

Perception and Benefits of Writing Personalized Weekly e-Learning Journals and the Effect on University Students' Academic Self-efficacy

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Academic self-efficacy is an essential element for effective and engaging learning. In order to improve academic self-efficacy, students need to engage in regular and effective self-reflection to form realistic beliefs about their own academic capabilities. However, students may not be motivated to sustain effective self-reflection. Suitable tools are needed to assist students to self-reflect effectively. The objectives of this study were to determine the effect of writing personalized weekly e-learning journals on students' academic self-efficacy, the perception of its usefulness, and how it has helped students improve their academic self-efficacy. Multiple data collection methods were used in order to provide data for better explanations on the causality of the dependent and independent variables. Fifty-four students studying a degree program wrote personalized weekly e-learning journals over a ten-week period. Pre-tests and post-tests on their academic self-efficacy were administered in study week one and eleven respectively. The personalized weekly e-learning journals contained personalized prompts. The purposes of these prompts were not only to scaffold students to self-evaluate and self-reflective effectively but also to collect weekly time series data on academic self-efficacy and perceived usefulness in writing these journals. The post-test scores and time series data showed that the academic self-efficacy and the perceived usefulness of writing e-learning journals over the intervention period have improved. Writing personalized weekly e-learning journals has motivated the students to self-evaluate regularly, sustain their self-reflection, and promote positive academic self-efficacy. This study highlighted the benefits of writing personalized e-learning journals.

L'auto-efficacité académique est un élément essentiel pour un apprentissage efficace et engageant. Afin d'améliorer leur auto-efficacité académique, les étudiants doivent s'engager dans une autoréflexion régulière et efficace pour se forger des convictions réalistes sur leurs propres capacités académiques. Cependant, les étudiants peuvent ne pas toujours être motivés pour mener une réflexion personnelle efficace. Des outils adéquats sont nécessaires pour aider les étudiants à s'engager dans une autoréflexion efficace. Les objectifs de cette étude étaient de déterminer l'effet de la rédaction de journaux hebdomadaires personnalisés d'apprentissage en ligne sur l'auto-efficacité académique des étudiants, la perception de l'utilité de cet exercice et la manière dont elle a aidé les étudiants à améliorer leur auto-efficacité académique. Plusieurs méthodes de collecte de données ont été utilisées afin de fournir des données permettant de mieux expliquer la causalité des variables dépendantes et indépendantes. Cinquante-quatre étudiants

suivant un programme menant à un diplôme ont rédigé des journaux hebdomadaires d'apprentissage en ligne personnalisés sur une période de dix semaines. Des pré-tests et des post-tests sur leur auto-efficacité académique ont été administrés respectivement lors de la première et de la onzième semaine d'étude. Les journaux hebdomadaires d'apprentissage en ligne personnalisés contenaient des messages-guides personnalisés. Ces messages avaient pour but non seulement d'aider les étudiants à s'auto-évaluer et à réfléchir efficacement, mais aussi de recueillir des données hebdomadaires sur l'auto-efficacité scolaire et l'utilité perçue de la rédaction de ces journaux. Les résultats du post-test et les données chronologiques ont montré que l'auto-efficacité académique et l'utilité perçue de la rédaction de journaux d'apprentissage en ligne se sont améliorées pendant la période d'intervention. La rédaction de journaux hebdomadaires d'apprentissage en ligne personnalisés a motivé les étudiants à s'auto-évaluer régulièrement, à soutenir leur autoréflexion et à promouvoir une auto-efficacité académique positive. Cette étude a mis en évidence les avantages de la rédaction de journaux d'apprentissage en ligne personnalisés.

For three decades, educational psychologists have been interested in understanding academic self-efficacy due to its influence on students' motivation and learning (Pajares, 2008; Pintrich, 2004; Zimmerman, 2000). Academic self-efficacy is a concept based on the Social Cognitive Theory developed by Bandura (1986). According to this theory, an individual has the ability to adjust the effort needed in order to achieve a targeted outcome through regular reflection on his or her knowledge and experiences. Such self-regulatory mechanisms can aid an individual to better control their feelings, thoughts, and actions. Self-efficacy is an essential component in this self-regulatory mechanism. It is the belief in one's capability to accomplish a given task or manage a specific situation. The concept of self-efficacy has been applied in many fields by researchers. In education, it has been adapted and referred to as academic self-efficacy learning (Pajares, 2008; Pintrich, 2004; Zimmerman, 2000)

Academic self-efficacy is a good predictor of academic achievement (Honicke & Broadbent, 2016). Students who have high academic self-efficacy tend to obtain high academic achievement. Bandura (1986) posited self-reflection as an effective way to evaluate and improve one's self-efficacy. This is because it enables the reflector to be actively aware and adjust his or her effort to ensure the accomplishment of a task. Self-reflection in education requires students to self-evaluate the progress of their learning, and make the needed adjustments to their learning strategies in order to achieve their learning goals. To scaffold students to self-reflect regularly and effectively on their studies is a laborious endeavour (Moon, 2004). Teachers often struggle with time in order to have regular conversations with the students to scaffold them to self-reflect effectively. In a university context, the large class size poses a greater challenge for lecturers to do so (Fung et al. 2019a). In addition, sustaining students' motivation for regular self-reflection is a challenge. Students might be aware of the importance of self-reflecting regularly but the lack of motivation might hinder them from doing so (Ng, 2010). This could lead to poor academic performance (De Paola & Scoppa, 2015; Naturil-Alfonso et al., 2018). In addition, students may not learn self-reflection autonomously (Ng, 2010). The advancement of learning management systems offers plenty of opportunities to create personalized learning tools for better quality of learning in universities (Dabbagh et al., 2019). Therefore, a tool on the university's learning management system can be utilised to help students toward better self-reflection (Fung et al., 2019b). Such a tool also needs to stimulate and sustain students' motivation in order to bring about the habit of regular self-reflection. In addition, lecturers must be able to utilize such a tool

to monitor students' self-reflection in order to provide the necessary support for the students to learn better. This support may include feedback to the lecturers on students' learning outcomes and the provision of additional learning materials that may foster students' understanding on the subject content of the course (Fung et al., 2019a).

In this study, personalized weekly e-learning journals were used to scaffold students to self-reflect regularly. The objectives of this study were to determine the effect of writing personalized weekly e-learning journals on students' academic self-efficacy, the perception of its usefulness, and how it helped students improve their academic self-efficacy.

Literature Review

Students will be able to determine their efficacy to succeed in an academic task if they are able to reliably determine the knowledge, skills, and effort they needed (Folk, 2016). Such academic self-efficacy could be improved through regular self-reflection (Bandura, 1986; Fritson, 2008). The process of self-reflection begins with self-consciousness and self-evaluation about one's own performance. Bandura (1986) posited that people will not be effective in self-evaluation if they are not aware of their behaviour. The performance attained in any task will be judged against one's own expectation and past experience. This will help students to be aware of their own learning progress (Johansson & Svensson, 2019). It also enables students to constantly self-evaluate and adjust their learning strategies in order to achieve their learning goals. Students who reflect regularly are actively engaged in their regulation of learning efforts and behaviour. They are able to exercise deep learning strategies through regular reflection (Körkkö et al., 2019; Nückles et al., 2012). Students need to constantly review and assess their learning process and outcome in order to exercise deep learning strategies. Such iterative processes could stimulate students' motivation to learn (Fung et al., 2019a; Huang et al., 2014; Johansson & Svensson, 2019; Ribeiro et al., 2019; Trautner & Schwinger, 2020; Wang et al., 2017). Indeed, students need to be aware of their increased capability, through self-reflection, in order to be constantly engaged in their learning. The lack of motivation in learning often leads to poor academic achievement (Steel & Klingsieck, 2016). Effective self-regulation of motivation can sustain students' engagement in learning (Grunschel et al., & Fries, 2016)

Some university students prefer a more teacher-centred learning environment (Loh & Teo, 2017). They lack the initiative and confidence to self-reflect effectively on their learning. Hence, the use of effective tools would be desirable to help them become more engaged in their learning. There are two types of reflection, namely reflection on action and reflection in action (Schon, 1983). Reflection on action is a retrospective action that requires a person to recall and self-examine a past experience. Reflection in action requires a person to reflect while carrying out a task. It requires intentional effort and skills to iteratively self-reflect and adjust strategies to ensure goals are achieved (Körkkö et al., 2019; Nückles et al., 2012). Students are required to carry out both reflection on action and in action during their course of study and these endeavours need to be guided accordingly.

Many past studies have used learning journals to aid students' self-reflection (Arsal, 2010; Dignath-van Ewijk et al., 2015; Guvenc, 2010; Huang et al., 2014; Schmitz & Wiese, 2006). However, with the advancement of internet technology, the learning journals can be modified in its form to expedite the process distribution and receiving of the journals (Fung et al., 2019b). Journals can be digitised and sent to the students to be completed and returned to the researchers through emails (Dignath-van Ewijk et al., 2015). Such kind of journals are more inviting,

especially to students who have grown up in the digital era (Fung et al., 2019a). However, the design and implementation of e-learning journal writing require considerable attention. It must be perceived by the students to be relevant and useful, otherwise they will not spend sufficient time and effort in writing the journals. Dignath-van Ewijk et al. (2015), using a quasi-experimental study, failed to detect improvement in students' academic self-efficacy after 14 weeks of writing weekly e-learning journals. They attributed this to the lack of motivation of the students in writing e-learning journals. Their qualitative data analysis revealed that some of the students in the experimental group did not perceive writing the e-learning journals as useful. This negative perception could have affected their responses in the self-reported pre-test and post-test measures of academic self-efficacy. Hence, it can be concluded that the learning journals need to be personalized according to the curriculum and assessments of the course in order to motivate the students to commit themselves to such endeavours (Fung et al., 2019a).

There was limited literature found on time series approach in the education field. Schmitz and Wiese (2006) used diaries to collect time series data on students' motivational beliefs in order to identify the changes in the pre-test and post-test of students' motivational beliefs. They recommended time series design to incorporate pre-test and post-test design. Dignath-van Ewijk et al. (2015), echoing Schmitz and Wiese (2006), also used electronic journals to collect time series data on students' motivational beliefs over a 14-week period to identify the change of these variables. However, these studies did not attempt to provide an explanation of how the writing of the e-learning journals has helped the students to improve their motivational beliefs. Hence this study attempts to fill in the empirical gap by utilising the e-learning journals not only as intervention but also as a data collection tool. The prompts in the e-learning journals collected time series data on academic self-efficacy and the perceived usefulness of writing the weekly e-learning journals. In addition, qualitative data concerning the benefits of writing e-learning journals were also captured in the e-learning journals. Shadish et al. (2002) highlighted the need to collect multiple types of data over an intervention period in order to help understand the causality of the variables. These data can act as a control over validity threat in a quasi-experiment. They need to be interpreted using applicable theories in order to rule out other possible causality.

When using e-learning journals, it is important to monitor students' motivational beliefs in order to sustain their writing. Dignath-van Ewijk et al. (2015) discovered that students' motivation to write the learning journals could decline over the intervention period and this might have affected the intervention effects of writing the weekly e-learning journals. This study overcame this shortcoming by incorporating personalized prompts in the weekly e-learning journals. When students believe the task that they carried out has significant contribution to their learning, they would be more motivated to keep engaging in that task (Johansson & Svensson, 2019; Ribeiro et al., 2019; Schwinger & Stiensmeier-Pelster, 2012). This would sustain students' motivation to write the journals. Indeed, students are willing to invest their time and effort on tasks that they believe will help them to attain better academic achievement (Schwinger & Stiensmeier-Pelster, 2012). Once they have established the habit of writing the personalized weekly e-learning journals, they would be more efficacious in handling problems in their learning. Constant self-reflection cultivates self-monitoring on their learning progress and this would not only improve their academic self-efficacy but also sustain their motivation to study (Trautner & Schwinger, 2020; Zimmerman, 2000).

With the advancement of learning management systems in education, e-learning journals can be embedded into the learning management system and form part of the learning activities

(Dabbagh et al., 2019). It can be an effective tool in capturing students' learning experience and provide rich data for analysis (Fung et al., 2019a). In addition, students have easy access to the e-learning journals through the learning management system, making it more convenient for the students to complete their writing.

Methods

Research Questions and Hypotheses

This research has three research questions.

Research Question One: Was there a significant increase in students' academic self-efficacy after the writing of weekly e-learning journals?

The two null hypotheses for this research questions are

- Ho1: There is no significant increase in the pre-test and post-test score of students' academic self-efficacy.
- Ho2: There is no significant change in the weekly scores of academic self-efficacy (based on the time series data).

For null hypothesis 2, an additional time series data plot has been used to identify the trend over the intervention period.

Research Question Two: Was there a significant change in students' perception about the usefulness in writing the personalized weekly e-learning journals over the intervention period?

The null hypothesis for this research question is

- Ho3: There is no significant change in the weekly score of perceived usefulness of personalized weekly e-learning journals.

This hypothesis is tested using the time series data collected in the personalized weekly e-learning journals. In addition, a time series data plot has been used to identify the trend over the intervention period.

Research Question Three: How has the writing of the personalized weekly e-learning journals over the intervention period helped the students to improve their academic self-efficacy?

This research question aimed to provide in-depth understanding of the experience and the beliefs of the students in writing the personalized weekly e-learning journals. Two prompts in the personalized weekly e-learning journals targeting at this research question:

- *In Week 7: Share, and explain, one point that you like and one point of dislike for writing the weekly e-learning journal.*
- *In Week 10: How has the writing of the weekly e-learning journals helped you in your study?*

Research Design

This study used time series mixed method approach. Such an approach can provide evidence on the change of students' academic self-efficacy, their perception on writing personalized weekly e-learning journals, as well as capturing rich data explaining how the writing of these journals has improved their academic self-efficacy.

The use of more than one design can help to provide better explanations on causality of the dependent and independent variables (Fung et al., 2019b; Shadish et al., 2002) Shadish et al.,

(2002) pointed out that research that incorporates multiple designs can rule out alternative explanations hence generate better prediction of the causality on the independent variable. In addition, multiple designs could provide a rich amount of data concerning students' learning (McCardle & Hadwin, 2015) and this could shed more light concerning the causality in a quasi-experiment. Indeed, data triangulation, drawing different types of data, both quantitative and qualitative, on a particular subject collected over different time horizons can strengthen understanding and help researchers draw a more reliable conclusion (Cresswell & Clark, 2017; Gutterman et al. 2018; Shadish et al., 2002). Hence, this study has incorporated pre-test and post-test scores on academic self-efficacy in order to support the time series data in measuring the changes in students' academic self-efficacy (Dignath-van Ewijk et al., 2015). Time series data also been used to measure students' perception in writing personalized weekly e-learning journals. At the same time, this study also captured qualitative data in the personalized weekly e-learning journals to provide in-depth understanding on the changes in their academic self-efficacy.

Participants

This study was carried out in a second-year undergraduate business degree course on management accounting. There were 86 students in the class. However, the writing of the personalized weekly e-learning journal was voluntary and it did not form part of the course assessments. In addition, there was no financial reward offered to them. Hence, not all students wrote ten weekly e-learning journals. Under such circumstances, sample selection criteria needed to be established in order to ensure meaningful data analysis (Dignath-van Ewijk et al., 2015). Our sample selection criteria were students who have completed all ten-weekly e-learning journals as well as the pre-test and post-test questionnaires. Out of 86, only 54 students ($N = 54$, male = 26, female = 28) met these criteria; 48% of participants were male and 52% were female. Hence, the data collected from these 54 students were used for analysis.

Instruments

Instrument 1: Questionnaire for Pre-Test and Post-Test

The instrument used in the study for the pre-test and post-test of academic self-efficacy was adapted from the subscale of self-efficacy for learning and performance in Motivation and Strategies for Learning Questionnaire (MSLQ). This instrument was found to be reliable and widely used to examine students' self-regulated learning as well as academic self-efficacy (Duncan & McKeachie; Roth et al., 2016).

The self-efficacy subscale has eight items. This instrument was verified by an English teacher to ensure its clarity and suitability to be used for this group of students. Minor amendments were made before it was pilot tested. The pilot test showed Cronbach alpha of .854, suggesting its high internal validity.

In both the pre-test and post-test instruments, students were required to provide their student identity number (ID), but not their name. This ID was used to identify the corresponding pre-test and post-test questionnaires as well as the corresponding e-learning journals and time series data. This was to ensure that only those students who had completed both the pre-test and post-test would have their e-learning journals analyzed. Such data triangulation enhanced the internal validity of the data collected (Cresswell & Clark, 2017).

Instrument 2: Personalized Weekly e-Learning Journals

The personalized weekly e-learning journals were designed using the “Survey” function on the learning management system (LMS). Hence, each “Survey” formed a “personalized weekly e-learning journal.” There are two reasons the “Survey” function was used. Firstly, the format of “Survey” contains questions or prompts that need “Short answers” or “rating.” This fits the requirements of the personalized weekly e-learning journals where students need to self-evaluate and self-reflect in order to provide some answers, while other prompts require rating, to capture the time series data. Secondly, the “Survey” appears automatically on the LMS on a weekly basis, with the date and time of appearance set in advance. All the expired e-learning journals will be hidden from the students on the LMS. This enables the students to answer the relevant weekly e-learning journal with ease. This would stimulate more engagement of the students in writing the weekly e-learning journals, since these journals were personalised, with slightly different prompts, to suit their learning needs.

The content of these weekly e-learning journals was developed based on the learning skills literature (Cottrell, 2013; Dignath-van Ewijk et al., 2015; Fung et al., 2019a). These weekly e-learning journals have been reviewed by the lecturer who taught this course to ensure its relevance to the students. In addition, these journals also have been reviewed by a second lecturer who specialises in English Language to ensure clarity of the instructions and suitability for the students to answer. Minor amendments have been suggested and the e-learning journals amended accordingly. The final version of the weekly e-learning journals contained two parts, with prompts targeting for different purposes.

Part One of the Personalized Weekly e-Learning Journals. The first part contained prompts that scaffold students to self-evaluate and self-reflect on their learning process. These prompts were personalized according to the curriculum and assessments of the course. These prompts were adapted from Cottrell, 2013; Dignath-van Ewijk et al., 2015; Schmitz & Wiese, 2006). Table 1 shows some examples of self-evaluation and self-reflection prompts that were personalized according to the curriculum and assessment tasks.

When writing e-learning journals, students need to recall their learning experience of the past one week. In this process, they need to organise their learning materials and self-assess the learning outcomes. These cognitive processes would help them to gain a deeper understanding of their learning progress (Nückles et al., 2012)

Part Two of the Personalized Weekly e-Learning Journals. The second part contained prompts that require students to self-evaluate their academic self-efficacy as well as their perception on the usefulness in writing weekly e-learning journals. These two prompts were in a questionnaire style with 5-point Likert scale for students to rate. The purpose was to collect time series data on students' academic self-efficacy and the perceived usefulness of writing weekly e-learning journals over a 10-week intervention period. These time series data served two purposes. Firstly, it was used as a validity check on the changes in the pre-test and post-test scores on academic self-efficacy. There would result in high validity when both demonstrated similar trends. Secondly, the changes in the perception of writing weekly e-learning journals acted as a check on the consistency of the qualitative data obtained pertaining to the benefits of writing weekly e-learning journals. Table 2 shows an example of these prompts in the weekly e-learning journal.

Table 1

Examples of Self-Evaluation and Self-Reflection Prompts

Open ended prompts	Purpose
Study Week No. 2	
Q1. What can I do in order to learn better?	This prompt stimulated the students to self-evaluate and to seek improvement.
Q2. In this week, which topics do I have difficulty understanding?	This prompt encouraged the students to review the lessons learned.
Study Week No. 4	
Q1. Based on the tutorials in Week 4, what do you think to be the difficult topics and why?	This week covered a brand-new topic. Hence self-evaluation was important.
Q2. What can I do in order to learn better?	It ensured students are taking action to overcome their learning problems.
Study Week No. 7	
Q1. The group assignment and mid-term test are over. But the semester is not over yet! Think about the topics that are examinable in the final exam. Can you recall the difficult ones, especially the ones that you have problem understanding? What study plan do you have to improve your chances of passing this Unit?	This prompt scaffolded the student to self-evaluate and self-reflect on their assessments. This was right after their submission of group assignment and mid-term test in the previous week (Study Week 6). It also created a sense of urgency for the students to plan their study for the rest of the semester.
Q2. Share, and explain, one point that you like and one point of dislike for writing weekly e-learning journals. How does writing the weekly e-learning journal in this unit change your way of studying?	This prompt aimed to elicit students' perception on the usefulness of writing weekly e-learning journals.

Table 2

Samples of Prompts in e-Learning Journals and the Purposes

Prompts	Purposes
Part Two:	
Prompt No. 1 * I think I am confident I can do well in this Unit of Study (5-Point Likert Scale)	To collect time series data on academic self-efficacy.
Prompt No. 2 ** I believe this weekly e-Learning Journal is helpful in my study (5-Point Likert Scale)	To collect time series data on perceived usefulness of weekly e-learning journals.

* Reliability score was .958, calculated as Guttman Split-Half coefficient using data collected in Week 1 e-LJ (Dörrenbächer & Perels, 2016; Schmitz & Wiese, 2006)

** Reliability score was .972, calculated as Guttman Split-Half coefficient using data collected in Week 1 e-LJ (Dörrenbächer & Perels, 2016; Schmitz & Wiese, 2006)

Data Collection Procedures

The data collection procedures were conducted in accordance with the University's human research ethics guidelines and requirements. In the first lecture of study week one, the first

researcher took five minutes to brief the students about this study and the procedures in writing the weekly e-learning journals. All the students were encouraged to participate in this study. The students were informed that their participation was voluntary and there were no financial rewards offered should they choose to participate. The students could choose not to continue writing the weekly e-learning journals during the semester without jeopardizing their academic results. In addition, the data collected were processed and analysed at the end of the semester. These data would only be used solely for this study and no personal identity would be revealed should these data be published in academic journals. A consent form, in accordance with the University's human research ethics requirements, was also given containing all this information and students were asked to sign off should they decide to participate. After the briefing, the first researcher distributed the pre-test questionnaire to those volunteered students. There was no mention of post-test during this time to reduce any possible reactivity to the pre-test scores. These questionnaires were collected at the end of the lecture.

Throughout the next ten weeks, students wrote weekly e-learning journals as they appeared on the LMS and these were kept in digital files after the expiry of each week until the end of Study Week 10. At the end of Study Week 10, the first researcher distributed the post-test questionnaire to those who had completed the pre-test questionnaire and collected them at the end of the lecture. There were no weekly e-learning journals in study Weeks 11 and 12 as there was no teaching. Week 11 was Revision Week and Week 12 was Self-Study Week. These 10 weeks of intervention have produced a total of 535 copies of e-learning journals, providing a rich amount of data to understanding how the writing of personalized weekly e-learning journals has impacted the students. Figure 1 depicts the overview of the data collection procedure over the intervention period.

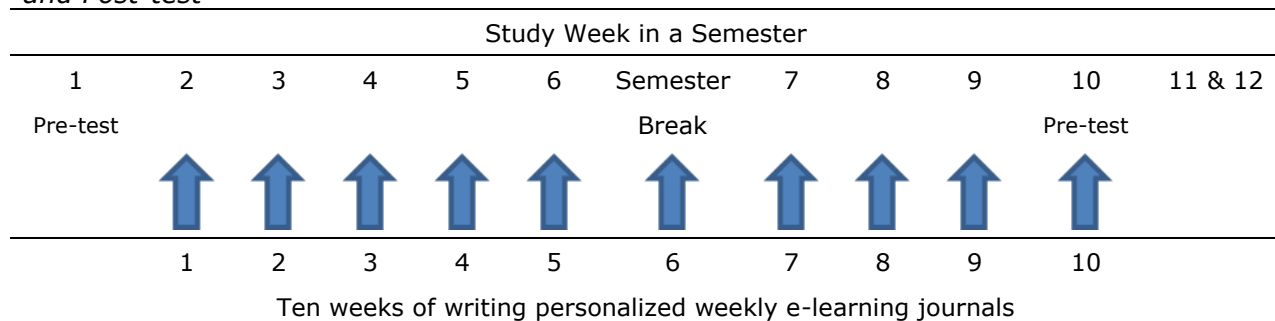
Quantitative Data Analysis

The data from the pre-test and post-test as well as the time series data contained in the weekly e-learning journals were keyed in into the Statistical Package for Social Sciences (SPSS) Version 23. Normality tests were carried out to ensure it fulfilled the assumptions needed for Paired Sample t-test and repeated measure ANOVA (Analysis of Variances) test respectively.

Paired Sample t-test were carried out on the pre-test and post-test scores on academic self-efficacy to determine whether there was a significant improvement over the intervention period. Repeated measures ANOVA were carried out on the time series data on the weekly academic self-

Figure 1

The Intervention Period of Writing Personalized Weekly e-Learning Journals with Pre-Test and Post-test



efficacy and perceived usefulness of weekly e-learning journals, to determine whether there was a significant change over the intervention period.

The weekly scores of academic self-efficacy and perceived usefulness of weekly e-learning journals were plotted on line graphs in order to identify the trends of these time series data over the intervention period.

Qualitative Data Analysis

The data were extracted and grouped according to the prompts in the weekly e-learning journals. Then these data were copied into Atlas.ti version 7. Two stages of data analysis were carried out (Silverman, 2010). Stage one analysis involved the emersion in the data and coding the data, using deductive coding strategies, that were based on the literature on academic self-efficacy and self-reflection. Stage two analysis expanded from stage one, by grouping the codes and categorising them into suitable themes. The themes were developed with reference to the literature of academic self-efficacy and learning journals (Saldaña, 2013) As recommended by Marshall and Rossman (2006), as well as Saldaña, (2013), analytic memos were prepared, where relevant, in order to guide understanding and interpretation of these data. These memos were read and reread in order to provide explanations on the research questions.

Results

Research Question One

Pre-Test and Post-Test Academic Self-Efficacy Mean Score Analysis

Ho1: There is no significant increase in the pre-test and post-test scores of students' academic self-efficacy.

Paired sample t-test was carried out on the pre-test and post-test scores of academic self-efficacy. Tables 3 and 4 show the descriptive statistics and results of paired sample t-test.

The Levene's Test for Equality of Variance for pre-test and post-test was carried out. The test for homogeneity of variances was not significant ($p > .05$). The pre-test mean score ($M = 4.58$, $SD = 1.00$) and post-test means core ($M = 5.05$, $SD = .75$) of academic self-efficacy differ significantly, where $f(53) = -3.299$, $p = .002$. This paired sample t-test showed that there was a significant difference in the pre-test and post-test mean scores of academic self-efficacy. Therefore, the null hypothesis is rejected.

Time Series Data Analysis: Weekly Self-Efficacy

Ho2: There is no significant change in the weekly scores of academic self-efficacy (based on the time series data)

Table 3

Descriptive Statistics of Academic Self-Efficacy

Variables	N	Pre-Test		Post-Test	
		Mean	SD	Mean	SD
Academic Self-efficacy	54	4.58	1.00	5.05	.75

Table 4

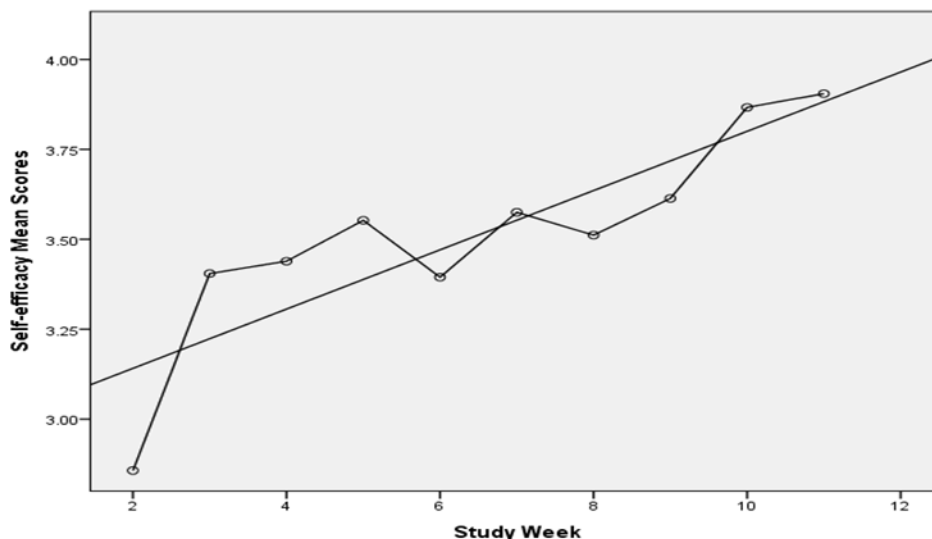
Paired Sample t-test for Pre-Test and Post-Test Mean Scores of Academic Self-Efficacy

	Paired Samples Test							
	Paired Differences							
	Mean	SD	SE Mean	95% CI		t	df	Sig. (2-tailed)
Academic self-efficacy Pre-test - Post-test	-.46759	1.04164	.14175	-.75191	-.18328	-3.299	53	.002

Note. Significant level at $p < .05$

Figure 2

Weekly Academic Self-Efficacy Scores Over 10 Weeks



A graph on these time series data was plotted, showing a positive trend over the intervention period. Figure 2 shows the scores of academic self-efficacy of the students while Table 5 shows the descriptive statistics of these scores over the intervention period.

One-Way repeated measure of ANOVA was used to determine whether there is a significant difference in the weekly self-efficacy scores over a ten-week period. The Alpha level of .05 was used for all statistical tests. Table 6 shows the analysis of the self-efficacy scores using the one-way repeated measures of ANOVA over the ten-week period.

There was a statistically significant difference in the weekly self-efficacy scores, $F(9, 405) = 6.946, p < .05$. The PES is .13 demonstrated large effect size (Cohen, 1992). Together with the graph in Figure 2, it shows that the weekly academic self-efficacy scores have improved significantly over the intervention period. However, it is worth noting that there was a slight reduction in Study Week 6. Based on the course unit outline, Study Week 6 has a class presentation on the progress of their group assignment. Students' academic self-efficacy could

have slightly diminished, perhaps, due to less favourable feedback from the lecturer on their progress.

Research Question Two

Time Series Data Analysis: Perceived Usefulness of Writing Weekly e-Learning Journal

A graph on these time series data was plotted, showing a positive trend over the intervention period. Figures 3 shows the weekly scores on “perceived usefulness of writing weekly e-learning journals” over the ten-week period while Table 7 displays the descriptive statics of these scores over the same period of time.

One-Way Repeated Measures of ANOVA Test. One-Way repeated measures of ANOVA were used to determine whether there is a significant difference in the weekly scores of “perceived usefulness of e-Learning Journal” over a ten-week period. The Alpha level of .05 was used for all statistical tests.

Ho3: There is no significant change in the weekly score of perceived usefulness of weekly e-learning journals. Table 8 shows the analysis on “Perceived Usefulness of e-Learning Journal” scores over a ten-week period using one-way repeated measures of ANOVA.

Table 5

Descriptive Statistics of Weekly Self-Efficacy Scores

Study Week	Mean	Standard deviation
Two	2.86	.57
Three	3.40	.59
Four	3.44	.87
Five	3.55	.72
Six	3.40	.75
Semester break	3.58	.71
Seven	3.51	.77
Eight	3.61	.69
Nine	3.87	.76
Ten	3.90	.69

Table 6

One-Way Repeated Measures of ANOVA on Self-Efficacy Scores Over a 10-Week Period

	Sum of squares	Df	Mean square	F	Sig.
Between groups	32.045	9	3.561	6.946	.000
Within groups	207.603	405	.513		
Total	239.648	414			

Note. $PES = 32.045/239.648 = 0.13$

Figure 3
Weekly Scores on 'Perceived Usefulness of Writing Weekly e-Learning

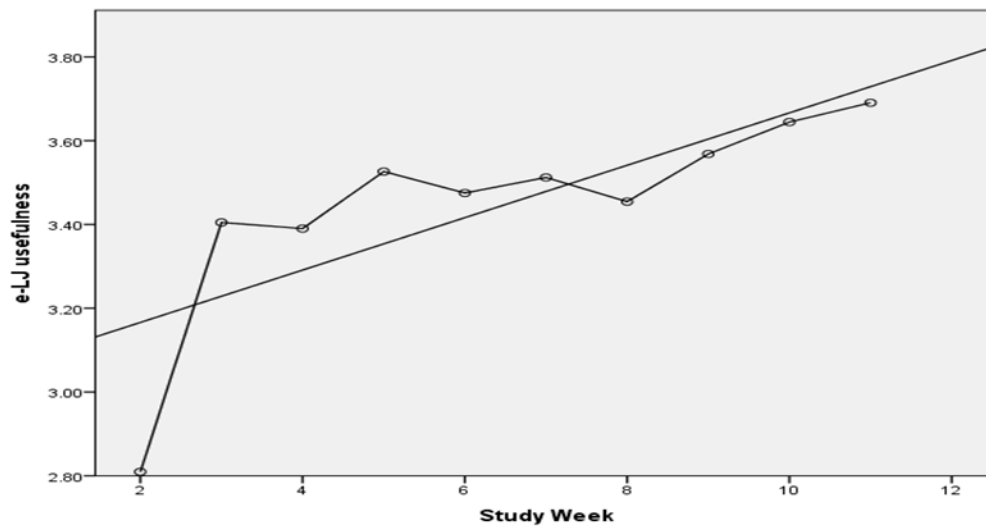


Table 7

Descriptive Statistics for Perceived usefulness of e-LJ Weekly Mean Scores

Study Week	Mean	Standard deviation
Two	2.81	.67
Three	3.40	.77
Four	3.39	.83
Five	3.53	.69
Six	3.48	.75
Semester break	3.51	.60
Seven	3.46	.90
Eight	3.57	.62
Nine	3.64	.74
Ten	3.69	.72

Table 8

One-Way Repeated Measures of ANOVA on "Perceived Usefulness of e-Learning Journal" Scores Over a 10-Week Period

	Sum of squares	Df	Mean square	F	Sig.
Between groups	22.611	9	2.512	4.649	.000
Within groups	221.036	409	.540		
Total	243.647	418			

Note. $PES = 22.611/243.647 = 0.09$

There was a significant difference in the weekly scores of “perceived usefulness of e-Learning Journal,” $F(9, 409) = 4.649, p < .05$. The PES is .09 demonstrated moderate effect size (Cohen, 1992). Together with the graph in Figure 3, it shows that the weekly scores on “perceived usefulness of e-learning journals” have improved significantly over the intervention period.

Research Question Three

The qualitative data were extracted from the following two prompts in the personalized weekly e-learning journals for analysis:

- Share, and explain, one point that you like and one point of dislike for writing weekly e-learning journals.
- How has writing e-learning journals helped me in my study?

These qualitative data not only provided in-depth explanations on this research question but also supported the quantitative findings in Research Questions One and Two (Creswell & Clark, 2017; Guetterman et al., 2018; Shadish et al., 2002). Such kind of triangulation enhanced the validity of the findings. The followings are the themes emerged from the analysis.

Regular Review/Reflection

Many students stated that writing weekly e-learning journals has helped them to self-review and self-reflect on their learning progress more regularly. This was not a surprise since writing the weekly e-learning journal has been embedded into the curriculum and formed part of the learning activities. Another view on these comments was that students were not able to self-review and self-reflect autonomously. Some examples of this are illustrated in the quotes shown below.

I am able to keep track on my studies. Weekly e-learning is helpful. (ID:21)

I am reviewing my lessons every week and I think this helps me a lot. (ID: 7)

... Weekly e-learning journals made me do revision ... every week. (ID:37)

Mastery of Learning Materials

Many students claimed that regular review has helped them to improve their understanding on the topics taught. They would review and assess their level of understanding before they write the weekly e-learning journals. This demonstrated the commitment that they have in answering the journals. Some also revealed that they would seek help from others on the topics that they do not understand.

I think this helps me in a lot. It forced me to know what has been taught and I need to understand these topics every week. (ID: 7)

Before answering this question (in the weekly e-learning journal), I need to ask myself what is difficult for me and I will go to read my slides. I will ask my friends or seniors for help if I do not understand certain topics. (ID:37)

Increased Confidence

Many students reported that their confidence in passing this subject has increased through the writing of the weekly e-learning journals. This was due to the regular review and assessment of the topics taught. They became aware of their progress in their learning. Needed actions were taken in order to ensure they could achieve their performance goals.

E-learning journal enhances the efficacy of knowledge ... (ID:44)

I like it cos it helps me to plan and motivate me to study ... (ID: 32)

I think weekly e-learning has motivated me for studying this subject Weekly e-learning journals made me do revision about this subject every week. So, it has helped me in both test and assignment. (ID:37)

It helps me to be constantly doing self-revision on weekly basis. It does help me on my Test (in-course assessment), it reminds me that the Test is coming and I have to pay more attention on the subject in order to get what I desire. Thus, I spent more hours doing revision. Fortunately, I got what I expected. (ID: 17)

Engagement in Study

Students reported that writing personalized e-learning journals has helped them to re-think about their progress and they acknowledged that it was helpful to them. This finding supported the result in Research Question Two where students have reported a significant increase in their perception about the usefulness of writing personalized e-learning journals (Figure 3). These students were able to identify their problems and the prompts in the e-learning journals have stimulated them to constantly think about ways to improve their understanding of their learning materials. These have helped them to be more engaged in their study. Again, this finding supported the findings in research question one where students' academic self-efficacy has significantly increased over the semester (Table 4 and Figure 2).

It helped me to revise regularly and always know my progress in my study. (ID: 40)

I spent more hours doing revision each week. (ID: 17)

For the first few weeks, I did not have motivation to prepare for anything. But until the fourth week, the constant reminder from the weekly e-Learning Journal somehow triggered some of my motivation, and I have allocated more time for reading and preparation etc. (ID: 41)

Better Time Management

A few students mentioned that regular writing of e-learning journals was useful to improve time management. Indeed, if the students were willing to invest their time to answer all the prompts that have been personalized in the e-learning journals (see Table 1), they would be able to better manage the learning processes through better time management. The prompts acted as reminders for the students take control over their learning progress. This in turn improved their mastery of

their learning materials and academic self-efficacy. Some of the quotes are shown below:

... it (e-learning journal) trained me into a person who has the desire to complete my work according to my plan and better manage my time. (ID: 13)

... and I have allocated more time for reading and preparation etc. I think this is a really good tool for students to have constant progress throughout their studies in the semester. (ID: 41)

Monotonous and Time Consuming

Despite many positive feedback and comments about the usefulness of writing the weekly e-learning journals, a few students expressed their concern over the burden to write it on a weekly basis. To some, it was a boring task due to its repetitiveness. Some suggested a fortnightly basis in order to reduce the time needed in completing the e-learning journals. Judging from the curriculum and assessments load, students found it time pressured to write especially towards the end of the semester where many assignments were due, not only from this course but also from other courses of study. However, despite these challenges, some students felt the benefits outweighed the challenges of writing these weekly e-learning journals.

It is quite dull to do the same thing over and over again. Thus, I think the journal needs to be improved Put some motivation quotes at the beginning or at the end of the journal to motivate us. (ID: 3)

Although I found it useful, writing it every week can be boring. ... so it is recommended to limit the journal completion to once every fortnightly. (ID: 18)

I like it cos it helps me to plan and motivate me to study, meanwhile I disliked it when same questions been repeated. (ID: 32)

Discussion

This study provided an insight on how to implement personalized weekly e-learning journals to improve university students' academic self-efficacy. These weekly e-learning journals were located in the learning management systems, making it a convenient way for students to retrieve and write the e-learning journals. Such a way has stimulated students' engagement in continuous writing of the weekly e-learning journals (Fung et al., 2019a). These journals contained prompts that were personalized, according to the curriculum and assessments of this course. These prompts functioned as a tool to scaffold students to reflect specifically on crucial events, e.g. post assessment review, review of difficult topics to date, etc. Students found these prompts relevant to their study hence were willing to stay engaged with writing these weekly e-learning journals (Johansson & Svensson, 2019; Ribeiro et al., 2019; Schwinger & Stiensmeier-Pelster, 2012). Indeed, Dignath-van Ewijk et al. (2015) discovered that such prompts were essential in order to sustain students' motivation to keep writing the weekly e-learning journals. Students were able to self-evaluate and self-reflect better with such kinds of prompts (Nückles et al., 2012). They were able to focus on a particular topic or assessment apart from being able to exercise effective reflection-in-action (Körkkö et al., 2019; Schon, 1983). Indeed, self-reflection requires students to concentrate their effort on a specific subject matter and in context (Wang et al., 2017).

The findings in the qualitative data suggested that regular self-evaluation and self-reflection

require self-discipline. Students felt the writing of weekly e-learning journals has helped them to be more engaged with their study (Steel & Klingsieck, 2016). This, in turn, would help the students to improve their academic performance. However, having the knowledge of study techniques, such as regular self-reflection, does not automatically turn into action. Students need to recognise its relevance to their study before they take active steps to carry out the task (Johansson & Svensson, 2019; Ribeiro et al., 2019; Schwinger & Stiensmeier-Pelster, 2012). Not only that, they need to sustain the motivation in order to maintain regular self-reflection (Huang et al., 2014; Ribeiro et al., 2019; Wang et al., 2017). In order to achieve these, the personalized weekly e-learning journals need to incorporate prompts that are related to the curriculum and assessments of the course (see examples in Table 1). Indeed, effective reflection requires students to identify and address the problems they experienced in their learning. They need to be guided accordingly by the use of a tool (Fung et al., 2019a; Körkkö et al., 2019; Nückles et al., 2012). The personalized weekly e-learning journals have fulfilled this objective. These episodes of recall, reflect and adjust in the writing of weekly e-learning journals have helped the students to improve their academic self-efficacy (Dignath-van Ewijk et al., 2015).

This study shows that personalized weekly e-learning journals that contain prompts would enable students to self-evaluate and self-reflect on their learning progress (Fung et al., 2019b). The exercise constantly reminds and scaffolds students to exercise better control and be more engaged with their learning (Johansson & Svensson, 2019). These tasks have helped the students to improve their academic self-efficacy over the intervention period. As the prompts were targeted at certain specific events in the course, e.g. review of students' test results, identifying difficult topics, etc. These had made the learning process visible and students had continuous consciousness to manage and improve their learning. These processes have turned the students to become active learners. Such reactivity also helped to increase their confidence, hence their academic self-efficacy, in facing their final exam at the end of the semester (Huang et al., 2014; Trautner & Schwinger, 2020). This also increased their motivation to study. This finding supported the significant increase in the academic self-efficacy found in Research Question One (Table 4 and Figure 2).

The qualitative data from the e-learning journals revealed that students felt motivated and improved in their self-efficacy because they were able to understand their learning progress regularly. They were able to improve their learning strategies in order to improve their academic achievement. Indeed, students who are more self-aware about their learning progress tend to take remedial actions where needed to attain the pre-determined learning targets (Johansson & Svensson, 2019). These helped foster their engagement and motivation in learning. Engagement in study and motivation to learn are intertwined and essential to improve academic self-efficacy and academic achievement (Fung et al., 2019b; Grunschel et al., 2016; Johansson & Svensson, 2019; Ribeiro et al., 2019; Trautner & Schwinger, 2020).

The increase in the perception on the usefulness of writing personalized weekly e-learning journals further affirm the prediction of the causality of the academic self-efficacy. Students felt the confidence in their ability to learn more effectively as they write and self-reflect in the personalized weekly e-learning journals. Such an increase in their confidence acted as an agent to motivate the students to use more effective learning strategies (Zimmerman, 2000).

This study highlighted that students need a tool that is personalized according to their curriculum and assessments, furnished with the relevant prompts, in order to reflect better. Students would find writing the e-learning journals relevant to their studies hence promoting the commitment to continue writing. This is essential as a decrease in the motivation to write would

limit the benefits of the personalized e-learning journals. Hence, a lecturer needs to incorporate relevant prompts in the personalized e-learning journals and take steps to ensure students understand its relevance to them (Fung et al., 2019b; Johansson & Svensson, 2019; Ribeiro et al., 2019; Schwinger & Stiensmeier-Pelster, 2012). This principle would enable personalized e-learning journaling a transferable tool across different courses for improving students' academic self-efficacy.

Using suitable prompts in the personalized e-learning journals would enable students to focus on a particular key area to reflect on (Fung et al., 2019b). This would improve the effectiveness of self-reflection. Students would need to recall their learning episodes or materials in order to self-reflect. They often need such intentional prompts to do so, otherwise they might disengage from their study. If this problem is not monitored, it would jeopardize their academic performance. Indeed, students need to be engaged in self-evaluation and self-reflection in order to exercise better control over their study. This would improve their academic self-efficacy over time.

The time series data on the perception on the personalized weekly e-learning journals and academic self-efficacy provided corroborative evidence concerning the changes over time (Shadish et al., 2002). The graphs highlighted that both academic self-efficacy and the perception about the usefulness of writing personalized weekly e-learning journals have improved over the semester (Figures 2 and 3). It gave an affirmation to the causality of writing personalised weekly e-learning journals and students' academic self-efficacy (Fritson, 2008). Indeed, a simple one shot of pre-test and post-test might not be able to provide high assurance of causality in social sciences experiment (Fung et al., 2019b; Shadish et al., 2002). It often undermines the complexity of human reactivity and the corresponding measurement of these activities. This study has demonstrated that using data triangulation can provide better explanations on causality of the dependent and independent variables (Creswell & Clark, 2017; Dignath-van Ewijk et al., 2015; Dörrenbächer & Perels, 2016; Guetterman et al., 2018; Schmitz & Wiese, 2006; Shadish et al., 2002).

Limitations of Study and Recommendation for Future Studies

This study found that writing personalized weekly e-learning journals is beneficial for university students in the field of applied social science, in particular business discipline. Empirical studies, however, need to be carried out to determine whether it could yield similar positive effects on students in different disciplines such as pure sciences and engineering. The teaching and learning approach in these disciplines are more lab-based and the use of LMS may also be lower, thus, the time needed for the intervention to take effect may be longer. A comparative study could be carried out to understand how the improvement of academic self-efficacy differs between students of different disciplines. This study also did not attempt to measure the academic achievement of the students. Future studies may attempt to measure the changes in academic self-efficacy and academic achievement. With the rapid development of internet technology, many courses are delivered online. Future studies may examine the effects of personalized e-learning journals in online courses. Considering that online courses have lesser face-to-face contact, personalized e-learning journals may take a more important role in scaffolding students to self-reflect and self-evaluate students' learning more frequently and effectively.

Conclusion

This study has demonstrated that the writing of personalized weekly e-learning journals has improved students' academic self-efficacy significantly over an intervention period. The e-journal writing scaffolded the students to self-evaluate and self-reflect on their learning process. They gained deeper understanding of their learning progress thus improved their academics self-efficacy. The e-learning journal can be designed using the survey function in the LMS. Hence, LMS should be optimized as a platform to promote and sustain students' self-reflection and academic self-efficacy through the use of personalized weekly e-learning journal. Students found it useful as it encourages regular reflection, promote mastery of learning materials and increases confidence, engagement, and time management. Although these repetitive processes were considered monotonous and time consuming by some students, overall, the perception on the e-learning journal writing was positive. It has helped the students not only to be more engaged with their studies but also to improve their academic self-efficacy. They were more confident in attaining better results in the assessments.

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