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Investigating self-beliefs and success for English medium instruction learners studying finance

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ABSTRACT

English is increasingly being used as a medium instruction in business education at the tertiary level, with its growth fueled by university internationalization. As a result, many students enrolled in English medium business programs are learning through a second or foreign language, with variant levels of prior knowledge and experiences. This raises questions over the impact these factors have on students' ability to succeed. This paper reports on an investigation of the extent that English language proficiency, mathematical ability, English self-efficacy, mathematical self-efficacy, experience overseas, and gender predict success in studying finance in English at a university in Japan.

KEYWORDS

English medium instruction;
finance; self-efficacy

Introduction

In recent decades English has become the dominant lingua franca of business and for education in business. Much of the growth of English in business education is driven by the global rise in English medium instruction (EMI) in higher education. EMI is defined as “the use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language (L1) of the majority of the population is not English” (Macaro, 2018, p. 19). Growth in EMI has been fueled by internationalization, as many business programs switch to English as a way to improve the global competitiveness of its graduates. Due to the strong connections between globalization and business, business education has become one of the largest EMI disciplines in higher education (Sandström & Neghina, 2017), with more and more students choosing English-medium business degrees in non-Anglophone countries.

While previous EMI research has explored the language-related challenges associated with learning social sciences and hard sciences in a second language, little research has explored functional disciplines in business which are quantitative in nature, such as accounting, economics, and finance, in which a combination of linguistic and mathematical knowledge might account for success in education. Some empirical evidence suggests that proficiency in mathematics

plays a role in determining academic success in introductory finance courses in Anglophone universities (Akimov, Kobinger, & Malin, 2018; Didia & Hasnat, 1998; Pritchard, Romeo, & Saccucci, 2000). However, less is understood about the role of mathematical knowledge in success in EMI contexts, where achievement may be underpinned by a myriad of factors. This study fills this gap in its investigation of predictors of student success in an English medium finance course at a private Japanese university. The study particularly explores the interplay between English proficiency, mathematical skills, and self-efficacy—a psychological construct that has been closely linked to educational success in EMI (Thompson, Aizawa, Curle, & Rose, 2019). The results of the study have implications for improving the educational experience in similar EMI contexts. As Akimov et al. (2018) observe “investigating the determinants of student success can help with better course design, adaptation of teaching techniques and program improvements” (p. 223).

Literature review

EMI is rapidly expanding in higher education institutions worldwide, with significant growth in recent decades in Europe and East Asia (Macaro, Curle, An, Pun, & Dearden, 2018). Recent statistics show there

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was a fifty-fold growth in English-taught bachelors programs in Europe over a period of eight years (from 55 in 2009 to 2,900 in 2017), with the greatest proportion of programs (>26%) offered in the field of business and management (Sandström & Neghina, 2017). In Japan, EMI has been actively encouraged via a string of aggressive government initiatives to internationalize higher education, but this trend has been accompanied by several challenges associated with the lower relative English proficiency of the general student population (Aizawa & McKinley, 2020). A growing concern of the EMI phenomenon is student preparedness to undertake education in English, which is especially concerning due to many programs having no centralized language proficiency requirements for admission.

In the discipline of business education, some European studies have suggested that non-native English-speaking business students are not disadvantaged by learning through the medium of English (e.g., Dafouz, Camacho, & Urquia, 2014; Hernandez-Nanclares & Jimenez-Munoz, 2017). However, Richards and Pun (2021) note a difference in typology of EMI between established programs in Europe and “late-starting” EMI programs in Japan, in which students have to adjust quickly from learning English as a foreign language in high school to using it as a medium of education in university. Indeed, studies in Japan have suggested that business students of lower proficiency experience severe academic language-related challenges (Aizawa, Rose, Thompson, & Curle, 2020). These challenges may impede students’ academic performance. These issues necessitate an exploration of the influences of success in EMI. That is, how much does language proficiency matter for students to be successful in English medium business programs? And how much do other factors play a role in determining higher performance in such programs?

Predictors of EMI success

A growing body of research has begun to explore factors that predict student success in EMI business educational settings. Thus far, studies have identified a range of factors, including English language proficiency, gender, language support, prior success in the study of content via the first language, and self-beliefs.

One investigation of an *International Business* course in Japan found that students’ English language proficiency predicted about 26% ($\Delta R^2 = 0.257$, $p < .001$) of the variance in their business exam scores

(Rose, Curle, Aizawa, & Thompson, 2020). A similar investigation of a *Business Management* course in China put this figure at 30% ($\Delta R^2 = 0.304$, $p = .0199$) (Xie & Curle, 2019). Both studies indicate that while language proficiency may have a significant influence on success, it is not the only factor that matters.

The study by Thompson et al. (2019) highlighted the important role of language support programs on EMI success—a conclusion also reached by researchers of EMI in Korea (Chang, Kim, & Lee, 2017). Gender has also been highlighted as a potentially influential factor on students reasons to undertake EMI (Macaro & Akincioglu, 2018), but we as of yet do not fully understand the role of gender on success in such programs. A recent review of EMI research by Curle, Şahan, Jablonkai, Mittelmeier, and Veitch (2020) has further highlighted the influence of prior success of learning through English on future EMI endeavors. In Japan, one study found that students with prior English-medium experience in high-school experienced significantly fewer challenges in their English medium courses at university (Aizawa & Rose, 2020).

Recent educational research has also explored the influence that learner psychology has on EMI success (e.g., motivation and self-efficacy). While language learning motivation has been widely established as a strong predictor of success in language education (Dörnyei & Ryan, 2015), it has not been found to be a significant predictor of success in business educational contexts (Rose et al., 2020; Xie & Curle, 2019). In contrast, self-beliefs—defined here as a perceptions of one’s own competence—has been highlighted as important in determining EMI success. A recent study of students encountering their first English-medium course in a bilingual business degree in Japan found self-efficacy to be a significant predictor of success in exam performance (Thompson et al., 2019). Generally, there is a strong body of research indicating that self-efficacy beliefs influence academic achievement, as learners with strong self-beliefs of capability may be more likely to expend effort to achieve academic success (Hackett & Betz, 1989; Pajares, 1996).

Gaps in previous research

Our study aims to fill three gaps in previous research into indicators of success in business education. First, a limitation of past studies is the range of subjects investigated. Specifically, most subjects have been heavily reliant on language, such as *international business* or *business management* courses. Little research

has explored functional disciplines in business which are quantitative in nature, such as finance, in which a combination of English knowledge and mathematical knowledge might account for success (Akimov et al., 2018; Dida & Hasnat, 1998; Pritchard et al., 2000).

Second, few studies have investigated the potential influence of different types of self-beliefs (e.g., toward studying via EMI versus toward the study of mathematics), indicating a need for further exploration of additional factors that may influence student success in mathematically oriented subjects. As a result, predictors of student success for the study of finance via EMI may be dependent on different factors, such as self-beliefs and prior experience with mathematics, rather than self-beliefs surrounding the use of academic English language alone.

Finally, this study addresses a need for more EMI research outside of Europe, especially in rapidly emerging contexts. EMI in Europe has a longer history—spurred by student mobility programs like ERASMUS, and supported by a globalized, integrated economic community. Business contexts like Japan differ from Europe, and are characterized by lower levels of English proficiency, and greater resistance to the adoption of English in corporate settings (Harzing & Pudelko, 2013). An investigation of EMI in a Japanese context allows us to better understand how business students can be best supported in environments where English does not have a strong structural or historical link within higher education.

Design of the study

The current study addresses the following research questions:

1. To what extent does English language proficiency, mathematical ability, English self-efficacy, mathematical self-efficacy, experience overseas, and gender predict success in studying finance via English?
2. How do students perceive a relationship between English language proficiency, mathematical ability, self-efficacy (Mathematics, English) and success in EMI?

This study was carried out with students from a college of business at a private university in Tokyo. Participants were completing an introductory finance course, offered in English, as an elective course for 2nd to 4th year students. The total enrollment for the course was 101 students. Of these, a total of 87 students agreed to participate in the study by completing

an online battery of educational measures during the first week of the program. This battery comprised of a questionnaire of demographic items encompassing gender, study abroad experience, and their self-reported highest score on the Test of English for International Communication (TOEIC). The TOEIC is an internationally recognized English language proficiency test with two sections (listening, reading) administered by the Education Testing Service (ETS) with a maximum score of 990. The battery also included four mathematical self-efficacy (SE_MATH) items adapted from Nielsen and Moore (2003), and four English self-efficacy (SE_ENG) items adapted from Thompson (2018), measured on a 7-point Likert scale (see Appendix 1). To gauge proficiency in mathematics (arithmetic) the battery also included an eight question mathematics pretest (MATH) for a maximum score of eight points. It included questions on ratios, factoring, graphing a straight line, averages, and summation consistent in level and content with the tests provided by Ballard and Johnson (2004). The construct of success was measured via an average score taken from students' midterm and final test scores (TEST) with a maximum score of 100. The midterm and final comprised of multiple choice and short numerical answer questions. After omitting incomplete observations from 15 students who did not complete the mid-term and final test of the course (i.e., our measure of success), we analyzed a sample of 72 students (40 male, 32 female).

To examine research question 1, we regressed the composite midterm and final test scores (TEST) on TOEIC, MATH, the self-efficacy scores for English (SE_ENG) and mathematics (SE_MATH), and a dummy variable for gender (GENDER) taking on a value of 1 for female and 0 for male. We estimate the following model:

$$\begin{aligned} \text{TEST}_i = & \beta_0 + \beta_{\text{TOEIC}} \text{TOEIC}_i + \beta_{\text{MATH}} \text{MATH}_i \\ & + \beta_{\text{SE_ENG}} \text{SE_ENG}_i + \beta_{\text{SE_MATH}} \text{SE_MATH}_i \\ & + \beta_{\text{GENDER}} \text{GENDER}_i + \varepsilon_i \end{aligned} \quad (1)$$

where ε_i is the error term for the i th student. The descriptive statistics and correlations between these

Table 1. Descriptive statistics ($n = 72$).

	<i>M</i>	<i>SD</i>	<i>MAX</i>	<i>MIN</i>
TEST	62.38	19.62	97.43	20.51
TOEIC	810.41	91.24	990	530
MATH	5.44	1.68	8.00	2.00
SE_E	4.72	0.99	6.75	2.25
SE_M	4.52	1.42	7.00	1.00

variables are summarized in Table 1 and Table 2. The regression estimates are summarized in Table 3.

To examine research question 2 and enhance the significance of our quantitative analyses, we carried out semi-structured interviews with six students (see Table 4). English was the primary language used (i.e., prompts were presented to participants in English), however as the interviewer is a functioning English-Japanese bilingual, both participants and the interviewer occasionally used Japanese words (e.g., *keiei* meaning management) and terms (e.g., *zemi* meaning seminar class) which were translated to English for transcription. Interviews were voluntary, which led to a gender imbalance in our sample, with all six interviewees being female. Due to the potential lack of saturation in sampling, we are cautious to interpret interview findings as exploratory, rather than representative of the entire class cohort. Despite this limitation, we include these analyses as they highlight patterns emerging between students based on their experiences overseas and their perceptions of capability.

Interviews were recorded for transcription and a qualitative content analysis (see Selvi, 2020) was carried on the interview data set to explore themes in student responses regarding the relationship between success, English language, mathematical ability, and self-efficacy beliefs. Following a “directed” approach (Hsieh & Shannon, 2005), our qualitative content analysis started with preparation (reading and re-reading the interviews), then organization using themes generated beforehand based on the research questions and prior research (e.g., perceived difficulty/capability of

learning via English; perceived difficulty/capability toward math; perceived success in EMI) which were combined into categories when they represented a pattern in the data set.

Results

(1) To what extent does English language proficiency, math ability, English self-efficacy, math self-efficacy, and gender predict success in studying finance via English?

As shown in Table 1, student English ability ranged from 530 to 990 on the TOEIC, indicating a wide divide in English ability between students. Using Tannenbaum and Wylie’s (2019) conversion table, this equates to a range from A2 (i.e., a basic user of the language) through to the C1 level (i.e., a proficient user of the language) on the Common European Framework of Reference for Languages (CEFR) levels. There are no minimum English language requirements in place preventing students with lower English ability from taking classes. Equally, the student scores on the mathematics pretest (MATH) indicated a wide range in ability with a maximum of 8 (100%), a minimum of 2 (20%), and mean score of 5.44 (68%). The self-efficacy data suggests that students were marginally more confident in their English capability in comparison to their perceptions of mathematics ability,

Table 2. Correlations between variables ($n = 72$).

	TEST	TOEIC	MATH	SE_E	SE_M
TEST	1				
TOEIC	0.29*	1			
MATH	0.32*	0.29*	1		
SE_E	0.04	0.20	0.05	1	
SE_M	0.18	0.07	0.41**	0.35**	1

* $p < .05$; ** $p < .01$.

Table 4. Interview participants.

NAME	GENDER	STUDIED ABROAD	TOEIC	CEFR	FINANCE GRADE
Student A	Female	No	720	B1	A
Student B	Female	Yes	945	C1	C
Student C	Female	No	920	B2	D
Student D	Female	Yes	825	B2	A
Student E	Female	No	925	B2	S
Student F	Female	No	895	B2	S

(1) CEFR levels were calculated using Tannenbaum and Wylie’s (2019) CEFR mapping tool, using the highest TOEIC score that the participant had achieved during their studies; (2) At the institution, the highest passing grade is ‘S’ (>90%), followed by A – C, while D represents a failing grade below 50%.

Table 3. Summary of regression analyses via time abroad.

Variables	All Students	Lived Abroad	Not Lived Abroad
Constant	1.17 (0.53, 0.957)	41.90 (1.38 0.181)	-26.05 (0.97, 0.335)
TOEIC	0.05 (2.04, 0.045)*	-0.006 (0.19, 0.852)	0.10 (3.26, 0.002)**
MATH	2.34 (1.52, 0.133)	1.23 (0.52, 0.609)	2.32 (1.32, 0.195)
SE_E	-0.86 (0.37, 0.727)	-8.73 (1.89, 0.072)	0.24 (0.09, 0.928)
SE_M	1.58 (0.84, 0.401)	10.75 (3.47, 0.002)**	-1.04 (0.52, 0.604)
GENDER	3.83 (0.84, 0.403)	23.00 (3.39, 0.003)**	-3.30 (0.65, 0.519)
Adjusted R^2	0.10	0.42	0.24
Observations	72	27	45
BPG F-stat (p-value)	0.36 (0.87)	0.33 (0.89)	0.87 (0.51)

Parenthesis (t-statistic, p-value); * $p < .05$; ** $p < .01$; BPG is the Breusch-Pagan-Godfrey test for heteroskedasticity (p-value in parenthesis).

although this difference was not statistically significant.

Correlations between variables indicate statistically significant positive relationships between test scores, English language ability, mathematics ability, and mathematical self-efficacy (see Table 2). Although there was a weak positive relationship, perceived self-efficacy toward the use of English was not found to have a statistically significant relationship with success in the Finance course.

To explore the predictive relationships of these variables on students' test scores in finance, regression analyses were conducted. The regression coefficient estimates are summarized in the first column of results in Table 3. For the full sample of 72 students, we find that only the TOEIC score has a positive and statistically significant impact on finance test performance.

To explore for the effect of previous study abroad experience, we then divided the sample into students who have studied and/or lived abroad for more than a month ($n=27$) against those students who did not have international experience ($n=45$). To test for a structural break in the data we employed a Chow Test (F-test) and found a statistically significant structural break between the subsample which lived abroad and those who have not lived abroad ($F(6, 60) = 4.51$ ($p < .01$)). The regressions are shown in Table 3. The results revealed a difference in how factors interplay with success for the two groups; self-efficacy in mathematics plays an important role determining performance for the cohort who studied abroad prior to entering college. One initial interpretation was a presumption that the study abroad students may be more uniformly proficient in English, which allows their perceptions of mathematical ability to influence their performance to a greater extent. On the other hand, for students who do not have international experience (i.e., have less experience studying content via English), it appears that English ability is the primary factor influencing success in the Finance class. However, analysis of proficiency differences between the two groups revealed no statistically significant difference in proficiency scores (TOEIC). This indicates that study abroad may contribute to success in a way that may be independent of proficiency. Gender was only a significant factor for the group with international experience, indicating that female students in this group significantly outperformed male students when accounting for all other variables.

(2) How do students perceive a relationship between English language proficiency, mathematical

ability, self-efficacy (mathematics, English) and success in EMI?

Our analysis of interview data supported the quantitative findings by highlighting an interaction between English language ability and perceptions of self-capability (i.e., perceived efficacy) for students in the course. First, all interviewees discussed the importance of English capability as a necessity for success. For example, Student D (CEFR B2, A grade) explained that "I think many students did not understand the class contents because some students are not good at English," while Student F (CEFR B2, S Grade) revealed that "not everyone understands English very well, so students always teach each other, like something they didn't understand, every week or before the test." Secondly, all participants tended to underestimate the importance of mathematical ability. For example, Student A (CEFR B1, A grade) explained that she was initially more concerned about her English ability, but finally realized that "mathematics was the difficult point for me." Similarly, when discussing the relative importance of English language and mathematics ability, Student C (CEFR B2, D grade) revealed that "math has a bigger impact."

Relating to English ability, two further patterns emerged which link to our regression findings. The four students who had been not been abroad focused on the importance of English language capability (i.e., in support of the link with English ability and success). Each of these participants discussed specific concerns related to their English language capability; each of the four students mentioned the challenge of interacting with the "difficult vocabulary" (Student C, CEFR B2, D Grade) required for "understanding math and English, at the same time" (Student E, CEFR B2, S Grade). Furthermore, the two students with lower (comparative) language proficiency both perceived a need to further improve their English ability. To illustrate, Student A (CEFR B1, A grade) explained that while she was able to study in English, she realized that her friends with higher proficiency "seemed like, more comfortable than me," concluding that "I have to learn English more." Similarly, Student F (CEFR B2, S grade) revealed that she "overestimated my English ability" as the vocabulary and language required was more "expert" than she anticipated.

In contrast, the two students who had been abroad both explained that they saw no personal challenge in learning via English, but rather their success was defined by their mathematical ability and capability to interact with finance theory. For example, Student B (CEFR C1, C grade) explained that "it didn't feel like

I was taking a class in my second language ... it's not like it was hard for me, like 'Ah, I'm learning this in English,' so, yeah, it was just the math part." Despite having a slightly lower level of English ability, Student D (CEFR B2, A grade), expressed a similar lack of anxiety toward studying via English, stating "I was not worried" about English, rather that she lacked confidence at the start of the course, because "I'm not good at math and in high school I didn't do really difficult math." Thus, these qualitative results support our quantitative findings that language proficiency was only a predictive factor of success for those students who had not lived abroad or who had no prior experience learning through English.

Discussion

Our results have shown that both preexisting mathematical ability (as measured by our mathematical pretest) and preexisting language proficiency (as measured by TOEIC) are highly correlated with success in this EMI context. This points to the importance the prior attainment of basic levels of content and English knowledge to undertake mathematically-oriented EMI business courses. In the regression analysis of the total student sample, language proficiency was the sole significantly predictive factor of success, indicating its central importance. This result echoes the findings of previous research into English medium business administration and international business courses of the importance of general proficiency for EMI success (Rose et al., 2020; Xie & Curle, 2019), but also points to the potential role that mathematical knowledge plays in finance courses. In future research, a more precise measure of mathematical knowledge might allow for greater precision in regression analyses.

Taken together, the patterns emerging from our regression analyses and interview findings indicate that the studying of finance via EMI is a very different experience for those students who have previous international study experience. While learners with overseas experience perceived far fewer language difficulties, academic language challenges remained important for those with less experience. These findings concur with those of Aizawa and Rose (2020), which also pointed to the importance of previous EMI experiences in lessening the perceived difficulties associated with learning through English as a foreign language.

This relationship was also prevalent in the regression findings, which revealed that the predictive

factors of success in the finance course were different for the groups who had lived or studied abroad. For students who had no prior international experience, language proficiency was the only significant predictor; for students with prior language experience, this predictive ability dissipated in favor of the constructs of mathematical self-efficacy and gender. A possible explanation is that student who have lived abroad may be at or above a proficiency threshold where it no longer exerts an effect on their success in EMI—at which point other factors come into play. Students with no international experience may rely more heavily on their language proficiency to "get them through" English medium courses successfully. This notion is supported by previous EMI research in business which has observed a strong relationship between language-related challenges and proficiency (Aizawa et al., 2020).

The findings surrounding self-efficacy and gender warrant further investigation to fully understand them. While gender has been previously found to be a significant determiner of motivational differences to undertake English medium studies (Macaro & Akincioglu, 2018), our results are the first to highlight its predictive power of success for some EMI students. It might be the case that female business students in our research context benefited more from their international experiences, heightening their ability to succeed. Overseas experience may have also had an effect on students' self-efficacy, perhaps to a greater degree for female students. Both hypothesized were not possible to explore in further detail in our sample, but might be of interest to future researchers.

Implications and limitations

Exploring the factors underpinning student success in EMI can help teachers to design better courses, adopt more appropriate teaching approaches, and improve program curricula (Akimov et al., 2018). Thus, based on our findings, some cautious implications can be drawn for business education in this context, which may also be applicable to similar EMI contexts.

First, as this study and previous studies have demonstrated that general language proficiency is predictive of success, English medium programs might consider implementing language proficiency benchmarks for entry into English medium programs. In the absence of benchmarks, programs might consider integrating English language support classes into the program to better prepare students for English medium study.

Second, basic mathematical ability had a medium correlation with test scores in our data, indicating that prior mathematical knowledge might help students do better in mathematically-oriented business subject like finance. This finding points to the fact that nonlinguistic abilities in the subject-related discipline may also play an important role in EMI. Thus, business programs might want to consider how basic knowledge can be developed before students undertake EMI. This could be in the form of foundation courses related to the subject, or ensuring students have had access to core concepts in prior education, ideally in their first language.

Third, our study has pointed to the important role of mathematical self-efficacy and gender for students with international experience. Although it was not possible to unpick this finding in our qualitative data, which consisted of all female students (of which only two had overseas experience), this result points to the value of including subject-specific self-efficacy measures in future EMI research. Previous studies have highlighted a poor fit of “transplanted” language-related measures of learner psychology for EMI research (e.g., Xie & Curle, 2019), and have suggested more subject specific measures be used. Our findings have highlighted the benefits of using measures such as mathematical self-efficacy for the studying of finance.

Our study is limited by the number of participants and potential sampling bias. Although a total of 72 participants allowed us to conduct regression analyses, one limitation of our sample size is that it could only identify strong effects. It could be possible that other factors may have been significant predictors of success, but were not revealed as such due to a lack of statistical power. Further studies are needed to continue exploring the relationship between success in EMI study on a larger scale.

Equally, as we interviewed each of the students who volunteered to participate, the potential of self-selection (e.g., stronger motivation, higher English language level) may limit the the conclusions that can be drawn from these interviews. Although this group represented a range of grades (from D to S) and some variation in English language ability, our participants were generally operating in the B2 to C1 proficiency range and were all female. Thus, while we were able to gain some insights into the perceptions of students toward language ability, self-beliefs, and their success in the finance class, further research would benefit from insights from a wider range of participants. Specifically, our findings also indicated that females

with international experience outperformed their male counterparts in our research context, but we cannot ascertain the reasons from our qualitative data. Thus, future studies utilizing interview data should expand the range of participants by including a greater number of males and those from the lower end of English ability.

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Appendix 1. Survey items

Each of the below were measured on a 7-point Likert scale (1 = No confidence at all, 7 = completely confident)

EMI Self Efficacy items (adapted from Thompson, 2018)

In order to help you achieve a high grade in this class (i.e., A or S), how confident are you that you can effectively perform each of the following tasks using English?

1. Participate in class discussions.
2. Understand the textbook content.
3. Complete the assignments and tests.
4. Understand the lecture materials presented by the instructor.

Math Self Efficacy (adapted from Nielson & Moore, 2003).

In order to help you achieve a high grade in this class (i.e., A or S), how confident are you that you can successfully perform each of the following mathematics/ arithmetic tasks?

1. Work with decimals.
2. Work with fractions.
3. Work with square roots.
4. Sketch a curve.