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Relationship Between Academic Procrastination and Differential Learning Outcomes in Asynchronous Online EFL Learning

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Abstract

Although one advantage of asynchronous online language learning is that learners can choose when and where to learn, this learning environment can also lend itself to procrastination. However, procrastination during asynchronous language learning has not been sufficiently studied. Therefore, the present study investigates student procrastination in an asynchronous English learning environment and examines its impact on learning outcomes. University students engaged in asynchronous learning were divided into three groups, reflecting the timing of access to online materials: procrastinators, habitual learners, and uncategorized learners. When the pre- and post-test scores of the three groups were compared, the procrastinators showed significantly less score growth than the habitual learners. However, these results leave room for further research on the learning outcomes of uncategorized learners, who lacked good study habits but did not procrastinate. The results suggest that, even in asynchronous language learning environments characterized by anytime/anywhere learning, interventions are needed to help students avoid procrastination and become habitual learners.

Keywords: academic procrastination, asynchronous online learning, differential outcomes

Introduction

The COVID-19 pandemic and the accelerating digital transformation worldwide have caused more people than ever to focus on learning English as a foreign language (EFL) online. Students are expected to benefit from anytime/anywhere learning through asynchronous courses, which do not impose time or space constraints. However, successful learning in an unconstrained environment requires self-regulation (Michinov et al., 2011). It is difficult for students to maintain self-regulation for a set period and for instructors to encourage deliberate, self-paced learning. Procrastination in learning is anticipated to occur frequently. One way to help students adopt self-regulated behaviors is to manage and support their progress in any way possible (Zhang et al., 2022). However, instructors cannot provide more appropriate and sophisticated progress-management support without a research-based understanding of how procrastination leads to improved or diminished learning outcomes. Then, what is the relationship between

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procrastination and learning outcomes in self-regulated online EFL courses?

Literature Review

Procrastination has been a topic in psychology since the 1980s (e.g., Lay, 1986; Rothblum et al., 1986; Solomon & Rothblum, 1984). Procrastination in educational settings is referred to as academic procrastination or student procrastination. According to the literature, as many as 95% of university students experience procrastination in academic contexts (Ellis & Knaus, 1977). Chronic procrastination is reported to occur in approximately 46% (Solomon & Rothblum, 1984), 50% (Day et al. 2000), or 70% (Schouwenburg, 1995) of students; thus, it can be recognized as a common trend. If academic procrastination is a general phenomenon, it may seem to be a problem that can be ignored. Indeed, some studies suggest that procrastination can have a positive effect, arguing that not all procrastination behaviors are harmful or linked to negative consequences (Chu & Choi, 2005; Choi & Moran, 2009). However, the close relationship between high levels of chronic procrastination and poor learning outcomes is a well-known finding among researchers (e.g., Cerezo et al., 2017; Klingsieck et al., 2012; Rothblum et al., 1986; Tice & Baumeister, 1997; You, 2015). Procrastination is a maladaptive behavior that can lead to a loss of academic confidence and self-esteem, and when such behaviors become habitual, they have long-term adverse effects on students (Owens & Newbegin, 2000). In light of these findings, researchers and practitioners involved with computer-assisted language learning need to consider ways to help students avoid procrastinating during remote online learning. According to Klingsieck et al. (2012), most procrastination research has been conducted in traditional face-to-face classroom environments, and more is needed in remote online environments. Since then, an increasing number of online learning studies have been published. Although these consistently show that procrastination harms academic performance online and in traditional educational settings (Cerezo et al., 2017; You, 2015), online language learning research is still rare.

This study, therefore, examines the relationship between procrastination and students' learning outcomes in asynchronous online EFL learning environments. University students engaged in EFL learning in an asynchronous online environment will be divided into multiple groups, including students who are frequent procrastinators, reflecting the time they access the material, and the pre- and post-learning score growth of each group will be compared. If procrastinators have poorer score growth, the anytime/anywhere nature of asynchronous learning can be both an advantage and a disadvantage. Such results would recognize the importance of considering interventions that prevent students from procrastinating and argue for the importance of accelerating related research projects.

Self-regulation in Online Language Learning

Self-regulated learning would be a theoretical framework for examining procrastination in asynchronous online environments during EFL learning. Self-regulated learning is defined as a process where students set their own learning goals and engage in monitoring or controlling themselves in their learning, subject to the constraints of their goals and environment according to the cases (Ferrari, 2001; Hong et al., 2021; Limone et al., 2020; Pintrich, 2000) and has

formed the background of much computer-assisted or online language learning research (Chen et al., 2019; Cheng & Xie, 2021; García Botero et al., 2021; Kondo et al., 2012; Lai & Gu, 2011; Luu et al., 2021; Şahin Kızıl, & Savran, 2018; Wang & Chen, 2020; Zheng et al., 2016). Zimmerman (2008) identified the monitoring and control of students' efforts in classroom learning tasks as one of the elements necessary for establishing self-regulated learning. However, in fully asynchronous environments, where students do not learn all together in a regular classroom or synchronous online setting, this element is absent or almost absent, leading to poor self-regulated learning and, in turn, academic procrastination. Hence, to prevent procrastination, it would be necessary to introduce asynchronous learning with some form of monitoring and control of students' efforts. To this end, more detailed understanding is needed on procrastination in asynchronous online language learning.

Procrastination in Online Language Learning

However, as mentioned earlier, studies dealing with academic procrastination in online language learning are rare. The phenomenon has not yet been fully elucidated. A higher priority for achieving future goals is to expand research to understand the certainty of its existence and the magnitude of its impact and to identify the need for interventions to substitute for in-class monitoring of students' efforts. Therefore, this study is a modified replication of Goda et al. (2015) and Li et al. (2018) among the few previous studies. Goda et al. (2015) conducted a longitudinal analysis to observe university students' online EFL learning behavior. The authors, who examined the relationship between learning behavior types and learning outcomes, found that procrastinators had lower test scores than habitual learners. Li et al. (2018) similarly examined the self-regulation behaviors of students in an online language course and found that those who procrastinated had lower final grades. These results are interesting to consider in conjunction with previous findings, which show that time spent using materials online may not be the direct cause of learning outcomes (Li & Tsai, 2017). Such studies may lead to the hypothesis that it is regular access to online materials without procrastination that instructors should intervene in, rather than the duration they spend learning with such materials overall.

While studies by Goda et al. (2015) and Li et al. (2018) are valuable and informative, they use final-course grades or post-completion test scores as indices of learning outcomes. They do not consider pre-course proficiency or explore the relationship between procrastination and proficiency growth. Since habitual learners who achieve higher scores after completing materials may have started the course with better pre-course proficiency than procrastinators, it is unclear how procrastination and proficiency growth are related. Therefore, this study reexamines the previous findings by administering pre- and post-tests and using the score increase to indicate learning outcomes. If procrastinators achieve less score growth than habitual learners in the current study, their conclusions would be reinforced.

Materials and Methods

This study examines how students in an EFL course procrastinated during an asynchronous online course and whether their procrastination influenced learning outcomes. To this end, we began by analyzing actual learning logs. Because the online materials used in this study by

default provided the course instructor with logs of the number of log-ins, total study time, time spent completing the study unit, and the moment the study unit was accessed, we used these data. We defined procrastinatory, premature, and habitual learning behaviors in an asynchronous online course by focusing on the moment of access to online materials (access points). We then examined the relationship between the types of learning behaviors and the students' pre- and post-test scores, which were used as an index to measure learning outcomes.

Pedagogical Setting & Participants

An eight-week asynchronous online EFL learning course was offered to first-year students at a national university in Japan during the fall semester. Table 1 shows the tasks which the students completed during each week. No online learning units were assigned to the first, middle week, and last two weeks as they were used for the orientation, pre-testing, post-testing, and exams. The remaining four weeks included asynchronous online materials described in more detail below. Students were assigned to complete designated learning units, perform separate vocabulary training, watch instructor-created instructional and feedback videos, and answer multiple quizzes. Completing these assigned tasks by the weekly deadline was equivalent to "attending" a face-to-face classroom setting. Due to university regulations, attendance for at least six weeks was required to receive credits.

Table 1.
Tasks for students to work on during the week

Week	Weekly Tasks
1	Pre-test, orientation, quizzes
2	Online materials, instructor-produced lecture videos, quizzes
3	Online materials, instructor-produced lecture videos, quizzes
4	Mid-term test
5	Online materials, instructor-produced lecture videos, quizzes
6	Online materials, instructor-produced lecture videos, quizzes
7	Post-test, quizzes
8	End-of-term exam

The target course is an online TOEIC preparation course similar to that found in the example of Hoang et al. (2021). The online material used in this study was the "Advanced Training for the TOEIC® L&R" provided by EdulinX. According to the EdulinX website, these materials were designed and developed for students with TOEIC® scores between 545 and 800.[1] The participating students had been studying EFL online since the spring semester, six months earlier, to achieve the university's target score of 730 or higher; those who did not achieve that goal during the spring semester took this course in the fall semester. The material was considered appropriate for the goal and adopted as the target coursework. Since there were 31 units in total, including both listening and reading, we allocated seven units to the third week and eight units to the other weeks (see Table 2). The instructors assumed that the overall material would take approximately 10–15 hours to learn. The students were asked to ensure that any unfinished weekly assignments must be completed by the end of the course.

Table 2.
Online material content and unit allocation

Week	Category	Unit Topic	TOEIC part	Week	Category	Unit Topic	TOEIC part
2	Listening	Conversations	Part 3	5	Listening	Conversations	Part 3
		Conversations	Part 3			Conversations	Part 3
		Talks	Part 4			Talks	Part 4
		Talks	Part 4			Talks	Part 4
	Reading	Text completion	Part 6		Reading	Text completion	Part 6
		Text completion	Part 6			Single and multiple passages	Part 7
		Single and multiple passages	Part 7			Single and multiple passages	Part 7
		Single and multiple passages	Part 7			Single and multiple passages	Part 7
3	Listening	Conversations	Part 3	6	Listening	Conversation	Part 3
		Conversations	Part 3			Conversation	Part 3
		Talks	Part 4			Talks	Part 4
		Talks	Part 4			Talks	Part 4
	Reading	Text completion	Part 6		Reading	Text completion	Part 6
		Single and multiple passages	Part 7			Single and multiple passages	Part 7
		Single and multiple passages	Part 7			Single and multiple passages	Part 7
						Single and multiple passages	Part 7

The asynchronous learning was divided into two phases: a learning-progress phase in which the students worked through the online material without designated completion times, and a learning-review phase in which they used the learning management system to check their learning with asynchronous but designated completion times (see Table 3). During the learning-progress phase, students were required to complete set parts of the material and learn the original word list within one week, from noon on Monday to noon the following Monday. Completing all designated sections was a condition for proceeding to the learning-review phase. The learning-review phase lasted from 8:45 a.m. to noon each Monday. The instructors sent an email to students shortly before each session to remind them to initiate the review. During these three-hour-and-fifteen-minute session, the students first watched original 20-to-30-minute EFL instructional videos prepared by the course instructors. They were then given three quizzes: the first to check their understanding of the videos, the second based on the online material content, and the third based on the listed words. The three quizzes were administered using Blackboard Learn R9.1, a learning management system, and all three contributed to student grades.

Table 3.
Procedure for completing the asynchronous learning task

Learning-progress phase
Designated time
From 12:01 p.m. on Monday to noon the following Monday
Main contents
Designated range of materials (for analysis) and original word lists (not for analysis)
Learning-review phase
Designated time
From 8:45 a.m. to noon on Monday
Main contents
Viewing of original videos, 20–30 minutes in length
Quizzes to check the students' understanding of the videos
Quizzes based on the content of online materials
Quizzes based on original word lists

There were 136 students enrolled in the course. Two students were excluded because they did not agree to provide research data, resulting in 134 participants. Students from four different educational programs participated in the study: medicine (n=49, 36.57%), dentistry (n=38, 28.36%), pharmaceutical sciences (n=25, 18.66%) and medicinal sciences (n=22, 16.42%). The ratio of male to female students is unknown, as the university does not disclose student gender.

Categorization of Types of Learning Behavior

The online learning system had a function that allowed the administrator to check the student's learning status, completion rate, and time accessed the material. With permission from the content provider, we examined the number of times the course material was accessed and those access points on a weekly basis, via learning logs that covered the four weeks of the course. This allowed us to understand students' various types of learning behavior. Our first plan was to categorize the different learning behaviors based on logs that used the same (or very similar) criteria as Goda et al. (2015). This seemed an appropriate way to accumulate research findings. However, it was difficult to apply the same or very similar criteria due to differences in the learning content and timeframe. We, therefore, devised and categorized different criteria for the four types of learning behavior in the previous study.

The four types of learning behavior and their criteria are explained below. The first type was "procrastinators." Students who procrastinate tend to put off the start or completion of the week's material until the last moment, focusing on it just before the deadline. There may be two types of students in this category, as Choi & Moran (2009) pointed out: those who actively procrastinate to improve their efficiency by taking advantage of the forced learning situation just before a deadline, and those who procrastinate simply because they cannot manage their time well enough to complete the task before the deadline. The straightforward prediction is that the former group will have better learning outcomes, while the latter will have poorer outcomes. Since students in both groups still procrastinate learning, we did not distinguish between them and defined procrastinators as students who recorded more than 70% of their logged access points within 24 hours of the deadline for each week.

While the main interest of this study was to determine what proportion of students were procrastinators and examine the impact of their behavior on learning outcomes, other groups of students, unlike the procrastinators, were expected to finish the materials early on or to study regularly and habitually. The second and third categories, "early birds" and "habitual learners," were thus established. Early birds generally complete the given materials well before the deadline (Goda et al., 2015). We defined students with this learning behavior as those who completed their materials more than 48 hours before each week's deadline and did not access the materials afterward. Habitual learners were presumed to be students who had already adapted to self-regulated learning, acquired the study habits recommended for university students, and were highly motivated to learn EFL. We defined this group as students who accessed the material for more than five days during the weekly study period.

Although more than the above three types of learning behaviors can be assumed, we decided to limit the categories to early birds, habitual learners, and procrastinators, since the purpose of this study is to examine the impact of procrastination on learning outcomes. However, it was anticipated that some students would not fit into any of the above three categories, so we defined such students as "uncategorized learners." We then counted the number of learners who fit into each of the four types and decided to present data on the learning behavior of each type.

Study Time Granted to Students and its Classification

Students had 168 hours (between the end of the lesson at noon on Monday and noon on the following Monday) to complete a specified range of material. Table 4 shows how the 168-hour timeline was delineated for analysis. The "24 hours before" column on the far right refers to the 24 hours before noon on Monday, the deadline for each week (i.e., Sunday afternoon and Monday morning); the "24 to 48 hours before" column adds the 24 hours before noon on Sunday, the day before the deadline (i.e., Saturday afternoon and Sunday morning). The timeline proceeds in this format until the "144 to 168 hours before" column. We focused primarily on the timing of access to the material in each of the seven delimitations. In Week 3, the course schedule called for a two-week study period, so the "more than one week ago" column was applied (see Table 5). Only this column covers a period of one week (168 hours). Further details in Table 5 will be discussed in the next section as it delves into the reporting of the results.

Table 4.

Timeline delimitations used in the analysis

Columns	144 to 168 hours before		120 to 144 hours before		96 to 120 hours before		72 to 96 hours before		48 to 72 hours before		24 to 48 hours before		24 hours before	
Day of the week	Mon	Tue	Tue	Wed	Wed	Thu	Thu	Fri	Fri	Sat	Sat	Sun	Sun	Mon
am or pm	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am

Results

Table 5.

Access times for seven days before the deadline for each week

Timing		Over a week before	144 to 168 hours before	120 to 144 hours before	96 to 120 hours before	72 to 96 hours before	48 to 72 hours before	24 to 48 hours before	24 hours before	Total
Week 1	n	na	67	106	44	127	184	411	984	1923
	%	na	3.48%	5.51%	2.29%	6.60%	9.57%	21.37%	51.17%	100%
Week 2	n	na	135	108	76	100	180	248	729	1576
	%	na	8.57%	6.85%	4.82%	6.35%	11.42%	15.74%	46.26%	100%
Week 3	n	583	18	20	36	49	99	129	759	1687
	%	34.20%	1.07%	1.19%	2.13%	2.90%	5.87%	7.65%	44.99%	100%
Week 4	n	na	50	49	47	136	165	243	874	1564
	%	na	3.20%	3.13%	3.01%	8.70%	10.55%	15.54%	55.88%	100%
Total	n	583	270	283	203	412	628	1031	3346	6750
	%	8.64%	4.00%	4.19%	3.01%	6.10%	9.30%	15.27%	49.57%	100%

Table 5 shows how many times the material was accessed and when it was accessed, calculating the weekly percentages to reveal overall learning behavior trends. As can be seen, around half of the participant access points are clustered in the 24 hours before the deadline. Apart from Week 3, the second most common access point was 24–48 hours before the deadline, indicating an overall tendency toward procrastination. No more than 10% of the access points in any week were recorded in the four columns indicating 72–168 hours before the deadline.

Table 6.

Number and percentage of students who fit each type of learning behavior

Behavior type	Number	Rate
Procrastinators	48	35.82%
Early birds	0	0%
Habitual learners	47	35.07%
Uncategorized learners	39	29.10%
Total	134	100.00%

Table 6 shows the number of students in each learning behavior type discussed above, in relation to the total number of students. Since none of the students fit into the “early birds” category, this learning behavior was excluded from the subsequent analysis. “Procrastinators” accounted for the largest type of learning behavior; 48 of the 134 students, or approximately 36%, fell into this category.

Table 7.
Access points by type and percentage

Type of learning behavior	Over a week before	144 to 168 hours before	120 to 144 hours before	96 to 120 hours before	72 to 96 hours before	48 to 72 hours before	24 to 48 hours before	24 hours before
Procrastinators	3.25%	0.16%	0.66%	0.58%	0.71%	1.39%	7.02%	86.24%
Habitual learners	11.21%	7.76%	8.52%	6.26%	13.16%	15.20%	17.18%	20.71%
Uncategorized learners	9.91%	3.89%	3.31%	2.42%	4.76%	12.50%	22.86%	40.35%
Total	7.98%	3.91%	4.19%	3.11%	6.25%	9.47%	15.19%	49.90%

Figure 1.
Time series display of access timing for each type

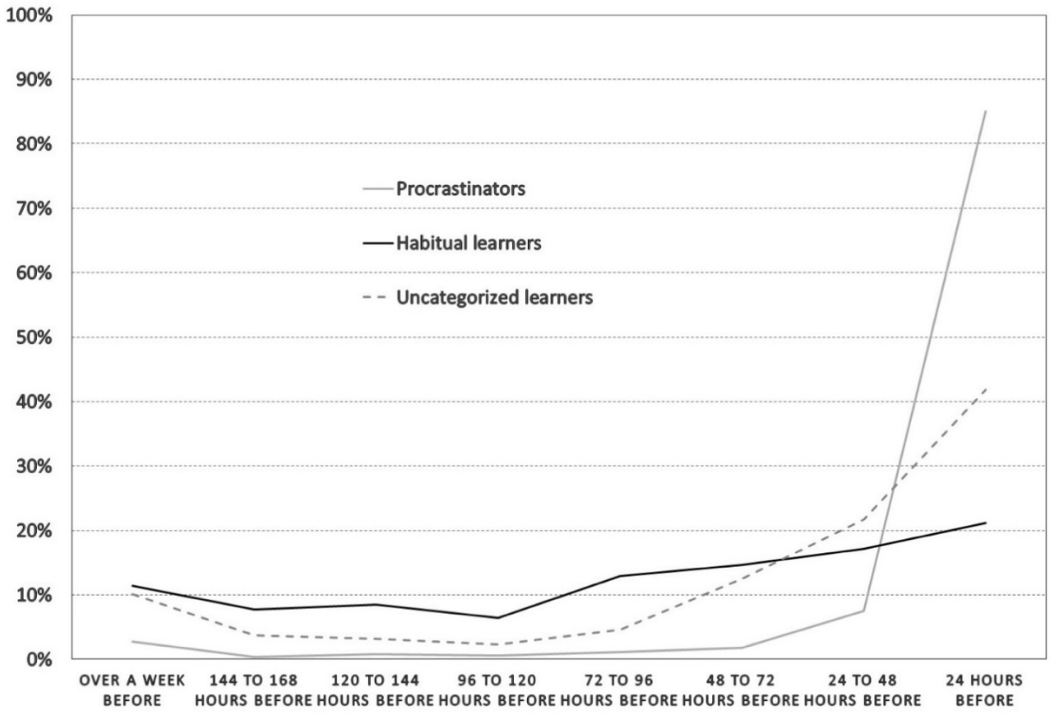

Table 7 and Figure 1 present and illustrate a time series of access points for each type of student. As Table 7 and Figure 1 show, around 86% of procrastinators' access points, on average, occurred within 24 hours of the deadline, indicating a pronounced behavioral tendency toward procrastination, when compared with the other two types. Only 7.02% of the students accessed material 24–48 hours before the deadline, while less than 1% accessed material more than 72 hours before the deadline in any column. By contrast, 47 of the 134 students (approximately 35%) fit the category of "habitual learners," with regular learning habits. As Table 7 and Figure 1 demonstrate, these students accessed the materials not only in the days immediately before the deadline, but also 120–144 hours before the deadline, and even 144–168 hours before, immediately after the previous week's deadline. In addition, 39 students (approximately 29% of the entire student group) were "uncategorized learners" who neither procrastinated nor studied consistently.

Table 8.
Pre- and post-test scores for each learning behavior type, with levels of increase

Score type	Type of learning behavior	*M*	*SD*	*SE*	95% CI		Min.	Max.
					Lowest	Highest		
Pre-test	Procrastinators	512.02	76.08	11.10	490.27	533.77	345	670
	Habitual learners	522.28	88.67	13.07	496.66	547.91	285	690
	Uncategorized learners	539.87	80.62	12.91	514.57	565.17	400	725
	Total	523.83	82.13	7.15	509.81	537.84	285	725
Post-test	Procrastinators	529.15	124.74	18.20	493.49	564.81	240	745
	Habitual learners	589.02	96.92	14.29	561.01	617.03	370	785
	Uncategorized learners	579.74	116.00	18.57	543.34	616.15	250	760
	Total	564.96	115.42	10.05	545.27	584.65	240	785
Mean difference	Procrastinators	17.13	83.19	12.13	-6.66	40.91	-205	165
	Habitual learners	66.74	80.94	11.93	43.35	90.13	-95	250
	Uncategorized learners	39.87	103.74	16.61	7.31	72.43	-190	220
	Total	41.14	90.77	7.90	25.65	56.62	-205	250

Table 8 presents the descriptive statistics, showing the pre- and post-test scores and their differences, which put the different types of learning behavior into perspective. The data had high variability when the score differences were examined in detail. Still, one procrastinator and one habitual learner were more than three times SD from the mean, suggesting that they were taking the post-test apathetically. Their scores did not reflect their proficiency. Therefore, these two students were treated as outliers and excluded from the data; their results are not included in Table 8.

Figure 2.
Changes in test scores for each type of learning behaviors

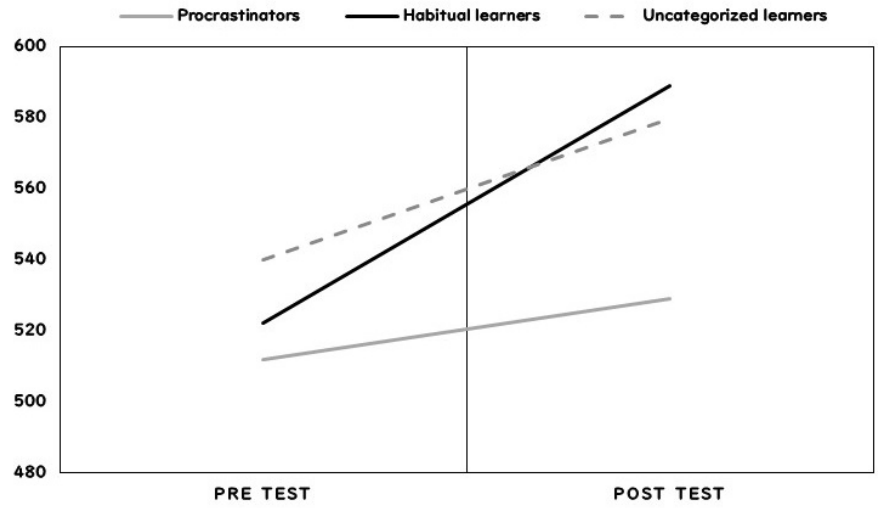

Figure 2 is a chart of the change in test scores for each learning behavior type after the exclusion of outliers. The pre-test results show that procrastinators had the lowest mean score of 512.02; habitual learners were 10.26 points higher with a score of 522.28, and uncategorized learners received the highest score: 539.87. The mean overall score was 523.83. Judging from these mean scores, the proficiency levels for each learning type are not strictly equivalent, even at the beginning of the course. Thus, this study considers score growth. In the post-test, the procrastinators increased their mean score by 17.13 points to 529.15. The score of the habitual learners increased by 66.74 points to 589.02, the largest score increase among the three groups. The score of the uncategorized learners increased by 39.87 points to 579.74. The overall mean was 564.96, an increase of 41.14 points. Although the uncategorized learners had the highest mean pre-test score, habitual learners had the highest mean post-test score and mean score increase.

Figure 3.

Box plots of the increase in test scores for each type of learning behavior

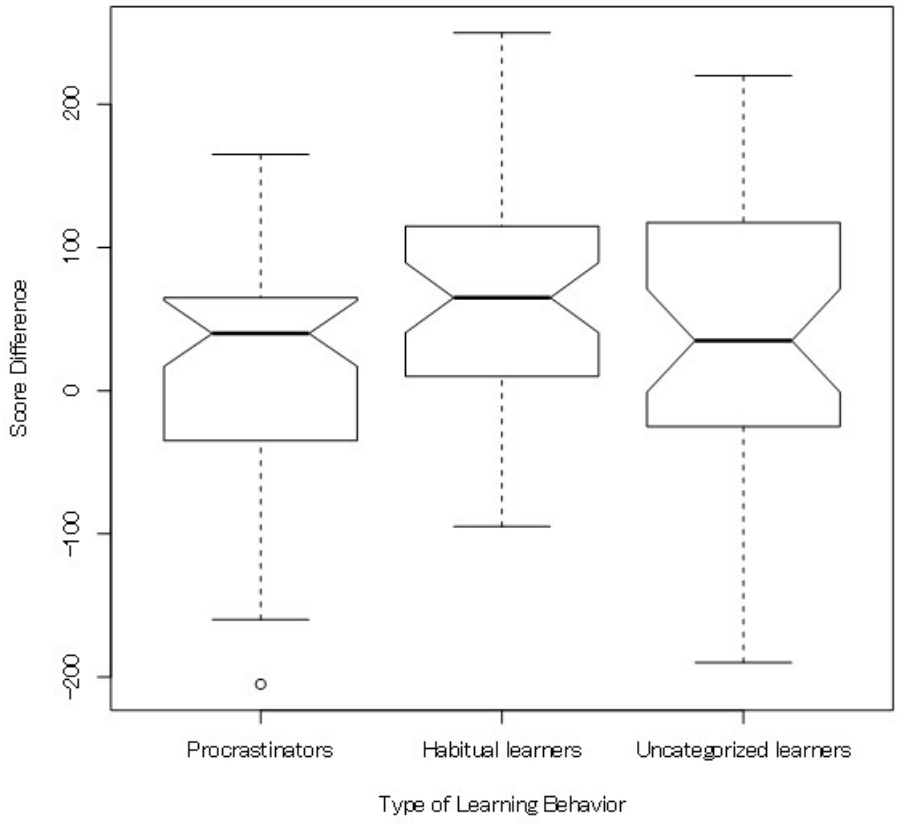

Figure 3 presents box plots of the increase in test scores for each learning behavior type. A one-way between-groups ANOVA was carried out to determine whether the difference in score growth among the three groups was statistically significant. The result showed a significant difference and a moderate effect size in the mean between the behavioral types ($F [2, 129] = 3.62$, $p = .03$, $\eta 2 = .05$). Tukey's multiple comparisons confirmed a significant difference between procrastinators and habitual learners, indicating a moderate effect size (mean difference = −49.61, $p = .02$, d [95%CI] = −0.60 [−1.02, −0.19]). However, the differences

between the procrastinators and uncategorized learners (mean difference = −22.74, p = .47, d [95%CI] = −0.24 [−0.67, 0.18]) and between the habitual learners and uncategorized learners (mean difference = 26.87, p = .35, d [95 %CI] = 0.29 [−0.14, 0.72]) were not significant and the effect sizes were small.

Discussion

In our categorization of student learning behaviors, slightly more than one-third of the students were severe procrastinators, with 86.24% of their access to the online material carried out within 24 hours of the deadline. Approximately one-third of the students were habitual learners, accessing the material more than five days a week. None of the students showed proactive behaviors, such as completing their learning more than 48 hours in advance, while the remaining students (slightly less than one-third of the group) did not fit any of the other categories. At one-third, the percentage of regular procrastinators was lower than the figure of approximately 46%–70% reported in several previous studies (Day et al., 2000; Goda et al., 2015; Schouwenburg, 1995; Solomon & Rothblum, 1984). The short course period of 8 weeks may have made it easier for the students to maintain their study habits without procrastination. This analysis has focused on the change from pre- to post-test scores. Habitual learners showed the most growth, followed by uncategorized learners and procrastinators. There was a significant difference in growth between habitual learners and procrastinators, with a moderate effect size. This indicates that the finding repeatedly reported in psychological research (e.g., Cerezo et al., 2017; Rothblum et al., 1986; Solomon & Rothblum, 1984)—that procrastination hurts learning outcomes, compared to habitual learning—was observed in this 8-week online EFL course.

Our results indicate that it would be reasonable to provide interventions to EFL students learning online to substitute in-class monitoring of the students' efforts in terms of self-regulated learning and to help them continue habitual learning and reduce their tendency to procrastinate. Such interventions must respect the benefits of asynchronous learning by allowing students to choose their own time and location for learning. Relevant interventions can be divided into two main types. The first involves the use of reminder messages. In the present study, email messages were sent to students on the morning of each weekly learning-review session to remind them when it would start, but no messages were sent to encourage habitual learning. For example, in terms of effort monitoring, the instructor could send an email to only those learners who have not yet accessed any of the materials 72–96 hours before the due date, informing them of the period's midpoint. The other option would be to establish and employ a system that offers students small rewards for logging to monitor their efforts. For example, a method of the type used in mobile freemium games, which provides rewards (in the form of in-app points) for logging in and completing units every day, and additional points for completing units every day for a week, might increase the number of students who access course materials every day. However, this strategy will take time to implement, as it involves somewhat advanced technical requirements, as well as the approval and collaboration of the content providers.

The main limitation of the present study is its inability to claim that habitual learners improved their scores more than uncategorized learners, or that procrastinators failed to improve their scores compared to uncategorized learners. In other words, this study has not proved that habitual learning alone has a positive impact or that procrastination alone has a negative effect, but only that habitual learning and procrastination, in combination with each other, can cause a difference in learning outcomes. In this study, we did not distinguish between intentional and unintentional procrastination as defined by Chu and Choi (2005). This decision might have disguised the harm of unintentional procrastination. In other words, some of the procrastinators in our study may have been learners who intentionally procrastinated, exploiting the time pressure to achieve better outcomes. If that were the case, it is conceivable that identifying and analyzing only unintentional procrastinators would have made the adverse effects of learning behavior more apparent. Furthermore, this study focused only on access points (the timing of access to the materials), without examining learning time. Learners who habitually access learning materials demonstrated higher score increases, indicating that habitual access to materials is an important consideration when examining effective language learning online. However, focusing exclusively on access points may have resulted in this limitation. We cannot guarantee that the regular access represents sufficient study time.

Given the above limitation, future researchers should conduct studies distinguishing between intentional and unintentional procrastination. While it is difficult to state how many intentional procrastinators may exist, it is conceivable that such research could reveal further insights into procrastination in learning behavior by identifying and analyzing only unintentional procrastinators. In addition, they would be well advised to focus on both access points to educational materials and overall study time. The research design should be such that access points to and study time on the materials are separate variables, and that the extent to which each has an impact on the results can be ascertained.

Conclusion

The present study has examined student procrastination behavior in an asynchronous online EFL learning environment and its impact on learning outcomes. The EFL students who engaged in online learning in the target course were roughly divided into three groups, based on the timing of their access to materials: procrastinators, habitual learners, and uncategorized learners. When their pre- and post-test scores were compared, the procrastinators were found to show significantly less growth than the habitual learners. This result, which confirms the findings of previous studies, suggests that, even in an asynchronous EFL learning environment, which offers the advantage of flexibility through anytime/anywhere learning, students need interventions to help them learn habitually and avoid procrastination. This raises the question of what type of intervention should be provided. The present study fills a gap in the literature by researching the effects of procrastination on online EFL learning and the impact on post-learning score growth, issues that have not been addressed in previous studies. However, the findings relating to uncategorized learners, who do not procrastinate but lack good study habits, leave room for further research. These issues will be explored further in future studies.

Notes

1. This information can be found at: https://www.reallyenglish.co.jp/courses/toeic-lr-800

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