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Facilitating learner reflection: online goal setting and self- evaluation in Japanese higher education

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Abstract

The aim of this study was to investigate student preferences and usage patterns of a custom web application designed for goal setting and self-evaluation, implemented within compulsory English as a Foreign Language (EFL) classes at a higher education institution in Japan. This application was introduced to support learner reflection, with the goal of enhancing student performance and reducing course repetition rates. Analysis of the web application usage data from 88 participants revealed that students choosing more challenging goals consistently rated their performance higher in self-evaluations ($p < .001$) than those opting for easier goals. Furthermore, data from closed-ended questionnaire responses showed a strong preference among students for the online platform over traditional paper-based methods for goal setting and self-evaluation ($p < .001$). While these results underscore the potential of such an approach in enhancing academic outcomes, the study's modest scale necessitates broader research for validation. Examining actual achievement data with a larger cohort would offer a more comprehensive understanding of the efficacy and broader implications of these methods.

Keywords: Goal Setting, Self-Evaluation, Web Application, Learner Reflection, Compulsory EFL

Introduction

This paper introduces a custom web application created to support goal setting and self-evaluation. Conceived as an educational aid, it aims to bolster learner reflection and subsequently enhance student performance within compulsory

English as a Foreign Language (EFL) courses at a higher education institution in Japan. Beyond just a pedagogical tool, the application is also envisioned to reduce course repetition rates by providing students with a structured platform for regular self-assessment and growth.

Embedded within the institution's Moodle Learning Management System (LMS) used by all English language teaching staff, there's an overarching ambition to further develop this application into a Moodle plugin, making it accessible to the wider Moodle community.

Using a quantitative approach, the application's usage data was analyzed over a 14-week semester to identify patterns between goal selection and students' self-evaluation scores. Concurrently, student questionnaire responses were assessed to determine preferences for the medium and method of goal setting. This investigation aims to offer a clearer understanding of how technology can assist in enhancing student self-reflection and goal setting within the Japanese EFL context.

Literature review

Goal setting and consistent reflection are integral to promoting learner autonomy and active engagement in learning, contributing significantly to lifelong learning abilities and the development of independent thinking skills (Japanese Ministry of Education, Culture, Sports, Science, and Technology, 2012). Locke and Latham's goal setting theory (GST) has seen continual evolution, largely due to its inductively derived model. GST's core principles suggest that the establishment of specific, difficult, and challenging goals provides individuals with a direction to focus their efforts and resources, thereby enhancing motivation and performance, and contributing to subjective well-being and increased learner autonomy (Latham & Locke, 2007).

Regular reflection is a crucial aspect of goal setting, enabling learners to form strategies and make necessary adjustments based on their progress toward achieving their goals. The OECD's Anticipation-Action-Reflection (AAR) cycle for 2030 provides a framework for the development of agency and transformative competencies (OECD, 2019). This model mirrors the three stages of self-regulated learning (SRL): forethought, performance, and reflection, however, while the AAR model is primarily designed to cultivate lifelong learning competencies, SRL places greater emphasis on fostering active, engaged learning.

Japanese university students are typically required to undertake approximately two years of compulsory English courses prior to graduation. Whilst students majoring in English may well be intrinsically motivated to study English, for most students taking non-elective English classes the primary motivations are the instrumental goals of course completion and gaining credit (Fryer et al., 2014; Yamamoto & Ohba, 2018). However, according to Ryan & Deci, (2000), even though goal setting is most effective when the goals arise from intrinsic motivation, extrinsic goals, like course completion, can also act as catalysts for motivation. These may subsequently transform into more autonomous forms of

motivation as students internalize these goals and begin recognizing the inherent value of learning.

While globally lauded as a technological nexus, Japan's digitalization lags, ranking 23rd in global digital competitiveness (IMD World Competitiveness Center, 2022). However, the Covid-19 pandemic forced Japanese higher education institutions (HEIs) to expedite technological integration (Crawford et al., 2020). Changes such as the shift to emergency remote teaching have resulted in improved technological infrastructure and more advanced digital literacy among both teachers and students. Although levels of digital competency can vary greatly among individuals (Reddy et al., 2020; van Deursen et al., 2016), the increased familiarity of 21st-century learners with digital mediums provides educators with an opportunity to leverage technology to support learning. Despite some predictions of a regression to pre-pandemic levels of technological integration in Japanese HEIs (Lavolette, 2022), an alternative perspective posits that the pandemic merely catalyzed overdue technological advancements, and these changes may persist, at least in part.

Given this evolving landscape of technological integration in Japanese higher education and the recognized importance of goal setting and reflection in learning, this study seeks to investigate student preferences for and patterns of interaction with a custom web-based application for goal setting and self-evaluation within the context of compulsory EFL courses.

Method

The web application

The web application specifically designed to support learners at the institution where this study was situated offers students the ability to set and evaluate their goals within three distinct categories:

- 1 Basic/advanced goals:** These represent instrumental, course-related objectives, composed by the instructor. Students choose between a 'basic' or more demanding 'advanced' variant of each goal.
- 2 Challenge goals:** These are optional goals emphasizing deeper, more immersive English study methods and interactions. These too are formulated by the instructor.
- 3 My goals:** This category allows students the autonomy to devise their own English-related goals, expressed either in English or Japanese.

Table 1 displays the goal categories and specific goal text used in this study.

Table 1

Goal categories, and goal text

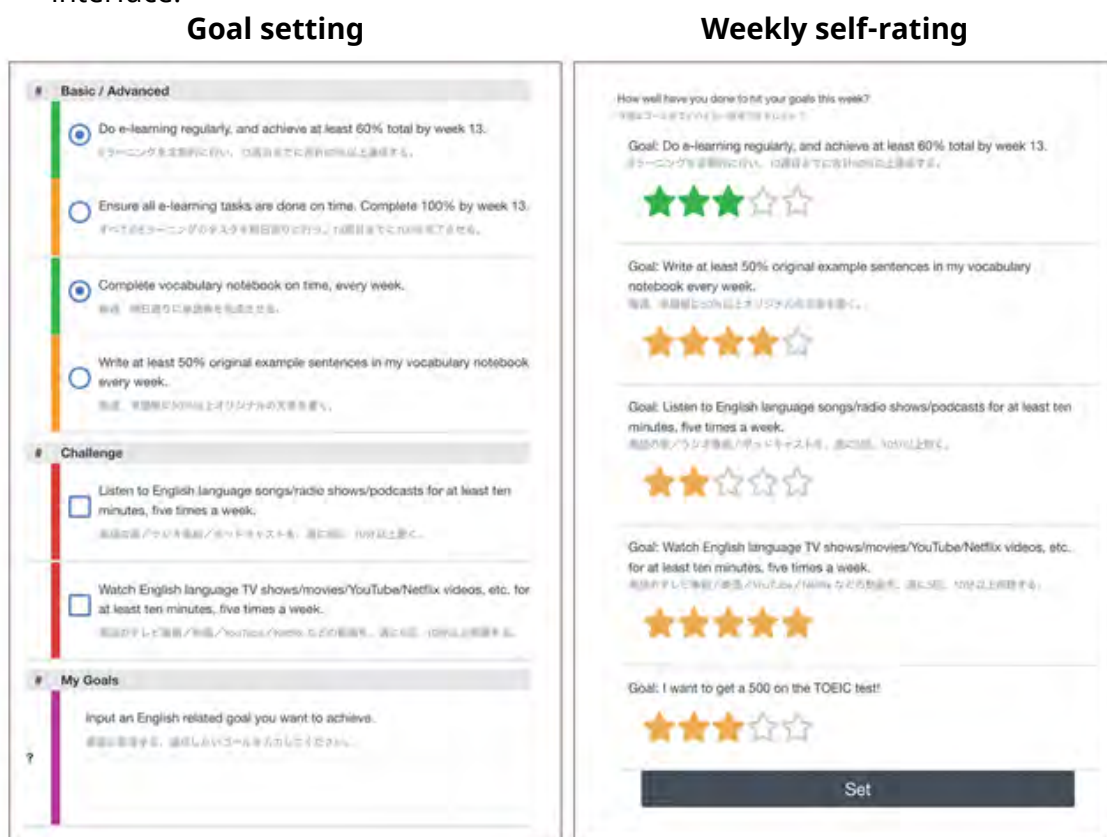
Goal category	Goal text
Basic	Complete vocabulary notebook on time, every week.
Advanced	Write at least 50% original example sentences in my vocabulary notebook.
Basic	Score at least 60% in weekly word tests.
Advanced	Score at least 90% in weekly word tests.
Basic	Complete speaking tasks using the scripts provided. Dialog duration at least 30 seconds.
Advanced	Write an original dialog based on the example dialog in each speaking task. Dialog duration at least 1 minute.
Basic	Do e-learning regularly, and achieve at least 60% total by week 13
Advanced	Ensure all e-learning tasks are done on time. Complete 100% by week 13.
Challenge	Watch English language TV shows/movies/YouTube/Netflix videos, etc. for at least ten minutes, five times a week.
Challenge	Listen to English language songs/radio shows/podcasts for at least ten minutes, five times a week.
Challenge	Read English language blogs/articles/magazines/books for at least ten minutes, five times a week.
Challenge	Attend English language events every week, e.g. English Discussions.
My Goals	"Input an English-related goal you want to achieve."

The 'basic/advanced' goals are proximal and performance-centric, tied directly to the course's graded components that undergo assessment at regular junctures during the semester. These tiered goals facilitate differentiation: while the 'basic' goals serve as foundational markers for achieving a passing grade, the 'advanced' ones steer students toward improved performance. On the other hand, 'challenge' goals promote extracurricular immersion in English through various mediums, fostering deeper engagement with the language outside the classroom. 'My goals' grant students the flexibility to create individualized objectives, capturing their unique aspirations in their own words.

Students set their goals in class 1 of the semester. At the end of each class, they accessed the web application—predominantly via smartphones—to self-evaluate their weekly achievements using a star-based system, spanning from 1 to 5 stars. This rating pertained to each goal selected by the instructor as relevant for that week. To give students a degree of freedom of interpretation, a precise rubric wasn't provided; however, the self-evaluation procedure was exemplified by the teacher during an introduction to the application, drawing parallels from their own Japanese learning journey. This modeling was seen as important, giving students a window into their teacher's language learning pursuits, and helping to

create an atmosphere of openness around learning. The application was integrated with other online class resources within the institution’s Moodle LMS, enabling students to conveniently self-evaluate at each session’s conclusion. Both students and teachers could refer to a goal review history page, which displayed students’ previous self-ratings. To ensure comprehensive understandability for all users, the interface is bilingual, enabling teachers and students alike to operate in the language they are most comfortable with. All Japanese text within the application was crafted with the assistance of native Japanese staff to guarantee accurate translations. Examples of the goal setting and self-rating student interface are shown in Figure 1 below.

Figure 1
Examples of goal setting and weekly self-rating pages from the student interface.



Aims

The primary aim of this study was to investigate student preferences concerning the format and their usage patterns of a custom web-based application designed for goal setting and self-evaluation.

Three key hypotheses underpin this research:

- 1 Preference for online over paper-based methods:** As the transition from traditional paper-based academic methods to digital tools continues, this study seeks to determine if Japanese students in a compulsory higher education EFL learning environment favor a web application for goal setting and self-evaluation over conventional paper-based approaches. All students who took part in the study had used paper-based goal setting in the semester immediately prior to the study, so were in a distinct position to make this comparison. It is hypothesized that there will be a marked preference for the online method.
- 2 Guided over self-written goal setting:** It is postulated that students will lean towards guided goal setting—with educator involvement—over independently crafting their goals. This proposition aims to highlight the potential influence of scaffolding and teacher guidance on student engagement with the goal-setting process.
- 3 Interplay between goal setting and self-evaluation:** This hypothesis suggests that students setting more ambitious goals might perceive and evaluate their achievements more positively than those with more moderate objectives. The intention is to explore the potential influence of goal setting on students' self-evaluations of progress in language learning.

Testing these hypotheses will contribute to the field of EFL pedagogy, particularly in the context of digital educational tools, and provide insights into enhancing student engagement and outcomes through goal setting and self-evaluative practices.

Sample

This research involved eighty-eight first-year and second-year students, enrolled in compulsory EFL speaking and listening courses at a higher education institution in Japan. Prior to the study, at the end of the first semester of 2022, participants undertook the Visualizing English Language Competency (VELC) test, which converted their performance into equivalent Test of English for International Communication (TOEIC®) scores. The cohort's average TOEIC® score, derived from the VELC test, was 375. According to the Educational Testing Service (ETS), this score situates the students within the 225-545 range, correlating with the Common European Framework of Reference for Languages (CEFR) A2 level (Tannenbaum & Wylie, 2019). This proficiency is basic and falls short of enabling full academic study in English or extensive interaction with English media.

Ethical considerations

In compliance with the ethical standards set by the Japan Society for the Promotion of Science (JSPS, 2015), informed consent was obtained from all participants. They were apprised of the study's aims, and the methods employed, and assured of their voluntary participation with the right to withdraw at any point without consequences. To protect participants' privacy, all collected data were de-identified

and securely stored. Personal details, such as names, are excluded from any published materials associated with this research.

Instrumentation

In the study, two distinct data collection tools were employed to gain a deeper understanding of student usage patterns and their perceptions.

1. System Usage Data. The primary data source was the system usage data, which was continuously recorded over a span of 14 weeks. This was done to comprehend the intricacies and dynamics of how students interacted with the online goal setting application. This specific data offered insights into different aspects, such as the kind of goals students selected—whether they were ‘basic’ or ‘advanced’, ‘challenge’, or ‘my goals’.

For the analysis, this data was processed using JASP, a statistical analysis software. While a part of the analysis was descriptive, shedding light on patterns of goal selection and self-ratings, the Mann-Whitney U test, a non-parametric method, was also used. This test helped in pinpointing statistically significant disparities in self-ratings between students who opted for ‘basic’ goals in contrast to those who chose ‘advanced’ goals.

2. Student Questionnaire. Towards the end of the course, specifically during classes 13 and 14, a supplementary data collection tool was introduced in the form of a student questionnaire. The primary objective of this questionnaire was to understand student experiences and preferences, especially concerning the medium and format of goal setting. The questionnaire itself consisted of two central closed-ended questions and several open-ended questions. The open-ended responses have been thoroughly discussed in a separate qualitative study (Emerson, 2024). The first key question sought to determine the student’s preferred medium for goal setting and self-evaluation, offering the options: online, paper, or no specific preference. The following question aimed to discern their preference for the format of goal setting. Here, students could opt between composing their own goals, choosing from predetermined basic or advanced options, or indicating no specific inclination. The detailed items and choices presented in this questionnaire are listed in Table 2.

Table 2

Closed-ended questions from the questionnaire conducted at the end of the study.

Item	Options		
Which did you prefer, goal setting and self-evaluation on paper or online?	Online	Paper	No preference
Would you have rather written your own class-related goals, or do you think it's better to have goals as a choice between basic and advanced?	Self-written	Basic/advanced	No preference

In terms of analysis, the closed-ended responses from the questionnaire were categorized as categorical data. Initial analysis employed chi-square tests of independence to identify any significant patterns or preferences among the participants. However, due to the deviation from a normal distribution in the data, non-parametric Wilcoxon signed-rank tests were later utilized to provide a more comprehensive comparison.

By converging insights from both these data collection tools, the study aimed to provide a comprehensive understanding of student behavior and perceptions surrounding goal setting and self-evaluation in the context of language learning. Having established the foundation and methodology of this research, the subsequent section will explore results derived from the student interactions with the web application and their responses to the questionnaire. This will provide insights into their preferences, the efficacy of the tool, and any emerging patterns.

Results

Web application

Following the conclusion of the study, the data derived from the web application was systematically analyzed to discern patterns in goal selection and self-evaluations. As depicted in Table 3, a higher proportion of 'basic' goals (57.7%) were selected by students as compared to 'advanced' goals (42.3%). A total of 111 'challenge' goals were selected, with a substantial majority of the cohort (75 out of 88 students) opting for at least one 'challenge' goal. Additionally, a majority of the students (77 out of 88) chose to construct an original 'my goal'. On a weekly basis, participants rated themselves on a scale of 1-5 for the goals that were deemed relevant to that week's class by the instructor. A comparative analysis of self-ratings for each goal type over the 14-week period of the study was conducted to discern emergent patterns in the dataset.

Table 3

Goal categories selected.

Goal type	Goals set	Average rating (mean)	SD
Basic	203	3.31	1.61
Advanced	149	3.85	1.42
Challenge	112	3.34	1.51
My goal	77	2.70	1.40

Given the stipulation that all students were required to select either ‘basic’ or ‘advanced’ goals for each of the four goal categories, a non-parametric Mann-Whitney U test was conducted to compare self-ratings for ‘basic’ and ‘advanced’ goals. The test, detailed in Table A2 in the Appendix, indicated a statistically significant difference ($p < .001$) between the self-ratings of students who selected ‘advanced’ goals and those who opted for ‘basic’ goals, with a small effect size. On average, self-ratings were 0.54 higher for ‘advanced’ goals compared to ‘basic’ goals. To further investigate this relationship between goal levels and self-ratings, a comparison was conducted between students who selected all ‘basic’ goals and those who selected all ‘advanced’ goals. This analysis, shown in Table 4, involved another Mann-Whitney U test (detailed in Table A3 in the Appendix) and revealed a greater divergence in self-ratings. On average, self-ratings were 1.41 points higher among students who selected all ‘advanced’ goals compared to those who selected all ‘basic’ goals. This difference was statistically significant ($p < .001$), and the effect size was moderate. This implies that students who set higher-level goals tend to self-evaluate more positively than students who opt for lower-level goals.

Table 4

Self-ratings for Students who Selected all ‘Basic’ Goals or all ‘Advanced’ Goals.

Goal type	Goals set	Average rating (mean)	SD
All basic	68	2.92	1.57
All advanced	48	4.33	1.22

An exploration of the optional ‘challenge’ goals, as shown in Table 5, illuminated the relative popularity of the ‘Watch English’ and ‘Listen to English’ goals, with more than half of the students opting for at least one of these two goals. Conversely, ‘Read English’ and ‘Attend English’ emerged as less favored choices.

Table 5

'Challenge' goals selected.

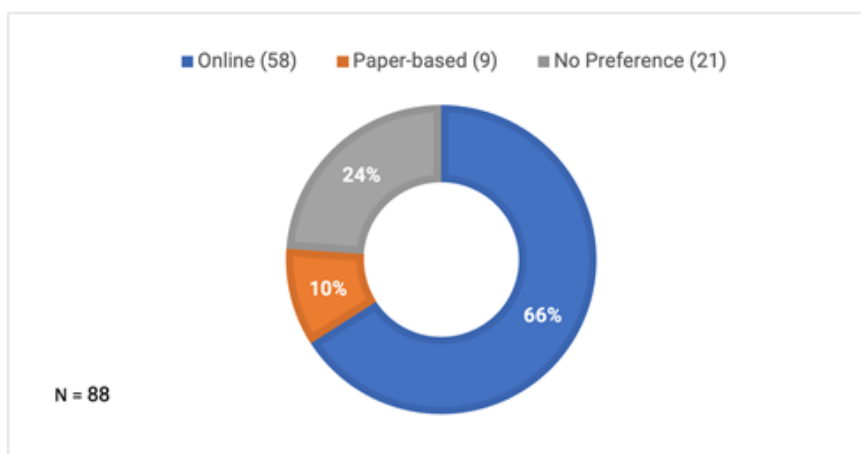
Goal	Goals set	Average rating (mean)	SD
'Watch English'	54	3.44	1.48
'Listen to English'	46	3.43	1.53
'Read English'	11	3.17	1.49
'Attend English'	1	0.65	0.48

Questionnaire

A questionnaire was deployed in classes 13 and 14 of a 14-week semester to the cohort of 88 students participating in the study. All participants responded to the questionnaire (students who were absent from class 13 were asked to complete the questionnaire in class 14). Participants were solicited for their preferences regarding the medium used for goal setting and self-evaluation. An initial examination of the resulting data, as depicted in Figure 2, revealed a stark differential. A chi-square test for independence ascertained a statistically significant divergence ($p < 0.001$), prompting a more comprehensive analysis. Given that the data deviated from normal distribution, non-parametric Wilcoxon signed-rank tests were subsequently employed to compare the responses. The most salient finding, as detailed in Table A3 in the Appendix, identified a statistically significant ($p < 0.001$) preference among students for 'online goal setting' ($M = .66$, $SD = .48$) as opposed to 'paper-based goal setting' ($M = 0.10$, $SD = .30$). The effect size for this difference was moderate.

Figure 2

'Which did you prefer, goal setting and self-evaluation on paper or online?'

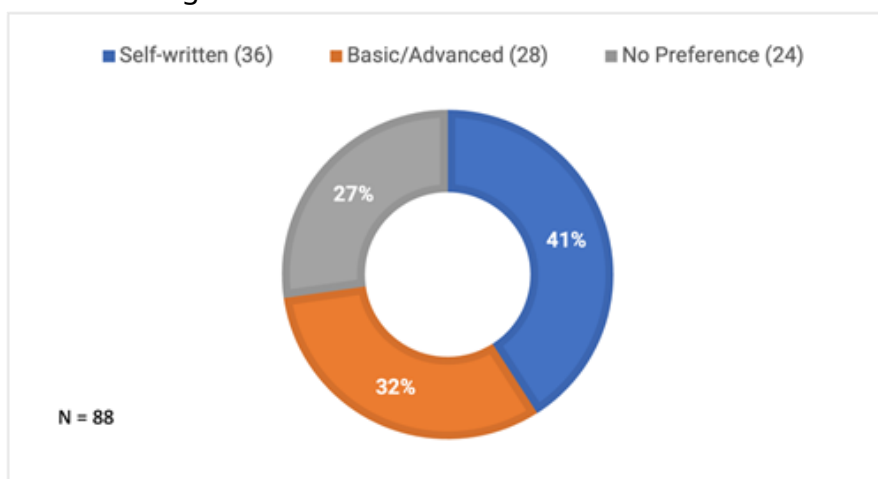


An additional query within the questionnaire sought to ascertain student preferences for the format of goal writing. Figure 3 displays the distribution of responses,

with the chi-square test of independence revealing no significant difference in preferences for self-written goals versus 'basic'/'advanced' goal setting options.

Figure 3

'Would you have rather written your own class-related goals, or do you think it's better to have goals as a choice between basic and advanced?'



Discussion

This study investigated the effectiveness of a novel web application for goal setting and regular self-evaluation designed to support learning in EFL speaking and listening classes at a Japanese higher education institution. Insights were derived from both system usage data and student feedback on preferred methods and mediums for goal setting.

Examination of questionnaire responses revealed no significant statistical divergence between participant preferences for guided and self-written goal setting strategies. This outcome contradicts the initial hypothesis, which anticipated a stronger preference for guided goal setting amongst students. The results suggest that a blended approach, merging both strategies, might hold considerable potential.

Locke & Latham's (2019) retrospective on GST provides illuminating insights on the topic of assigned versus self-set goals. According to them, the primary value of self-set goals isn't so much in heightened motivational effects but in the cognitive processes triggered when individuals set their own goals. Engaging deeply in thought and planning allows learners to better comprehend their aspirations, strengths, and areas for improvement, nurturing a sense of dedication to their learning journey. Conversely, assigned or guided goals, especially crucial in educational settings, offer a straightforward roadmap to success. Such goals help students traverse their learning paths without feeling daunted and enable educators to convey learning objectives directly, ensuring student endeavors align with overarching educational goals.

In the project examined, a diverse approach to goal setting was adopted,

merging aspects of both assigned and self-composed goals. This strategy integrated choice within a given framework, introduced optional predefined goals, and provided for wholly self-authored ‘my goals.’ Endeavoring to harness the merits of both self-written and guided methods, this approach aspired to strike an equilibrium, promoting learner autonomy while still offering structured guidance.

However, the data, indicating no marked preference for either self-written or guided goal-setting strategies, doesn’t conclusively endorse this mixed method as superior. Instead, it invites further contemplation on the potential advantages of such an approach, underscoring the necessity for continued research.

As anticipated, students exhibited a distinct preference for the digital format over conventional paper-based methods for goal setting and self-evaluation. Several factors might influence this preference, including the digital platform’s user-friendly design and accessibility. The digital medium’s convenience—allowing goal setting, tracking, and updating on commonly used devices—offers a flexibility paper-based methods can’t replicate.

Moreover, this predilection for digital tools aligns with the prevailing societal inclination towards digitalization, particularly pronounced among younger generations. Educators, however, should differentiate between general technological acceptance and genuine digital literacy. Adopting new technologies isn’t always intuitive, and practitioners must provide proper guidance. Given the current digital landscape, students tend to prefer seamless tech solutions that enhance both their academic endeavors and broader life pursuits. Thus, educators need to continually innovate, adapting their teaching methods to keep them relevant.

Shifting to a more technologically integrated learning environment also offers an opportunity to refine data collection techniques. Digital tools don’t merely streamline data acquisition and organization; they allow for more sophisticated analysis, culminating in deeper insights into student learning paths. This data-driven approach equips educators to offer more tailored guidance, though effective tool utilization requires deliberate implementation and continuous support. Within the context of this study, both students and teachers being able to see a history of performance self-ratings in combination with grading data offered a comprehensive view of learning progress. This combined perspective furnished a more nuanced and accurate portrayal of a student’s educational trajectory.

A closer look at the web application’s usage data unveiled a notable trend: students setting ambitious ‘advanced’ goals often gave themselves more favorable evaluations than those selecting ‘basic’ goals. This pattern mirrors the principles of GST, with Latham & Locke (2007) positing that ambitious goal setting can elevate performance. This observation also aligns with studies like Ross (2006) that correlate self-evaluation with academic accomplishment. Despite the majority of compulsory EFL learners lacking intrinsic motivation (Fryer et al., 2014), the role of goal setting within this context needs to be recognized, as it holds the potential to increase motivation and accelerate language acquisition.

The original motivation for creating the web application at the core of this study was to foster student reflection with the intent to bolster performance and

reduce course repetition instances. However, through the inclusion of optional non-course related 'challenge' goals, and personalized 'my goals' the application offered a personalized goal setting medium that could adjust to meet the needs of a variety of learner profiles – from those merely wanting to know how to gain credits, to the students who felt some intrinsic motivation to study English.

Broadly, this data emphasizes the significance of cultivating a learning atmosphere where students are encouraged to set ambitious targets. Additionally, creating a space conducive to reflection that aligns with modern learning habits is paramount. Setting specific, challenging goals can enhance students' self-perception and academic advancement. Regular self-evaluation offers students an avenue for reflection on their progress that runs parallel to their standard lines of assessment. Digital platforms, such as the one employed in this study, serve as valuable tools that educators can harness to support students' goal-setting endeavors. By providing students with a flexible platform for goal setting and tracking, digital tools can significantly boost learner autonomy, empowering students to delineate their learning goals and chart their own progress.

Limitations

While the study yielded several insights, it's imperative to recognize its limitations. The research was predominantly practice-oriented, with the principal practitioner also serving as the lead researcher. This arrangement increases the potential for bias. To mitigate possible distortions in future research, consideration should be given to methods that reduce this overlap. Furthermore, the use of convenience sampling, as opposed to a more systematic approach like probability sampling, may constrain the generalizability of the findings. Given that there were 88 participants, the scale of the study, especially for a quantitative investigation, could be considered modest. A larger sample might have provided more compelling data. The questionnaire's design was simplistic, and employing a validated instrument for measurement could have offered finer resolution in the responses. Therefore, extrapolating these findings to broader contexts should be undertaken with caution.

Future directions

For a more comprehensive understanding, subsequent studies would benefit from situating the program within an experimental design. Incorporating both pre- and post-study evaluations and considering actual achievement data alongside self-evaluation metrics could offer a clearer depiction of the effectiveness of such goal setting platforms. A more expansive participant demographic is recommended. The evaluation tools could be bolstered by adopting established scales focusing on aspects like learner reflection, motivation, and engagement. Before the program's full deployment, these scales should undergo rigorous pilot testing to ensure their accuracy and applicability. Additionally, involving a larger participant group is crucial, as a more extensive sample invariably reinforces the reliability of the study's outcomes.

Conclusion

This research examined student preferences concerning the mode and medium of goal setting within compulsory EFL classes at a higher education institution in Japan. A salient observation was that students who opted for more challenging goals routinely evaluated their performance more favorably. This implies a potential relationship between the ambition of goals set and the learners' self-assessment of their progression.

A marked preference emerged for the digital platform for goal setting over traditional paper-based methods, resonating with the broader pedagogical movement towards integrating technology in education. This shift toward the greater utilization of digital tools not only reflects current student inclinations but also accentuates the imperative for educational systems to evolve in tandem with these predilections.

However, it's pivotal to approach the findings with an understanding of their context-specific nature. While they offer valuable insights, broader inquiries are essential for a holistic grasp of goal setting and self-evaluation in EFL contexts in higher educational settings in Japan. Comprehensive research endeavors should aim to test the ideas that emerged from this study in order to draw more encompassing conclusions.

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Appendix

Table A1

Independent samples t-test comparing ‘basic’ and ‘advanced’ goal self-ratings

	W	p	Rank-biserial correlation	SE rank-biserial correlation	95% CI for rank-biserial correlation	
					Lower	Upper
Self-rating	871980	8.233×10 ⁻¹⁶	0.188	0.024	0.142	0.234

Note. For the Mann-Whitney test, effect size is given by the rank biserial correlation.

Note. Mann-Whitney U test.

Table A2

Independent samples t-test comparing self-ratings for students who selected all 'basic' goals or all 'advanced' goals

	W	p	Rank-biserial correlation	SE rank-biserial correlation	95% CI for rank-biserial correlation	
					Lower	Upper
Self-rating	138571.5	3.858×10 ⁻⁴⁰	0.492	0.039	0.431	0.549

Note. For the Mann-Whitney test, effect size is given by the rank biserial correlation.
Note. Mann-Whitney U test.

Table A3

Paired samples t-test comparing student preferences for goal setting and self-evaluation medium

Measure 1	Measure 2	W	z	df	p	Rank-biserial correlation	SE rank-biserial correlation	95% CI for rank-biserial correlation	
								Lower	Upper
Online	Paper-based	1972.0	5.203		< .001	0.731	0.140	0.576	0.836
Online	No preference	2320.0			< .001	0.468	0.129	0.249	0.642
Paper-based	No preference	139.5	-1.913		0.029	0.492	0.039	0.431	0.549

Note. Wilcoxon signed-rank test.

Author bio

Nicolas Emerson received his Master of Education with distinction from Plymouth Marjon University, UK, in 2013. His research interests include learner development, educational technology, and the potential of artificial intelligence in supporting collaborative learning in the language classroom.