas the qualitative ones were analysed using inductive-based narrative analysis. The results showed that Web 2.0-based Aviation English was ably developed through Thiagarajan's 4D model. Another result portrayed that the learning website was able to increase cadets' ICAO English Language Proficiency through the implementation of project-based learning (M equal 12.84783; t(45) equal -14.443; p equal .000). Thus, the learning website can be used to prepare aviation cadets to confront with ICAO English Proficiency test.

I. Introduction

ICAO English is a mandatory English skill to be mastered by many aviation cadets across the states (Bullock & Westbrook, 2021; Liu et al., 2022 Windiahsari & Wen-li, 2021; Rekhlova et al., 2021). It's an international standard that regulates the criteria of human resources in the aviation field (Sirikanjanawong & Wasanasomsithi, 2018), especially those dealing with air communication and air traffic control. It involves general English and, more specifically, copes with radiotelephonic phraseology, encompassing aviation special terminologies in conducting pre-flight, in-flight, and post-flight communication and instruction (C.A. Prado & Tosquil Lucks, 2019). In addition, ICAO English comprises some standardized operational and communicational procedures when problems occur in both emergency and urgent situations. It not only regulates how communication is conducted but also the procedures for disentangling issues (Buhr, 2012; Zuluaga-Gomez et al., 2023; Bystrova et al., 2019; Marzani et al., 2023; (C.A. Prado & Tosquil Lucks, 2019). Both air traffic controllers and air communication officers must understand it rigorously to succeed in their responsibilities in the field. This research aims to develop a Web 2.0-based Aviation English learning platform and assess its effectiveness in improving cadets' ICAO English Language Proficiency at the Aviation Polytechnic of Surabaya.

The findings are consistent with previous studies on web-based learning media; however, a closer comparison indicates that specific challenges related to ICAO English have not been fully addressed. Moreover, although the survey shows notable improvements, limitations such as the small sample size and the quasi-experimental design necessitate cautious interpretation and emphasize the importance of conducting broader experimental research (Priando Purba et al., 2021; Marzani et al., 2023; N et al., 2021; Aslan, 2021).

However, to the best of the researcher's knowledge, no study had developed website-based learning media in aviation, especially in coping with the materials of the ICAO English language proficiency. Many previous studies that dealt with ICAO English only focused on the assessment, which was extraneous to the present study's focus (Fowler et al., 2021; Wang et al., 2023; Parohinog

http://dx.doi.org/10.17977/um048v31i1p50-60

& Meesri, 2015(D. T. K. Ng et al., 2023). Moreover, (Fowler et al., 2021) did not use Web 2.0 and only focused on assessment and training, in which the media lacked feedback, making the learning process less significant. Similarly,(Parohinog & Meesri, 2015) focused on providing a reliable assessment of Thailand's aviation human resources, where the outcome was limited to Thailand's case and might not be generated in other regions and geographical and sociological contexts. The present study compiles the material practices, projects, assessments, and feedback; henceforth, Web 2.0-based Aviation English developed in this study comprises complex learning activities. By the gaps provided, creating Web 2.0-based learning media is significant to support aviation cadets' ICAO English mastery. Besides developing the media, the present study aimed to unravel the cadets' improvement in understanding ICAO English materials.

A. Project-Based Learning with Web 2.0 Technology

Project-based learning is a learning model that uses projects or activities as a learning tool to achieve attitude, knowledge, and skill competencies (Markula & Aksela, 2022; Darmuki et al., 2023). Project-based learning uses problems as the first step in gathering and integrating new knowledge based on experience with real activities in life (Widarbowo et al., 2023; Zhang & Ma, 2023). Project-based learning and Web 2.0 technology are two interconnected aspects of the recent learning scheme (Mielikäinen, 2022). In the blended learning mode, project-based learning (PjBL) can be effectively implemented through online assignments completed via LMS or other learning platforms (e.g., Schoology and ClassMarker). The learning scheme could be divided into three sections, namely pre-learning, whilst-learning, and post-learning activities. The pre-learning activities initiate students' learning motivation and stimulate their schemata. Moreover, in this learning stage, the students could be given some cases representing and carrying the materials and learning objectives. During the activities, students might be instructed to open the learning website based on Web 2.0 technology, which is interactive and promotes autonomous learning concepts. The students can read the materials on the website and generate some solutions to the problems. They also might talk to other participants for online and offline discussions. They could share their ideas and some mind maps. At the last learning stage, the students can be assigned to present the solutions.

B. ICAO English

1) Identify applicable sponsor/s here. If no sponsors, delete this text box (sponsors).

As part of aviation English, ICAO English is vital to pilots, air traffic controllers, and air communication officers to support pre-flight, in-flight, and post-flight coordination and communication (Douglas, 2014; Fowler et al., 2021). The positions above must pass the ICAO English language proficiency (IELP) test with a minimum level of 4. The ICAO rating scale contains the following six-level descriptors: Expert (level 6), Extended (level 5), Operational (level 4), and Non-operational (levels 1–3) (Fowler et al., 2021; Prinzo & Thompson, 2009; Park, 2020; Tosqui-Lucks & Silva, 2020). Each level consists of the following language proficiency components: pronunciation, structure, vocabulary, fluency, comprehension, and interactions (Tosqui-Lucks & Silva, 2020). The materials included in the ICAO English might vary, including but not limited to emergency and urgent situations. An emergency refers to any flight problem that threatens all the passengers, such as an engine fire (Xu & Witlox, 2022; Hancock, 2019; Mnaoui et al., 2022; Kuklev & Zhilinsky, 2018). It is also known as a life-threatening emergency, which is often indicated using the word *mayday*. An urgent situation refers to any flight problem that does not threaten all the passengers, such as being out of gas or lost in fog (Mnaoui et al., 2022; Vitryak et al., 2016). Handling different problems requires different phrases and plain English; therefore, cadets must master the communication procedures for all emergencies. Today, there are still many ICAO English learning problems, such as insufficient media (Bystrova et al., 2019; Herasymenko et al., 2021; Ng et al., 2021; Cookson, 2019). Thus, inventing a Web 2.0-based ICAO English learning media is necessary.

II. Method

The present study used multi-method research, namely research and development and one-group pretest-posttest designs(Vivek & Nanthagopan, 2021; Bauer, 2020; (Osei-Kyei & Chan, 2017). The research and development design adopted Thiagarajan's 4D model (1974), consisting of defining, designing, developing, and disseminating stages (Thiagarajan, 1974). The defining stages included the conduct of cadets' needs analysis and curriculum needs analysis. The designing stage covered the web 2.0-based learning media's look, the colors chosen, the font used, and the features provided. The developing stage involves creating media tailored to the cadet's needs analysis, curriculum analysis, and design results. During the development stage, media validation was carried out by three experts in education technology, ICAO English Test, and Aviation English. Moreover, the trial process was conducted to see the response of the prospective users (e.g., a lecturer and cadets). In the trial process, 1 lecturer was chosen purposively, and 10 cadets majoring in Air Communication were randomly interviewed to see their opinions about the developed media. Finally, the disseminating stage encompasses the promotion of future inputs for better development. The one-group pretest-posttest design, as part of a quasi-experiment, was used to unravel how the developed media enhanced the cadets' ICAO English proficiency (Bin-Tahir & Hanapi, 2020; ("IUPsyS Invited Symposium, Poster Session, Oral Session, Keynote, State ‐ of ‐ the ‐ Art Session," 2004; Osei-Kyei & Chan, 2017). Forty-six cadets of the Aviation

Polytechnic of Surabaya majoring in Air Communication were used as research participants. The sample was selected purposively based on these criteria: (1) fourth-semester students majoring in Air Communication, (2) enrolled in Intermediate English for ICAO English Proficiency preparation, and (3) willing to participate in all research stages. They were chosen purposefully based on the department and the courses taken in the fourth semester, one of which was Intermediate English or preparing for IELP. They were chosen purposefully based on the department and the courses taken in the fourth semester, one of which was Intermediate English or preparing for IELP.

Data were collected using a questionnaire, a test, and interviews. The questionnaire was used to collect information on cadets' needs. The cadets' needs were obtained using a needs analysis questionnaire consisting of 15 questions: 5 questions revealing their current situation in the ICAO English learning process, and 10 questions revealing their needs and typical learning media desired. Questions 1 and 2 revealed the cadets' comfort and effective learning process. Questions 3 to 5 revealed their currently used learning media, such as books, applications, and videos, and their opinions on how the media helped them elevate their ICAO English understanding. Questions 6 to 15 mainly asked about the cadets' expected learning media, including the learning media types, operation ease, efficiency, looks, and affordability. The questionnaire was in the form of a six-point Likert scaling method from strongly disagree (1) to strongly agree (6) (α = .977). The test was in the form of a multiple-choice format with four options. The test consisted of nine questions revealing the cadets' knowledge about pre-flight, in-flight, and post-flight phenomena or problems, and 6 questions examining their understanding of what to do in the ICAO English test. The 15-question test was administered in the pretest and posttest sections. Interviews were conducted in two different settings. First, the interview was employed to reveal the responses of the prospective users during the development stage of Thiagarajan's 4D model (1974) (Thiagarajan, 1974). Second, another interview was used to confirm the statistical analysis results. Table 1 shows the interview participants' characteristics.

The quantitative data obtained from the needs analysis questionnaire were analysed using descriptive statistics to look at the general pattern of demands (Yılmaz, 2019; E. Varghese, S. Jaggi, R. Gills, 2018; Homer, 2018). The M score was then analysed to look at the level of agreement. The quantitative data obtained from the pre-test and post-test were then analysed using IBM SPSS 25 with a paired sample t-test to reveal the cadets' improvement in understanding of ICAO English. At last, the interviews were analysed using an inductive-based narrative analysis technique to involve the interviewees' feelings and perspectives.

Table 1. Interview participants' characteristics

Cadet	Class	Gender	Pre-test Score	Post-test Score	Description
C1	A	Male	55	87	He got the lowest pre-test score and the highest post-test score for the male cadet in class A.
C2	A	Female	63	95	She got the highest post-test score both in Class A and aggregately.
C3	B	Male	67	93	He got the highest post-test score in Class B.
C4	B	Female	55	90	She got the lowest pre-test score and the highest post-test score for the female cadets in Class B.

The intervention was conducted in 10 meetings, consisting of 1 meeting for a participant's Web 2.0-based Aviation English tutorial, seven meetings for delivering materials or participant web work tools, and two meetings for participant product presentations. The seven conferences of delivering materials included the delivery of fourteen units; thus, each meeting covered two material units. At the first meeting, the lecturer introduced Web 2.0-based Aviation English media. The cadets were familiar with how to open and log in to the website (https://aviationenglish.web.id/). They were directed to register and create an account to monitor their future learning progress. After they had their account, the lecturer guided them in surfing the features on the website. They introduced one feature at a time and raised a discussion whenever they encountered trouble. They also provided peer-to-peer support to help each other eliminate problems. After familiarizing themselves with the website, they started the first unit in the next meeting.

The cadets learned about the first and second units in the second meeting: Gear Problems and Engine Failure. First, the cadets went to the website and logged in. Afterward, they clicked the unit feature to see the first and second units. At first, they were instructed to guess the pictures given and make a sentence using the provided clues. Then, the lecturer stimulated them to explore their prior knowledge beyond the picture provided. The lecturer then asked the cadets to listen to some audio related to the photographs and discuss the contents of the audio with the

lecturer. The lecturer presented some highlighted materials on Gear Problems and Engine Failures during the discussion. In this case, the lecturer might use supplementary files or media to ease the delivery of the materials after confirming the cadets' understanding. The lecturer asked them to move on to the question feature. The cadets had an exercise in this feature and recalled their knowledge about Gear Problems and Engine Failures. Then, as an additional and not compulsory feature, they might also have a speaking practice about Gear Problems and Engine Failures in the speaking questions feature. The cadets were asked to record each response for one scenario or phenomenon in this feature. After submitting their records, the lecturer could give feedback and score them using the ICAO standard assessment of pronunciation, fluency, comprehension, interaction, and structure. This learning process was then repeated until the eighth meeting.

In the ninth and tenth meetings, the cadets presented projects related to their topics and experiences from the second to eighth meetings. They were required to present one of the material topics and explain what they knew about it. The lecturer and other cadets could give feedback after the presentation. This step was necessary to recall the materials learned so that the cadets could review the previously learned materials. However, these ten meetings did not include the pre-test and post-test sections. Therefore, twelve meetings were held to implement the entire learning activity, utilizing Web 2.0-based Aviation English media and interventions.

III. Results and Discussion

A. 4.1 Developing Web 2.0-based Aviation English Learning Media

This chapter explains the results of each stage of Thiagarajan's 4D model 1974 (Thiagarajan, 1974). First, the defining stage included the information on the cadets' needs and curriculum analysis. Table 2 portrays the cadets' needs analysis.

Table 2. Cadets' Needs Analysis

Aspects	Items	M	Description
Current Learning Media	**The cadets feel comfortable using the media.**	**2.3657**	**Disagree**
	The media is effective to deliver the materials of ICAO English.	2.4696	Disagree
	The book media helps the cadets understand the ICAO English materials easily.	2.5754	Disagree
	The video media helps the cadets understand the ICAO English materials easily.	2.3421	Disagree
	The application media helps the cadets understand the ICAO English materials easily.	2.5217	Disagree
Expected Learning Media	I need an online-based learning media.	5.8261	Agree to Strongly Agree
	I need a web-based learning media.	5.3783	Agree to Strongly Agree
	I need a media that can be used wherever and anytime.	4.8913	Agree
	I need a media that can be used without complicated installation and device requirements.	4.9348	Agree
	I need a media that include materials needed in ICAO English test.	5.7391	Agree to Strongly Agree
	I need a media that can enrich my understanding about ICAO English easily.	5.5676	Agree to Strongly Agree
	I need a media with full of illustration to ease my learning process.	4.8971	Agree
	I need a media with simple features.	5.1744	Agree to Strongly Agree
	I need a media with free utilization / no subscription.	4.7609	Agree
	I need a media with few tools supports.	4.4535	Agree

Table 2 shows that the cadets did not feel comfortable using the current media, including books, videos, and applications. They also stated that the current press did not even help them easily understand the ICAO English materials. Hence, they believed the current learning media did not significantly boost their ICAO English proficiency. According to the expected learning media, the cadets expressed a strong desire for online website-based learning media, ICAO-based materials, and media to enhance ICAO knowledge easily, as well as a simple feature (M = 5.8261, M = 5.3783, M = 5.7391, M = 5.5676, M = 5.1744, respectively). This finding implied that the cadets needed to know how the assessment was undertaken and what materials could help them achieve better scores on the ICAO English Proficiency (IELP) test. These results seemed exciting, as many studies have focused less on materials and assessment practices for IELP test preparation. Moreover, Table 3 shows that the learning media needed to support the learning process should apply to both online and offline learning settings. Thus, an online website-based learning medium was the best option to be developed. The materials needed in the media should cover several contents from the curriculum analysis namely Gear Problems, Engine Failure,

Jurnal Ilmu Pendidikan (JIP)
Vol. 31, Issue 1, June 2025, pp. 50-60
ISSN: 0215-9643
e-ISSN: 2442-8655

Emergency Descent, Engine on Fire or APU on Fire, Smoke or Fire in the Cockpit, Bird strikes, Icing, Hydraulic Problems, Fuel Problems, Pressurization Problems, Unlawful Interference, Dangerous Goods Incident, Bomb Warning, Electrical Problems, and Communication Failure. Table 3 shows the curriculum analysis.

Table 3. Curriculum Analysis

No.	Aspects	Needs
1	Materials	The materials must include Gear Problems, Engine Failure, Emergency Descent, Engine on Fire or APU on Fire, Smoke or Fire in the Cockpit, Bird strikes, Icing, Hydraulic Problems, Fuel Problems, Pressurization Problems, Dangerous Goods Incident, Bomb Warning, Electrical Problems, and Communication Failure.
2	Media	The media must accommodate both online and offline learning scenarios.

After the cadets' needs and curriculum analyses' results were known, the design of the web 2.0-based learning media was developed. Figure 1 depicts some home and feature interfaces.

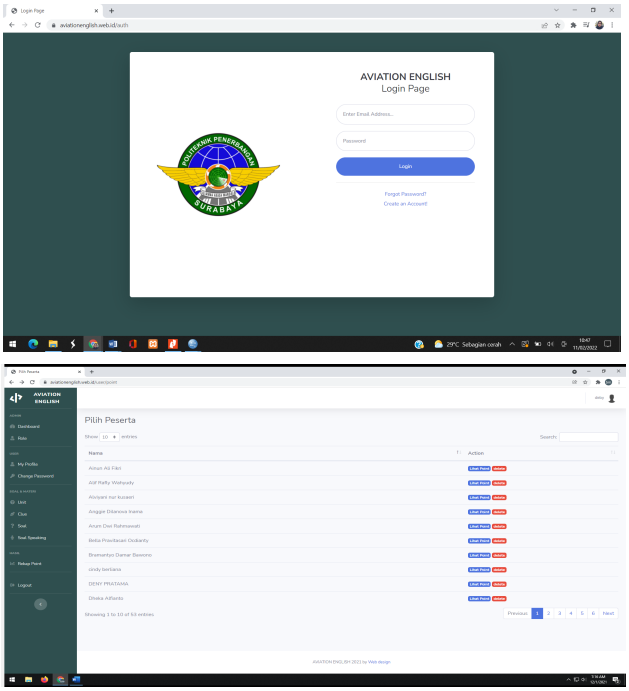

Fig. 1. Web 2.0-based Aviation English learning media's interface

Figure 1 shows the login page, and the participants enrolled in the media. There were several features in the Aviation English media: dashboard, role, my profile, unit, clue, speaking questions, and recap point. The dashboard included the learning activities and information needed in the learning process. Role refers to the user's job, which is either as a lecturer or a cadet. My profile was customized with personal information to make it easy for lecturers or cadets to get to know others through this feature. The unit feature covered the materials, while the clue feature helped the users understand the unit's contents. Speaking questions were two features to practice for the ICAO exam or assessment. Finally, the recap point feature covered the total scores and the feedback on the practices undertaken. These simple looks and colours were appropriated from the cadets' needs analysis results.

In the developing stage, the web 2.0-based Aviation English media was validated by three experts in education technology, ICAO English Test, and Aviation English. They stated that the learning media was very good in terms of the web interface and features, content/materials, and curriculum relevance. Moreover, the results of the trial process showed the users' positive responses. The lecturer was eager to use the website to teach ICAO English materials. Moreover, the ten cadets portrayed a positive response toward the learning media, and they suggested that the media could be used by their friends from other aviation education and training institutions. After learning the results of the developing stage and the users' suggestions, the disseminating stage included spreading information about the website to other aviation education and training institutions to see their responses and implications. Unfortunately, the present study did not focus on collaborative work to improve the website. However, it was still possible to do it soon.

B. Improvement of Cadets' ICAO English Mastery through Project-Based Learning.

The present study also aimed to reveal the improvement of the cadets' ICAO English proficiency by having the test. First, the fifteen-question test was trialed with small numbers of participants (N = 23), and the items were tested using an internal consistency reliability test and categorized as reliable (Œ± = .877). Therefore, the questions could be used in the pre-test and post-test sections. In the periods between the pre-test and post-test, an intervention was undertaken using the developed Web 2.0-based Aviation English learning media through the project-based learning (PjBL) setting. This chapter will explain the intervention using the developed media through the PjBL setting and the improvement of the cadets' ICAO English mastery, for which the score was obtained from the pre-test and post-test.

C. Implementation of Web 2.0-based Aviation English Media in Project-Based Learning.

The learning periods included participant tutorials, participant web work tools, and participant product presentations (excluding pre and post-test days). Researchers observed that some students could easily navigate web 2.0-based Aviation English, while others had difficulty logging in. One of the most frequently made notes was that the cadets help each other. These records indicated that the cadets felt comfortable asking their peers for help with web tools. They seemed to ask for help from their peers or the lecturer before using the web tool, as if

they had not fully understood the tutorial given beforehand. Many of these cadets explored the functions of web tools not covered in the tutorial, which indicated that they could easily explore web tools independently and discover new functions for themselves. They also seemed to focus on another problem faced by the others, many of whom continued to have problems with their Internet connection. Unstable internet was documented as a connectivity issue. It was also a daily struggle because there were so many devices online in the same area with the same Wi-Fi connection, but the internet connection was too slow. However, the lecturer was able to fix internet connectivity problems with a portable Wi-Fi device that had a more stable internet connection than the campus internet connection. The participants were also confused when they were encouraged to use multiple web browsers. Although many participants attempted to use various browsers, only a few were successful. Peer-to-peer support helped with almost everything, including starting the computer, logging in, and filling out word lists. Second, participants exhibited behaviors that indicated they were eager to complete their web tool task. The participants were observed to have helped each other in various aspects of the task. Some key participants were adamant about helping their colleagues by providing guidance and direction.

In contrast, others exhibited their work and guided their colleagues on how to do something similar. Participants were also seen discussing a lot of material in aviation English. They used the web tool efficiently, as evidenced by its features.

The cadets demonstrated their ability to use and complete the questions with ease. They could define vocabulary terms, identify synonyms and antonyms, and describe pictures and videos. However, the final product reflected how participants interacted with and used web 2.0-based Aviation English during the intervention, indicating that participants expressed themselves in their lessons, surfed the web and its components, were familiar with the internet, and learned terms in aviation English.

D. Cadets' ICAO English Mastery after The Intervention.

Before revealing the cadets' ICAO English mastery after the intervention, it was necessary to portray the results of the descriptive statistics of the participants to show the data and the participants' characteristics. Table 4 shows the results of the descriptive statistics test.

Table 4. Results Of Descriptive Statistics Test

Aspect	N	M	SD
Gender	46	1.48	.505
Age	46	19.1304	1.30994
Pre-test	46	67.1957	5.48379
Post-test	46	80.0435	5.69973

Regarding Table 4, most participants were male cadets with an average age of 19. The average pre-test score was 67.1957 (N = 46, SD = 5.48379) and the average post-test score was 80.0435 (N = 46, SD = 5.69973). Although there was a difference between the M scores of the pre-test and post-test, it was not necessary to make a claim based on this difference. Thus, the present study conducted a statistical analysis using a paired sample t-test to see how effectively the intervention improved the cadets' ICAO English mastery. Table 5 depicts the results of the paired sample t-test.

Table 5. Results Of Paired Sample T-Test

Pair	*M*	*SD*	*SE*	*t*	*df*	*p*
Pretest-Posttest Scores	12.84783	6.03312	.88954	-14.443	45	.000

Table 5 shows that the learning website was able to increase cadets' ICAO English Language Proficiency through the implementation of project-based learning (M = 12.84783; t(45) = -14.443; p = .000). The 12.84-point increase in average scores indicates that Web 2.0-based Aviation English effectively enhances ICAO English proficiency, aligning with technology-based learning theories emphasizing digital media's role in promoting interactive and autonomous learning. This implied that the materials contained in Web 2.0-based Aviation English, the ICAO English materials, were not only accommodating the cadets' needs but also easy to understand. This implied that the materials contained in Web 2.0-based Aviation English accommodated the cadets' needs, and the ICAO English materials were also easy to understand. Moreover, the media was easy to use with the support of ICAO practices, so that cadets could use it wherever and whenever. This supported the idea of autonomous learning, where the cadets did not always rely on the lecturer's assistance when practicing and learning ICAO English. Some cadets responded positively to the learning process with Web 2.0-based Aviation English media. For instance, when C1 was asked about his opinion after using the developed media, he conveyed eagerness to use it, as it helped him understand the materials and the mock test.

"I find it easy to understand the ICAO materials because the pictures and audios help me a lot. I also know the typical questions for the ICAO English test." (C1).

C1 pointed out the ease of understanding the ICAO materials. This argument could be valid because he got the lowest pre-test score and the best post-test score among the male cadets. The illustrations and audio, step-by-step learning guidance offered by the website, assisted him in mastering the ICAO English materials. His statement implied that the previous learning materials were less supportive regarding reliable illustrations and audio availability. Moreover, he conveyed the ease of knowing

the typical questions for the ICAO English Proficiency (IELP) test. In this case, he might be significantly helped by speaking question features, where he could explore authentic questions and speaking practices. Indeed, he could feel assisted with these features since he could practice everywhere and anytime, regardless of the presence of lecturers or peers to practice his speaking. The available feedback from the lecturer may also help him improve his speaking quality for the IELP test, enabling him to perform well on the post-test. A similar tone of opinion was also conveyed by his classmate C2, who got the best post-test score among 46 cadets.

"This application is brilliant. I can understand the materials and implement them in the assessment section. Now, I am ready to take the real IELP test (laughing)." (C2).

C2 thought the invention of Web 2.0-based Aviation English learning media was a breakthrough she had waited for so long. She implied that the press should have existed before the current learning media complicated her. Moreover, she was familiar with the materials and demonstrated an ability to utilize them in the speaking test section. In other words, the materials were relevant to the ICAO English exam or assessment, enabling her to attain a better score. As she was familiar with the materials and believed she could handle the evaluation, she stated that she was more than ready to face the real ICAO English Proficiency (IELP) test. Similarly, C3 and C4, who came from different classes, also responded positively to the media and the application through project-based learning (PjBL).

"The current learning media did not support me. I must be in a class with my lecturer when using them. Now, with this website, I can be more independent in learning ICAO English. Even I can use it to prepare for the test myself." (C3).

"I had no idea when I learned about the IELP test from my senior. When I see my seniors' modules, I still get lost in understanding the materials. Now, I have a website to support my IELP preparation." (C4).

With the same question asking about their experience using the developed Web 2.0-based Aviation English media, C3 and C4 presented contrasting arguments. First, C3 compared the previous learning media with the Web 2.0-based Aviation English media in terms of supporting the learning process and the chance to actualize autonomous learning. He claimed the previous learning media did not provide an enjoyable independent learning experience. They were only books and videos with limited interactions to correct some fallacies during the speaking practices. With the Web 2.0-based Aviation English, C3 could learn wherever he was, making the learning process more tangible. Second, C4 was unsure how to handle IELP, so she asked her seniors. She tended to be more confused with the preparation and the materials. When the researchers introduced the Web 2.0-based Aviation English materials, she was interested and finally enjoyed them. She did not get lost in understanding the materials, proven by the significant improvement in her pre-test and post-test scores.

"I am so blessed with the website. This has been the approach to troubleshooting during some teaching periods. I know what I have done is insufficient to prepare them to be the best airman. Now, it has changed. The website helps me a lot, and I recommend that other Indonesian aviation campuses use this." (L1)

In coping with the lecturer's perspectives, the lecturer stated that the website's presence helped her. She conveyed her higher motivation to teach ICAO English after appropriating the website. From her statement, she had no idea how to provide other reliable media for the ICAO English learning process. She felt that the books and videos she had were insufficient in boosting the cadets' ICAO English mastery or proficiency. She believed the books and the videos were not connected due to the different sources she used. She claimed that the books only served as audio, which was challenging to follow since no illustrations appeared. Based on the practical gaps, she tried to provide videos that best connected to the materials in the books. However, the cadets still got confused when the materials learned from the books could not address the videos. Therefore, she argued that the developed website was a breakthrough in the Aviation Field, especially in the aviation campuses under the Indonesian Ministry of Transportation.

The mastery of ICAO English could not be negotiated for those working in aviation fields, especially pilots, air traffic controllers, and air communication officers (Douglas, 2014; Fowler et al., 2021; Monteiro & Bullock, 2020; Babboni & Quast, 2020). It became the standard in communication and coordination during the pre-flight, in-flight, and post-flight periods. Moreover, it not only dealt with how to use plain English and radiotelephonic phraseology (Kim & Elder, 2009; (Lopez, 2013; Drayton & Coxhead, 2023; Kovtun et al., 2019) but also how to coordinate during some flight problems, including but not limited to emergency and urgent situations [33]. Some studies pointed out that this mastery should be built from the beginning of the education process due to the complexity of language use (Emery, n.d.)(e Silva & Raymundo, 2022; Tosqui-Lucks, P., & de Castro Santana, 2022; Miller et al., 2001). Indeed, this could be another challenge for non-English native countries (Walch, 2024; Kim & Billington, 2018), such as Indonesia. As English was a foreign language, many Indonesian prospective airmen must also learn the pronunciation (Rochmawati et al., 2022). Many previous studies also pointed out that many Indonesian students were still confronted with pronunciation problems (Kusuma, 2021; Ramadhan & Rovita, 2018;(Putera Jaya et al., 2022). Another consideration was the fact that pronunciation became the

assessment element in the ICAO English Proficiency (IELP) test (Fowler et al., 2021). Therefore, preparing the aviation cadets for mastering ICAO English was vital and should be undertaken from the beginning of campus life.

In coping with the learning process of ICAO English, the fact showed that the current learning media were insufficient. The learning process was still limited to unstructured materials, so many cadets got confused and failed to succeed in the ICAO English Language Proficiency (IELP) test. Moreover, their learning practices still relied on the lecturer's assistance with less autonomous learning practice. In other words, they only practiced with the lecturer during classroom activities. This, consequently, did not optimize the cadets' learning process and tended to drive them into test failure. When the IELP required the cadets to do practices during the test (e.g., handling pilot incapacitation problems), the current learning process was insufficient to support the cadets. Thus, the present study developed the website-based learning media using the Web 2.0 technology named Aviation English.

In its development process, many cadets desired Web 2.0-based Aviation English, and the lecturers who taught ICAO English. The present study found that the development process could use Thiagarajan's 4D model (1974) [41]. At the defining stage, the present study found that almost all cadets wanted an online website-based learning media that covered ICAO English materials and the assessment. By looking at their needs and the curriculum needs, the present study made a simple Web 2.0-based Aviation English. The results of the expert judgment also showed that the media was valid according to content coverage, interface or look, and the content's suitability with the curriculum. The success of this development was a novelty that must be appreciated, like what other previous studies did [62][63][64].

In coping with the effectiveness of the media, the present study found that the media enhanced cadets' understanding of ICAO English. Even though the present study was limited to the one-group pretest-posttest design, the results were satisfying. The cadets and the lecturer could use the media easily, so they felt more at ease in understanding the ICAO English materials. Moreover, as many previous studies discovered, they believed that website-based learning media was easy to use anywhere and anytime. By looking at the positive responses through direct interviews and the results of statistical tests, Web 2.0-based Aviation English could be used in preparing Indonesian aviation cadets for the ICAO English Proficiency (IELP) test. The implementation of Web 2.0-based Aviation English faced challenges, including unstable internet connectivity, which hindered cadets' access to the platform, and limited direct interaction with instructors, potentially reducing real-time feedback and guidance.

IV. Conclusion

Web 2.0-based Aviation English is the new learning medium that accommodates the learning of ICAO English and prepares the cadets for the ICAO English Proficiency (IELP) test. The present study finds that the developed media got positive responses from the lecturer, the cadets, and the three experts invited to validate the media. The media is indeed new in the scope of Indonesian aviation campuses, especially those under the Indonesia Ministry of Transportation. Therefore, this could be a novelty offered by this study. In coping with the lack of the study, there were still some limitations, such as the sample size. Future studies might invite many participants from different aviation campuses to look at broader perspectives and the tangible effects of the media. They might also pack the research in an actual experimental research design setting so that they might see the significance of the media. Finally, the researchers welcome more discussions about the media for a better and more reliable version for other aviation campuses.

References

Aslan, A. (2021). Problem- based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education*, *171*, 104237. https://doi.org/10.1016/-j.compedu.2021.104237

Babboni, C. A., & Quast, K. (2020). Pronunciation and Aeronautical English: Brazilians' difficulties and possible routes to intelligibility. *The ESPecialist*, *41*(4). https://doi.org/10.23925/2318-7115.2020v41-i4a3

Bauer, C. (2020). Multi-method evaluation: Leveraging multiple methods to answer what you were looking for. *CHIIR 2020 - Proceedings of the 2020 Conference on Human Information Interaction and Retrieval*, 472–474. https://doi.org/10.1145/3343413.3378015

Bin-Tahir, S. Z., & Hanapi, H. (2020). Designing the Indonesian Local Language Learning in English Teaching at the Multilingual Classroom Context. *Asian EFL Journal*, *27*(32), 108–120.

Buhr, K. (2012). The Inclusion of Aviation in the EU Emissions Trading Scheme: Temporal Conditions for Institutional Entrepreneurship. *Organization Studies*, *33*(11), 1565–1587. https://doi.org/10.1177/017084-0612463324

Bullock, N., & Westbrook, C. (2021). Testing in ESP: Approaches and Challenges in Aviation and Maritime English. In *Challenges in Language Testing Around the World* (pp. 67–77). Springer Singapore. https://doi.org/10.1007/978-981-33-4232-3_7

Bystrova, B., Nemliy, L., Paziura, N., & Vasiukovych, O. (2019). Problem-based esp methods for teaching future air traffic controllers to conduct radio exchange in non-routine situations. *Advanced Education*, *6*(12), 74–79. https://doi.org/10.20535/2410-8286.155041

C.A. Prado, M., & Tosquil Lucks, P. (2019). Designing the Radiotelephony Plain English Corpus (RTPEC): A specialized spoken English language corpus towards a description of aeronautical communications in non-routine situations. *Research in Corpus Linguistics*, *7*, 113–128. https://doi.org/10.32714/ricl.07.06

Cookson, S. (2019). *Learning from the Past: Airline Accidents & the Icao Language Proficiency Program*. 229–234. https://corescholar.libraries.wright.edu/-isap_2019/39

Dabrowski, M., & Cleveland-Innes, M. (2023). Editorial Volume 49 Issue 1. *Canadian Journal of Learning and Technology*, *49*(1), 1–3. https://doi.org/10.21432/cjlt-28496

Darmuki, A., Nugrahani, F., Fathurohman, I., Kanzunnudin, M., & Hidayati, N. A. (2023). The Impact of Inquiry Collaboration Project Based Learning Model of Indonesian Language Course Achievement. *International Journal of Instruction*, *16*(2), 247–266. https://doi.org/10.29333/iji.2023.16215a

Douglas, D. (2014). Nobody seems to speak English here today: Enhancing assessment and training in aviation English. *Iranian Journal of Language Teaching Research*, *2*(2), 1–12.

Drayton, J., & Coxhead, A. (2023). The development, evaluation and application of an aviation radiotelephony specialised technical vocabulary list. *English for Specific Purposes*, *69*, 51–66. https://doi.org/10.1016/j.esp.2022.10.001

E. Varghese, S. Jaggi, R. Gills, and J. J. (2018). An Overview of IBM® SPSS® Statistics. In *IBM SPSS Statistics 25 Step by Step* (pp. 15–21). Routledge. https://doi.org/10.4324/9781351033909-7

e Silva, A. L. B. de C., & Raymundo, N. de A. (2022). Test preparation issues in the aeronautical context in Brazil. In *Aviation English - A global perspective: analysis, teaching, assessment* (pp. 171–181). Bookerfield Editora. https://doi.org/10.53268/BKF-22080509

Elshafey, M. A., & Ghoniemy, T. S. (2021). The Development Of QMMS: A Case Study for Reliable Online Quiz Maker and Management System. *Future Computing and Informatics Journal*, *6*(2), 82–96. https://doi.org/10.54623/fue.fcij.6.2.3

Emery, H. (n.d.). Plane English, plain English: Henry Emery charts the upward rise of a very specific type of teaching. *English Teaching Professional*, *56*. https://link.gale.com/apps/doc/A180271230/AONE?u=googlescholar&sid=sitemap&xid=c33e5bc8

Fowler, R., Matthews, E., Lynch, J., & Roberts, J. (2021). Aviation English Assessment and Training. *Collegiate Aviation Review International*, *39*(2). https://doi.org/-10.22488/okstate.22.100231

Hancock, P. A. (2019). Some pitfalls in the promises of automated and autonomous vehicles. *Ergonomics*, *62*(4), 479–495. https://doi.org/10.1080/00140139.-2018.1498136

Herasymenko, L., Muravska, S., Lomakina, M., Martynenko, N., & Mazurenko, I. (2021). Reticence is not a Virtue in Aviation: Improving English Speaking Proficiency of Future Aviation Specialists. *Revista Romaneasca Pentru Educatie Multidimensionala*, *13*(2), 498–515. https://doi.org/10.18662/rrem/13.2/433

Homer, M. (2018). An introduction to secondary data analysis with IBM SPSS statistics (1st ed.). *Educational Review*, *70*(2), 251–252. https://doi.org/-10.1080/00131911.2017.1330503

IUPsyS Invited Symposium, Poster Session, Oral Session, Keynote, State-of-the-Art Session. (2004). *International Journal of Psychology*, *39*(5–6), 346–472. https://doi.org/10.1080/00207594.2004.200408-12

Kim, H., & Billington, R. (2018). Pronunciation and Comprehension in English as a Lingua Franca Communication: Effect of L1 Influence in International Aviation Communication. *Applied Linguistics*, *39*(2), 135–158. https://doi.org/10.1093/-applin/amv075

Kim, H., & Elder, C. (2009). Understanding aviation English as a lingua franca. *Australian Review of Applied Linguistics*, *32*(3), 23.1-23.17. https://doi.org/10.21-04/aral0923

Kovtun, O., Khaidari, N., Harmash, T., Melnyk, N., & Gnatyuk, S. (2019). Communication in civil aviation: Linguistic analysis for educational purposes. *CEUR Workshop Proceedings*, *2588*.

Kuklev, E., & Zhilinsky Žilinskis, V. (2018). Accident Risk Assessment for Highly Reliable Aviation Systems in Emergency Situations. *Transport and Telecom-munication Journal*, *19*(1), 59–63. https://doi.org/-10.2478/ttj-2018-0006

Kusuma, I. P. I. (2021). Speaking issues faced by Indonesian students during classroom discussions in the US. *Electronic Journal of Foreign Language Teaching*, *18*(1), 5–17. https://doi.org/10.56040/siik1811

Liu, X., Wang, C., & Zhou, H. (2022). *Analysis on bilingual teaching of aircraft system course*. *5*, 6–10. https://doi.org/10.23977/curtm.2022.051302

Lopez, S. (2013). Linguistic analysis of english phraseology and plain language in air-ground communications. *Journal of Air Transport Studies*, *4*(1), 44–60. https://doi.org/10.38008/jats.v4i1.84

Markula, A., & Aksela, M. (2022). The key characteristics of project-based learning: how teachers implement projects in K-12 science education. *Disciplinary and Interdisciplinary Science Education Research*, *4*(1), 2. https://doi.org/10.1186/s43031-021-00042-x

Marzani, E., Kartikowati, S., & Gimin, G. (2023). Development Of Website-Based Learning Media to Improve Students' Self-Regulated Learning in Economics. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, *9*(2), 929. https://doi.org/10.29210/12023-23164

Mielikäinen, M. (2022). Towards blended learning: Stakeholders' perspectives on a project-based integrated curriculum in ICT engineering education. *Industry and Higher Education*, *36*(1), 74–85. https://doi.org/10.1177/0950422221994471

Miller, L. K., Virginia, W., Miller, L. K., & Virginia, W. (2001). *Jury Instructions : Using Plain English to Win*.

Mnaoui, Y., Najoua, A., & Ouajji, H. (2022). *Automatic English Proficiency Assessment for Air Traffic Controllers in Emergencies* (pp. 996–1002). https://doi.org/10.1007/978-3-030-90633-7_87

Monteiro, A. L. T., & Bullock, N. V. (2020). A broader view of communicative competence for aeronautical communications: Implications for teaching and high-stakes testing. *The Especialist*, *41*(3). https://doi.org/10.23925/2318-7115.2020v41i3a4

N, N. F., Syarif, S., Ahmad, M., Budu, & B, Y. S. (2021). Web-based learning media the skills of suturing rupture perineum of midwifery students. *Gaceta Sanitaria*, *35*, S248–S250. https://doi.org/10.1016/j.gaceta.2021.07.017

Ng, C. B. R., Bil, C., & O'Bree, T. (2021). An expert system framework to support aircraft accident and incident investigations. *The Aeronautical Journal*, *125*(1289), 1131–1156. https://doi.org/10.1017/aer.2021.11

Ng, D. T. K., Su, J., & Ng, R. C. W. (2023). Fostering non-aviation undergraduates' aviation literacy in an online aviation laboratory: effects on students' perceptions, motivation, industry optimism. *Journal of Computing in Higher Education*, *35*(2), 341–368. https://doi.org/10.1007/s12528-023-09367-0

Osei-Kyei, R., & Chan, A. P. C. (2017). Implementation constraints in public-private partnership. In *Journal of Facilities Management* (Vol. 15, Issue 1). https://doi.org/10.1108/jfm-07-2016-0032

Park, M. (2020). Investigating Target Tasks, Task Phases, and Indigenous Criteria for Military Aviation English Assessment. *Language Assessment Quarterly*, *17*(4), 337–361. https://doi.org/10.1080/15434303.2020.1799221

Parohinog, D., & Meesri, C. (2015). ICAO-Based Needs Assessment in Thailand's Aviation Industry: A Basis for Designing a Blended Learning Program. *Procedia - Social and Behavioral Sciences*, *208*, 263–268. https://doi.org/10.1016/j.sbspro.2015.11.202

Priando Purba, B. E., Riris, I. D., & Muchtar, Z. (2021). Development of Website-Based Learning Media Integrated Inquiri Learning Strategies in Learning Thermochemical Matter Chemistry. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, *4*(1), 454–461. https://doi.org/10.33258/birle.v4i1.1658

Prinzo, O. V., & Thompson, A. C. (2009). *The ICAO English Language Proficiency Rating Scale Applied to Enroute Voice Communications of U . S . and Foreign Pilots*. *May*.

Putera Jaya, H., Petrus, I., & Lingga Pitaloka, N. (2022). Speaking Performance and Problems Faced by English Major Students at a University in South Sumatra. *South Sumatera. Indonesian EFL Journal*, *8*(1), 105–112. https://journal.uniku.ac.id/index.php/IEFLJ/index

Ramadhan, D., & Rovita, D. (2018). Interference in Javanese Language: An Analysis of Interference Factors in the User Interface Facebook Javanese Language. *IOP Conference Series: Earth and Environmental Science*, *175*, 012116. https://doi.org/10.1088/1755-1315/175/1/012116

Rekhlova, A., Donina, O., Kuznetsov, A., Nabatova, L., & Goriunov, R. (2021). Formation of competitiveness of graduates of military aviation universities by means of integral teaching technology. *Eduweb*, *15*(2), 128–140. https://doi.org/10.46502/issn.1856-7576/2021.15.02.11

Rochmawati, L., Fatmawati, F., & Sukma, M. M. (2022). Metacognitive Reading Strategies of English Lesson at Indonesian Civil Aviation Polytechnic. *International Journal of Instruction*, *15*(1), 583–600. https://doi.org/10.29333/iji.2022.15133a

Sirikanjanawong, N., & Wasanasomsithi, P. (2018). Relationship between The ICAO Language Proficiency Requirements (LPRs) and Test of English for International Communication (TOEIC) Scores of Flight Attendants in Thailand. *Journal : Language Education and Acquisition Research Network Journal*, *11*(1).

Thiagarajan, S. (1974). *"Instructional Development for Training Teachers of Exceptional Children: A Sourcebook."*

Tosqui-Lucks, P., & de Castro Santana, J. (2022). *Aviation English-A global perspective: Analysis, teaching, assessment. Bookerfield Editora.*

Tosqui-Lucks, P., & Silva, A. L. B. de C. e. (2020). Aeronautical English: Investigating the nature of this specific language in search of new heights. *The ESPecialist*, *41*(3). https://doi.org/10.23925/2318-7115.2020v41i3a2

Vitryak, A., Slipak, B., & Serhii, K. (2016). Plain Aviation English – Qualitative and Quantitative Interpretation. *Journal of Social Science Studies*, *4*(1), 42. https://doi.org/10.5296/jsss.v4i1.9478

Vivek, R., & Nanthagopan, Y. (2021). Review and Comparison of Multi-Method and Mixed Method Application in Research Studies. *European Journal of Management Issues*, *29*(4), 200–208. https://doi.org/10.15421/192119

Walch, A. (2024). *Blockchain and distributed ledger technologies Vocabulary*. BSI British Standards. https://doi.org/10.3403/30471399

Wang, W.-T., Lin, Y.-L., & Lu, H.-E. (2023). Exploring the effect of improved learning performance: A mobile augmented reality learning system. *Education and Information Technologies*, *28*(6), 7509–7541. https://doi.org/10.1007/s10639-022-11487-6

Widarbowo, D., Nofirman, N., Jasiah, J., Surur, M., & Astuti, E. D. (2023). Meta-Analysis Study for the Use of Project Based Learning Models in Teaching and Learning Activities. *Journal on Education*, *5*(4), 16306–16311. https://doi.org/10.31004/joe.v5i4.2781

Windiahsari & Wen-li, T. (2021). English for Seafarers: Need Analysis and Course Design for Cadets. *Proceedings of the Thierteenth Conference on Applied Linguistics (CONAPLIN 2020)*, *546*(Conaplin 2020), 633–637.

Xu, C., & Witlox, F. (2022). Understanding total evacuation time perception in airplane emergency: A stated preference approach. *Safety Science*, *146*, 105540. https://doi.org/10.1016/j.ssci.2021.105540

Yeboah, D. (2023). Undergraduate students' preference between online test and paper-based test in Sub-Saharan Africa. *Cogent Education*, *10*(2). https://doi.org/10.1080/2331186X.2023.2281190

Yılmaz, N. (2019). Trend analysis of sea level changes using IBM SPSS software. *Australian Journal of Maritime & Ocean Affairs*, *11*(4), 201–217. https://doi.-org/10.1080/18366503.2019.1686105

Zhang, L., & Ma, Y. (2023). A study of the impact of project-based learning on student learning effects: a meta-analysis study. *Frontiers in Psychology*, *14*(July), 1–14. https://doi.org/10.3389/fpsyg.2023.1202728

Zuluaga-Gomez, J., Nigmatulina, I., Prasad, A., Motlicek, P., Khalil, D., Madikeri, S., Tart, A., Szoke, I., Lenders, V., Rigault, M., & Choukri, K. (2023). Lessons Learned in Transcribing 5000 h of Air Traffic Control Communications for Robust Automatic Speech Understanding. *Aerospace*, *10*(10), 898. https:-//doi.org/10.3390/aerospace10100898