

Improving Online Learning Design for Employed Adult Learners

Ngoc Buu Cat Nguyen

School of Business, Economics and IT, University West, Sweden

ngoc.buu-cat-nguyen@hv.se

Abstract: With the growing need for developing competence at workplaces, the number of employed adult learners is increasing in higher education institutions to follow continuing education. Often they are educated and treated as traditional students. To satisfy the learning demands of employed learners, work-integrated education has emerged to spotlight the importance of the integration of work and education in contemporary education. Many studies show that employed adult learners have different and more complex ways of learning compared to traditional students. Furthermore, employed adult learners have lacked the attention of researchers and educators to enhance their learning in general and online learning in particular. Meanwhile, online learning is a preferred way for learners who work and study in tandem. This study aims to make the online learning design for employed adult learners more effective and adaptable to their circumstances by asking the research question “How can online learning design for employed adult learners be improved?”. The case study of a course for employed adult learners was examined with a mixed method approach including interview and learning analytics. The interview data laid the groundwork for developing assumptions and hypotheses for the examination of employed adult learners’ learning patterns. Learning analytics consist of data visualization, which revealed employed adult learners’ learning patterns, and statistical tests, which inspected the validity and reliability of the patterns revealed by the log data. The log data were extracted from the learning management system, which recorded the educational activities of the learners during the course. This study exposed the pitfalls of the learning design including average to low engagement not only in learning but also in the course. As a result, the indicators to improve the online learning design for employed adult learners comprise investing in learning materials and increasing online interaction to fortify learner engagement in the course, thereby enhancing course completion. The indicators are viewed as the first step in the process of developing a proper and effective online learning design for employed adult learners. Finally, the reflection on online interaction for employed adult learners is also discussed.

Keywords: work-integrated education, employed adult learners, online learning design, online learning

1. Introduction

The provision and enactment of continuing education has become a hallmark of modern occupational development. This is because the requirements for remaining competent at work are constantly changing, particularly in developed countries, due to the globalization and the technology-driven world. There is a trend towards mature-age workers returning to educational institutions to update and enhance their knowledge. The responses to these educational provisions are performed in different ways from the approaches for students who are in entry level preparation for employment. Thus, lifelong learning and continuing education are becoming increasingly important, yet necessitate distinct educational provisions (Smith et al., 2013). To offer the distinguishing educational provision for employed adult learners (EALs), work-integrated education (WIE) has emerged to tailor the connection between workplaces and higher education institutions. The collaboration between employers and educators ensures that learners are offered new and accessible knowledge which is relevant to their workplace situations (Little and Brennan, 1996). In addition, WIE aligns the learning with the organization’s goals and the individual’s needs to reinforce organizational and personal growth. Regarding the learning of EALs, learning experience becomes a core that requires more attention (Billett, 2009).

Understanding EALs’ learning experiences helps educators adjust learning designs to adapt to the circumstances and characteristics of EALs. According to Billett (2011), mature-age workers inferred the discomfiture when being treated as students with somebody teaching them. These workers had much to contribute to their learning while acknowledging that they needed to learn. Thus, a pedagogic approach was proposed, which was to engage with others in the form of a dialogue forum with other workers to share knowledge and experiences. Although exchanging knowledge through forums also exists in courses for traditional students, the forums for EALs need to be more proactive and robust to lead to the formation of learning communities. This is considered as a distinguishing feature in learning design for EALs.

Currently, learning design in higher education institutions has shifted towards online environments, not merely in traditional classrooms as before. This is to say that the concern in this paper is not simply a proper learning design for EALs, but also an effective online learning design for EALs. Smith et al. (2013) divulged that there was a preference for online and computer-based learning amongst EALs. Time is precious to EALs when they work and study at the same time. In addition, travel can be a considerable expense to them. As a result, it is not

strange when the majority of learners in distance courses are EALs (Bergman, 2012). The potential of digital technology to support and enhance teaching and learning is undeniable. Digital technology in particular facilitates EALs with flexibility in learning. However, the full capacity of technology in transforming teaching and learning has rarely been maximized in practice (Glover et al., 2016). Digital technology is even underutilized in continuing education for EALs (Short and Greener, 2014).

This paper strives to improve the online learning design to be more characteristic and appropriate for EALs through the case study of a hybrid course for employees from different companies at a Swedish university. The case study was investigated by interviewing the educator and using learning analytics to identify the limitations of the learning design through EALs' learning patterns in the learning management system (LMS). Relying on the limitations of the current learning design, the indicators for the online learning design improvement for EALs are set to answer the research question "How can online learning design for employed adult learners be improved?".

2. Online learning design for employed adult learners

The characteristics that students bring to online learning environments determine the success in online learning (Leeds et al., 2013). To understand the characteristics of adult learners, Frey and Alman (2003) and Cercone (2008) applied theories of adult learning to make recommendations for online learning design (Table 1). Although both papers concern adult learners in general, the adult learners in their studies are employed and show the typical characteristics of EALs. Thus, the results of these papers can be used to generalize the online learning design for EALs. The recommendations of both papers consider EALs' characteristics, circumstances, and learning. Regarding the characteristics of EALs, the limitations and individual differences are taken into account in these papers. Additionally, the traits in EALs' learning such as prior experience, interaction, flexibility, and support are accommodated here. There are similarities and different emphases in the recommendations of these papers.

Table 1: Recommendations for online learning design for adult learners

Cercone (2008)	Frey and Alman (2003)
<ol style="list-style-type: none"> 1. Consider limitations of adults. 2. Consider learning styles due to individual differences. 3. Create opportunities for learners to be actively involved in the learning process. 4. Provide learner support. 5. Support in dealing with pre-existing learning history and working in the new learner-centered paradigm. 6. Act as a facilitator. 7. Help learners to connect new knowledge to prior experience. 8. Show the link between knowledge and how to apply it to their own lives. 9. Focus the learning on issues concerning learners and show how to conduct the learning. 10. Help learners test their learning in specific cases. 11. Create a collaborative, respectful, mutual, and informal learning climate. 12. Provide self-reflection on the learning process and support for transformational learning. 13. Provide dialogue and social interaction. 	<ol style="list-style-type: none"> 1. State clear expectations. 2. Incorporate multiple forms of feedback into courses. 3. Provide regular communication to individual learners and the group. 4. Provide learner flexibility and control. 5. Incorporate motivational strategies to encourage students. 6. Offer a variety of forms of learner support. 7. Maintain the focus of content within units. 8. Provide consistency among courses. 9. Consider limitations of adults. 10. Respect learner roles and life experiences.

3. Methods

Due to the complexity of EALs' circumstances, an in-depth case study of a course for EALs was conducted to understand EALs' learning and improve the online learning design for them. In this case study, a mixed method approach was used due to the necessary combination of qualitative and quantitative methods providing a better understanding of this research problem (Anguera et al., 2018). In the qualitative method, an in-depth interview was undertaken. In the quantitative method, learning analytics was performed with two sub-methods: data visualization and followed by statistical tests to test how reliable the observations on data are.

3.1 Qualitative method

Due to the unknown context beforehand, an in-depth interview was selected to find out more about EALs, their learning, and their course. The interview was conducted online with the educator of the course, and lasted

longer than one hour including note-taking, recording, and obtaining approval. The investigation inquired into pedagogical designs distinguishing the course for professionals from courses for traditional students, thereby determining to what extent the data was able to divulge the learning patterns of EALs. The initial interview questions included:

- Did you design the pedagogical elements in the course to support the context of the combination between the learners' workplaces and the educational offerings from the university?
- How were the pedagogical elements for EALs shown in the course (for example, through which educational activities, learning time)? Could the pedagogical elements for EALs be seen in the LMS?
- What did you expect from the students with respect to learning behaviors when you designed the elements for EALs?

Premised on the educator's responses, follow-up questions were asked to gain a better understanding of EALs.

3.2 Quantitative method

3.2.1 Data visualization

There were two systems from which data were extracted including Canvas LMS and the national grading system. The quantitative data include: (1) Canvas log data and (2) final results. Canvas log data contain learners' data about course page views, assignment submissions, discussions, and an access report. Result data from the national grading system encompass final results of the learners in this course. To prepare for the data extraction, permission from the company was obtained. Regarding data privacy, Student ID field was anonymized by hiding two digits when it was displayed in the charts. The URLs were mostly pruned and only the necessary content such as title and category name were shown. The titles are translated into English.

3.2.2 Statistical tests

The statistical tests were undertaken to test the validity and reliability of the observations on data after data visualization revealed the learners' learning patterns. Due to the small sample size, Fisher-exact test was used for the comparison of two independent proportions (Kim, 2016). The test examined a binary outcome (engage or not engage) obtained from two groups (the learners completing versus not completing the course) in the educational activities of submitting assignments, participating in discussion threads, viewing instruction files, recordings, and learning materials. The null hypothesis was formed based on the qualitative data.

4. Results

4.1 The case study of a course for employed adult learners

Through the interview, information about the course and the learners was investigated. The study was undertaken on an advanced level course in the Engineering department at a Swedish university. The course was particularly designed for EALs who were between the ages of 34 and 59 and employed in different companies. These companies ordered and paid for the course for their employees. Thus, the course syllabus and curriculum were built and developed through collaboration between the employer and the educator to adapt to working demands and individuals' needs. This course was selected due to the relatively varied educational activities that can be observed through log data. Following the national system of study results in higher education, there were nineteen learners registered for the course of which seven learners did not complete the course and the rest completed. There was no failed or low grade. The course was conducted in a hybrid form, signifying that on-campus lectures and seminars took place on one weekend and three other meetings took place in the online platform. The course offered 3.5 credits, equivalent to approximately ninety-three learning hours and lasted from the middle of December, 2019 to the end of March, 2020. The learners were expected to study on weekends, evenings, and in their spare time while still working full time.

4.2 The learning design of the course for employed adult learners

From the qualitative data, the pedagogical designs for EALs in particular were described, whereby an assumption about learning patterns was drawn as the basis to perform the next step of data visualization. A null hypothesis was set based on the assumption for the statistical tests.

There were the characteristic designs for the course for professionals. The first point was the provision of instructions and overview of the lectures and seminars beforehand, so the learners grasped the information and prepared for the imminent lectures and seminars. The educator additionally addressed that although the information was presented in the course plan at the beginning of the course, the learners could not afford to regularly check the course plan due to their full schedules. Thus, it was necessary to do so before every lecture and seminar. The second point was creating warm-up assignments before lectures to capture how the learners perceived and what they thought about after preparing and reading the literature. The assignments were not mandatory but were still expected to be submitted. The third point is the discussion activity which was conducted physically and virtually. The discussion threads were used for collecting information about the learners’ backgrounds, their expectations for the course, their previous experience as well as opinions on specific topics. Although the discussion activity was not mandatory, the learners were expected to post their viewpoints in the threads. The fourth point was recording the lectures which were elective and uploading them to the course page, whereby the learners were able to watch them later in case they could not participate in the lectures. Moreover, there were three exams that the learners needed to do to complete the course. Two of them required submissions in the LMS and one was the presentation on campus.

According to the pedagogical designs for EALs, the assumption for the further examination on EALs’ learning patterns is that “there is a correlation between engagement and course completion”. Correspondingly, the null hypothesis for the statistical tests is “there is no correlation between engagement and course completion”.

4.3 The learning patterns of employed adult learners

The study is followed, first by visualizing the activities of viewing instruction files, recordings, learning materials, participating in discussions, and submitting assignments (Figures 1, 2, 3, 4, and 5), and second by statistical tests for each activity.

Figure 1 alludes four instruction files ordered by time. The educator uploaded the files before the respective lectures and seminars. It is straightforward to see that learners completing the course viewed all or most of the instruction files while the learners who did not finish the course had two dispositions. Some viewed most or all of the instruction files while others viewed only the first file. From the chart, twelve learners completing the course and four learners who did not complete the course were presented, which means that three remaining learners who did not complete the course and were not presented in the chart, did not view any instruction files.

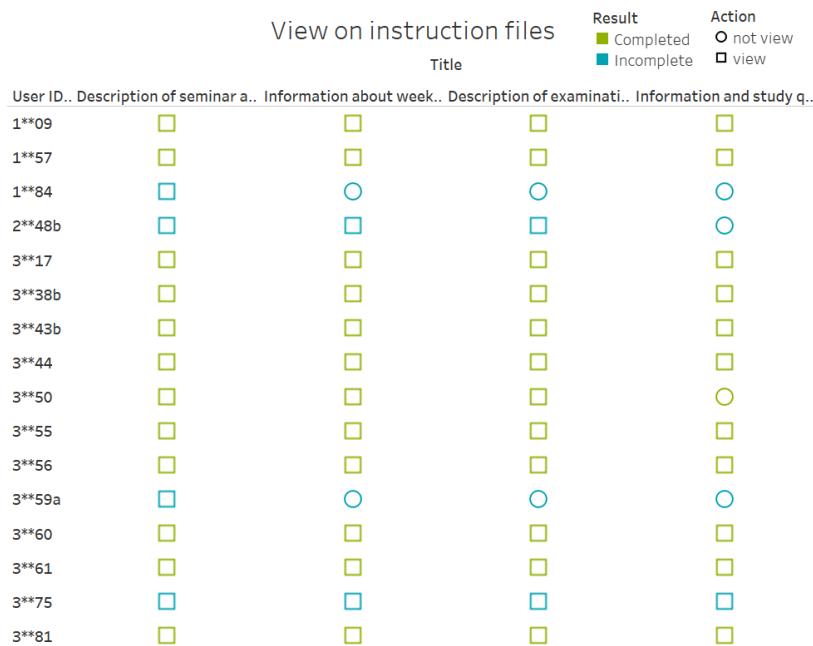


Figure 1: View on instruction files

Figure 2 presents the view on recordings of elective sessions uploaded in the LMS for the learners who could not participate in the elective sessions. This chart dominantly shows that the learners finishing the course

proactively viewed recordings, unlike the learners who did not finish. The total number of learners viewing the recordings fluctuates between three and ten.

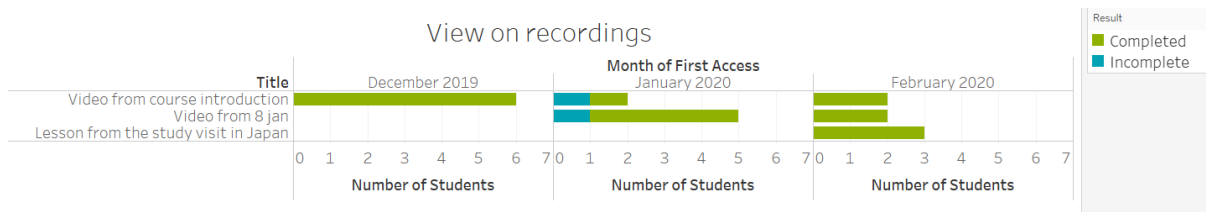


Figure 2: View on recordings

Figure 3 reveals that the majority of learners who viewed most of the learning materials completed the course, while only a small percentage of learners who did not finish the course viewed some of the materials. Additionally, the learning materials that involve course knowledge, such as “problem”, “Literature seminar”, “Experience from visit to Japan”, and “Coaching leadership Sensei canvas” had only one to two, or no non-completing learners viewing. The materials relating to the use of LMS such as “Create a meeting in Zoom”, “Manual booking”, and “Create a new page” were viewed by only one or two learners, which is a low rate compared to the number of learners in total. The maximum number of learners viewing learning materials was twelve and the smallest number of learners viewing was one.

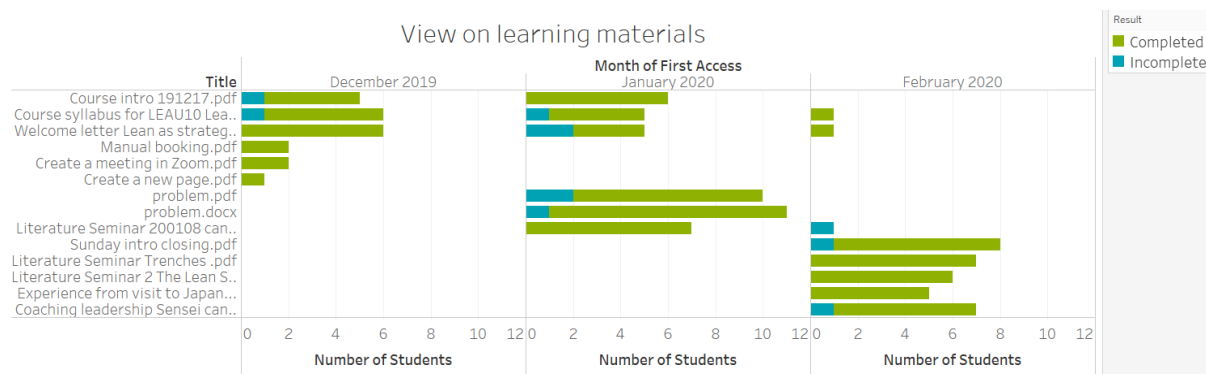


Figure 3: View on learning materials

Figure 4 shows the time that learners engaged in the discussion threads. All of these discussion threads were not mandatory, thereby revealing the self-motivation of the learners. The number of non-completing learners engaging in the discussion threads fluctuated between one and four learners. There are ten to sixteen learners in total in both groups participating in the threads. Figure 5 with assignment submissions and examinations demonstrates that the learners who completed the course engaged in assignments and examinations more than the learners who did not.

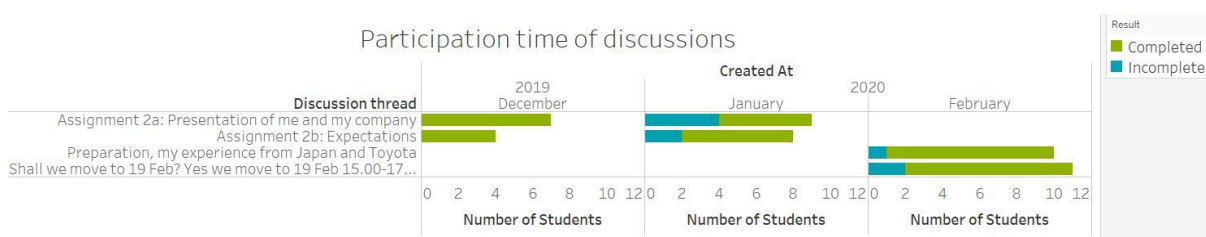


Figure 4: Participation time of discussions

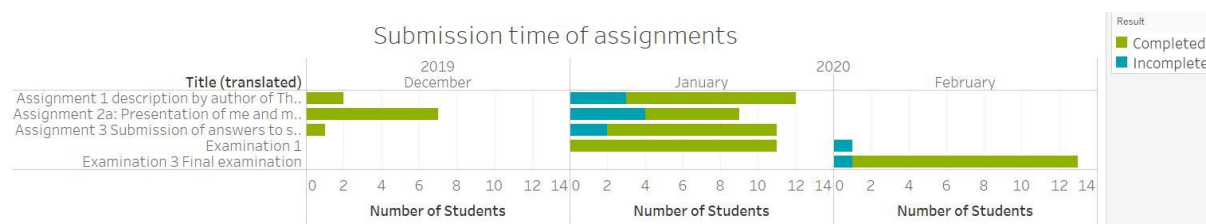


Figure 5: Submission time of assignments

The statistical data for view on instruction files, learning materials, participation in discussion, and assignment submissions are alike and presented in Table 2. The p-value (2-sided) of this dataset is 0.036 which is significant (< 0.05). Simultaneously, the p-value of the statistical data for view on recordings (Table 3) is 0.045 which is also significant (< 0.05).

Table 2: Statistical data for the engagement in instruction files, learning materials, discussion, and assignments

	Completed	Incomplete	Total
Engage	12	4	16
Not engage	0	3	3
Total	12	7	19

Table 3: Statistical data for view on recordings

	Completed	Incomplete	Total
Engage	10	2	12
Not engage	2	5	7
Total	12	7	19

In summary, premised on the visualization, Figures 1 to 5 denote that both completing and non-completing learners all engaged in the educational activities. The number of completing learners outweighed the number of non-completing learners. From the data visualization and the statistical tests, the correlation between engagement and course completion is proved in EALs' learning.

4.4 Pitfalls in the online learning design

Based on the analysis and interpretation of learning patterns, there are pitfalls identified in the current learning design of the course.

First, the number of students really engaging in learning is average to small. The educator expected that the learning materials should be viewed by the learners. However, Figure 3 discloses that there were approximately eight students of the total of nineteen who viewed the materials for seminars. The course introduction, syllabus, and welcome letter were viewed by eleven to twelve students of nineteen students in total. The observation shows that twelve students on average who participated in discussion threads are more than those viewing learning materials: seven students on average. Because the purpose of the discussion threads is to collect information rather than create a learning community, the assessment of learning can objectively be based on the view on learning materials. This is to say that the number of learners viewing learning materials is smaller than the learners answering in discussion threads, even much smaller than the total number of learners in the course.

Next, we come to the collective insight of Figure 1, 2, 3, 4, and 5 to elicit the moderate to low engagement of the learners in the course. The learners with identifiers as 1**84 and 3**59a viewed only the first instruction file named "Description of seminar and study questions" and there were three non-completing learners who did not view any instruction files (Figure 1). This demonstrates that in general the learners who did not complete the course did not participate in or only looked through the course. Additionally, the number of learners who completed and did not complete the course engaging in the educational activities is lower than the total number of learners in the course through the figures. This analysis and interpretation show that the level of engagement in the course needs to be considered.

4.5 Indicators for the online learning design improvement for employed adult learners

4.5.1 Investing in learning materials

Investing in learning materials aims to maximize their advantages integrated and designed in the course page. Due to the cases viewing only the first or no learning materials at all, how to make learning materials more compelling to learners becomes a critical concern for educators. Ally et al. (2006) disclosed that participants freely engage in any learning object involving in their work. The authors accentuated having clearly identified learning objectives for the specific learning materials and representing them in the title.

Accordingly, this indicator can be considered from two perspectives: the content of learning materials and the titles of learning materials. Illeris (2003) and Kim et al. (2021) elicited that learners likely become self-directed

in their learning if they feel connected to or engaged with the content, which reaffirms previous studies that self-directed learning has the relation with learners' perceptions of the value they put on the course. Hence, the investment on course content increase the attractiveness of the course to EALs. Regarding the titles of learning materials, Ally et al. (2006) did the study on how learners choose learning materials. The study explored the disposition of learners on choosing and utilizing the learning materials with relevant content. Thus, Ally et al. (2006) suggested that learning materials need to be titled appropriately as well as that the titles of learning materials need to reflect the content of the learning materials and be inviting.

4.5.2 Considering the increase of online interaction

Many studies underscore interaction to increase the engagement of EALs. Figure 4 shows four discussion threads, yet these threads were initiated by the educator to collect information through straightforward questions and topics, for example, introduction of learners and their companies, description of learners' learning expectations, or consultancy of changing time. The learners were supposed to answer voluntarily. The point here is a lack of stimulation and influence on constructing knowledge amongst learners through discussions, and sharing as a learning community (Holland, 2019). Although interaction was planned for the lectures and seminars as the educator elicited, there were not many meetings between the educator and the learners throughout the course. Accordingly, the interaction of learners, educators, and course content might be lessened. Meanwhile, interaction is an essential component of the learning process in both an online and offline learning environment (Cheng and Jiang, 2015). Interaction is embodied under various forms of communication, participation, feedback, reflective activity, discussion forums, or collaboration. Moreover, it is pivotal to provide the opportunities of knowledge construction through conversations (Bradley, 2021) and in the development of learning communities (Holland, 2019). To urge the development of discussions, learners should be encouraged to engage in the content and learning communities in an immanent manner with the breadth and depth as they wish (Holland, 2019). In addition, a solution to augment the connection between peers, peers-educators, and peers-content is asynchronous interaction. Asynchronous activities tally with learners who are in conjunction with other commitments and drive learners into being autonomous and self-regulating, such as exploring learning materials, engaging in effective communication, and managing their study in tandem (Bradley, 2021).

5. Discussion

As Frey and Alman (2003) showed, interaction which was not addressed in adult learning theories needs to be leveraged in online classrooms. In fact, having only a few meetings between educators and learners in online learning is insufficient to share or delve into knowledge. Moreover, due to the short time of the course and the busy lives of EALs with a myriad of commitments, it is fairly challenging for the educator to make the most time-saving schedule and still be able to engage learners throughout the course. To escalate the connection in online learning, synchronous or asynchronous interactions through discussion forums, dialogue, collaboration, and group work in LMS play a connecting role between learners, educators, and course content, and optimize the availability of learning for EALs in both time and space. High-quality interaction, full participation, and reflection do not simply happen by technology but require thorough online learning design to diminish the old fashion in traditional classrooms and take advantage of the potential of technology (Salmon, 2013). Thus, ways of working with colleagues and learners need to be rethought to produce success in online learning. Moreover, the support of educators is vital to contribute to learners' successful learning experiences (Rennie and Morrison, 2013). The support needs to be provided in a structured development process such as the five-stage model of teaching and learning online (Salmon, 2013). The support of educators can be, for instance, leaving comments on discussions, interacting with student groups in forums, posting feedback as replies to student input, and giving assessment feedback (Walji et al., 2016). The harmonic cooperation between educators and learners generates productive online interaction. Interacting with educators and peers opens opportunities for EALs to use their prior experience and receive input from the others in tandem. With varied prior experience, EALs construct knowledge in their unique ways. Online interaction increases not only individual learning but also learning communities. This helps reconcile this tension between the focus on individual learning and the desire for an active learning community (Cornelius et al., 2011).

6. Conclusion

This paper strives to propose the indicators for the online learning design improvement for EALs through the case study approach. Through the lens of learning analytics and the perspectives of the educator on the learning design for EALs, investing in learning materials and considering an increase in online interactions are the indicators to assist the growth of learners' engagement in the course, thereby improving course completion.

More than that, learning experiences are improved and technology potential is thoroughly exploited. The indicators are viewed as the first step in the process of proposing an appropriate and effective online learning design for EALs. Educators and course designers who work with EALs can consider applying the indicators to the courses which will be held in upcoming semesters or similar courses.

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