English and Career Planning: A Case for Students in the School of Environmental Science and Engineering

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Abstract: One of the goals of the School of Environmental Science and Engineering at Kochi University of Technology is to foster communication and language skills and to apply that knowledge into practice in society. To fulfill this goal, the majority of undergraduate students enroll in English language courses during their first year of study. The CASEC English Test is currently used to objectively measure students' English language skills, and is administered at the beginning and end of their first year. In this particular study, the correlation between language proficiency and GPA was examined from 73 Environmental Science and Engineering students who took the test twice in 2019. In the first quarter of 2021, when the students were entering their third year, 59 students in a Career Plan 1 course in the school of Environmental Science and Engineering responded to a questionnaire about their English study. The results of this study indicated that English proficiency improved over the first year of English language instruction, and a weak but significant correlation was found between the end-of-the-year CASEC and GPA scores. Furthermore, the survey results suggested that although students perceived English as an important skill, the majority of the respondents were not currently making efforts to improve their English skills and few indicated interest in using English in their future careers.

1. Introduction

The impact of COVID-19 on the economic situation in Japan will continue to affect company hiring procedures for years to come. The current undergraduate students are now facing an uncertain future as they embark on their job search journey. More students in Japan are starting to think creatively about how to better position themselves to land a successful job within a company. One possible skill that could set successful job seekers apart from the competition is English communication ability.

The focus of this paper is to investigate the relationships between Kochi University of Technology students' performance and interest in English, their overall GPA and their attitudes of the importance of English for em-

ployment.

The data from this study was collected from students in the School of Environmental Science and Engineering, since many of these students are taking courses on career development skills and therefore this group would potentially be thinking about their future careers and what aspects of their education play an important role in determining their success in finding a rewarding job position.

1.1 English Placement and Proficiency Test

The majority of undergraduate students at Kochi University of Technology complete at least two English courses during their first year. To assess all incoming students' English abilities and to place them in a level to best de-

velop their English skills, students are divided into three or four English proficiency levels based on their results of a standardized English placement test. Students take the English placement test at three different times during their undergraduate study — at the beginning of their first year, at the end of their first year and at the end of their second year of undergraduate study.

1.2 CASEC Test

CASEC (Computerized Assessment System for English Communication) is a standardized English proficiency test based on research by both the Eiken Foundation of Japan and the Japan Institute for Educational Measurement, Inc. The Oubunsha Group is currently developing and administering CASEC as an online computerized adaptive English proficiency test. CASEC is composed of four sections with the highest score for each section set at 250 points bringing the total to 1000 points. The CASEC English test is used as both a placement test and a general English proficiency level check at Kochi University of Technology.

1.3 GPA

GPA (Grade Point Average) scores are used to measure and to assess learners' overall performance each quarter during a school year. A GPA score itself is a non-negative number ranging from 0 to 4. According to a survey report [1] published from a commissioned project by the Ministry of Education, Culture, Sports, Science and Technology, GPA scores are utilized for study support in 424 schools (83%) out of surveyed 511 schools. One example use in the School of Environmental Science and Engineering, is to analyze the past GPA track record of a student in contrast with the average GPA scores from the same grade students within the same department.

For the students who have multiple CASEC scores, we were interested in analyzing corresponding GPA changes in order to determine the strengths of the correlations that these metrics have.

2. Research Questions

There are two questions to address in this report:

1. What relationships exist, if any, between students' GPA scores and their CASEC English test scores? In other words, do students who excel in general undergraduate coursework studies also have better En-

glish language skills?

2. What are engineering students' attitudes toward English and employment? Specifically, are students motivated to learn English for better job prospects?

Section 3 of this report analyzes possible correlations or relationships between CASEC and GPA scores to answer the first research question. Section 4 summarizes survey answers to address the second research question.

3. Data Analysis for 2019 Data

3.1 Surveyed Students

An analysis of changes in CASEC and GPA scores was conducted for a set of students who entered the school of Environmental Science and Engineering in 2019. In their first school year, students took the CASEC test twice — in Q1 and in Q4. The number of eligible students was 73. It should be noted that, in the former CASEC test, 95 students participated. However, 22 students (approximately one-fourth of the former test takers) did not complete the latter CASEC test.

3.2 GPA and CASEC Scores

In this study, the raw data from both the Q1/2019 CASEC and the Q1/2019 GPA scores are respectively normalized to have the mean equal to 0 and the standard deviation equal to 1. In addition, the raw data from Q4/2019 are similarly normalized using the parameter values from the first normalization to ensure that the Q4/2019 data are centered and scaled in the same manner as the former normalization. Therefore, time lapse analyses can be performed using a common metric scale.

Figure 1.(a) shows the CASEC score distributions from Q1/2019 and Q4/2019 in an overlaid manner. Their score distribution crossplot is presented in Figure 1.(b). Similarly, Figure 1.(c) shows the same overlay for GPA scores and their corresponding GPA crossplot is shown in Figure 1.(d). In Table 1, descriptive statistics for CASEC scores and GPA scores from Q1/2019 and Q4/2019 are respectively tabulated.

According to Table 1, the mean value of the CASEC score increased by 0.17 points. This rise in performance can also be seen in Figure 1.(a) — the number of students who fell into the range exceeding 1.2 increased, while the number of students with scores below -1.2 decreased. By contrast, the GPA scores suffered a small decline by -0.06. This phenomenon is also shown in Fig-

ure 1.(c) as a loss of high performers especially in the (normalized) GPA range exceeding 2.0. This GPA-score depression that appeared during the Q1–Q4/2019 period is typically observed within the School of Environmental Science and Engineering student population.

It should be noted that every skewness value has a negative value in Table 1. This means that the distributions in Figures 1.(a) and 1.(c) are moderately skewed left; the left tails remain. The CASEC skewness values increased from Q1/2019 to Q4/2019, which implies that the number of students in the left tail decreased. In contrast, the skewness values from the GPA scores decreased, which shows that the number of low performers increased.

To address the first research question, the Pearson Correlation Coefficient test was used to determine if the participants' GPA scores correlate with the CASEC English test scores. In Figures 2 and 3, the CASEC scores and the GPA scores are plotted with a linear model, including an estimate of a 95% prediction interval. The results in Figure 2 show a small positive correlation for Q1/2019 (the value of R, or the coefficient of determination, is 0.209, and the P-value is 0.0756, which is greater than *0.05*); suggesting that we are unable to determine if any correlation exists between the CASEC scores and the GPA scores at the beginning of the first year (Q1/2019). Notice that here the value of *0.05* is the significance level for the percent confidence level of 95%. However, as can be seen from Figure 3 for Q4/2109, the R and P values are 0.303 and 9.15×10^{-3}, respectively; suggesting that there was a tendency that students with a higher GPA also scored higher on the CASEC English test, and vice versa.

Further data analysis was performed on the relationship between variations in the CASEC scores and the GPA scores over the Q1–Q4/2019 period. In Figure 4, the lateral-axis indicates the CASEC-score variations from Q1/2019 to Q4/2019 and the longitudinal axis similarly indicates the GPA-score variations over the same period. In addition, a set of data points and their linear model are depicted including an estimate of a 95% prediction interval. As seen in Figure 4, a very small correlation of $R = 8.29 \times 10^{-2}$ with a P-value of 0.485, which is greater than *0.05*, is observed between the CASEC-score variations and the GPA-score variations. This suggests that we are unable to determine if any correlation exists between the CASEC-score variations and the GPA-score variations.

Table 1. Descriptive statistics of CASEC and GPA scores. The raw data from both the Q1/2019 CASEC and the Q1/2019 GPA scores are respectively normalized to have the mean (μ) equal to 0 and the standard deviation (σ) equal to 1. In addition, the raw data from Q4/2019 are similarly normalized using the parameter values from the first normalization.

	CASEC (n=73)		GPA (n=73)	
	Q1/2019	*Q4/2019*	*Q1/2019*	*Q4/2019*
μ	0.0000	0.1703	0.0000	-0.0550
σ	1.0000	1.0589	1.0000	0.8578
skewness	-0.3247	-0.2227	-0.0892	-0.1914
R-value	0.8104		0.8638	
P-value	3.788×10^{-18}		7.919×10^{-23}	

As we have reported above, the data analysis of the CASE English scores and the GPA scores acquired in 2019 revealed that:

- the 73 students in the School of Environmental Science and Engineering had English training in 2019 and improved English proficiency at the end of the first-year training, and
- the correlation between the CASEC English scores and the GPA scores was found to be weak but significant in Q4/2019.

4. Results from 2021 Survey

This section outlines the results of the survey that was administered to the third-year undergraduate Environmental Science and Engineering students at Kochi University of Technology in Q1/2021. See Figure 5 for the list of survey questions and their answers. This survey was conducted by way of the Career Plan 1 course in the KUT LMS Moodle site. In total, 59 students out of 74 enrolled in the course responded to the survey.

4.1 Survey Question Results

From the results of the first item, we can see that most undergraduate students take the two available English courses during their first year — *English Projects* (54 out of the 59 responses) and *Reading/Listening* (57 out of the 59 responses). There was a large drop in participation in the second year English classes (28 enrolled in *Present-*
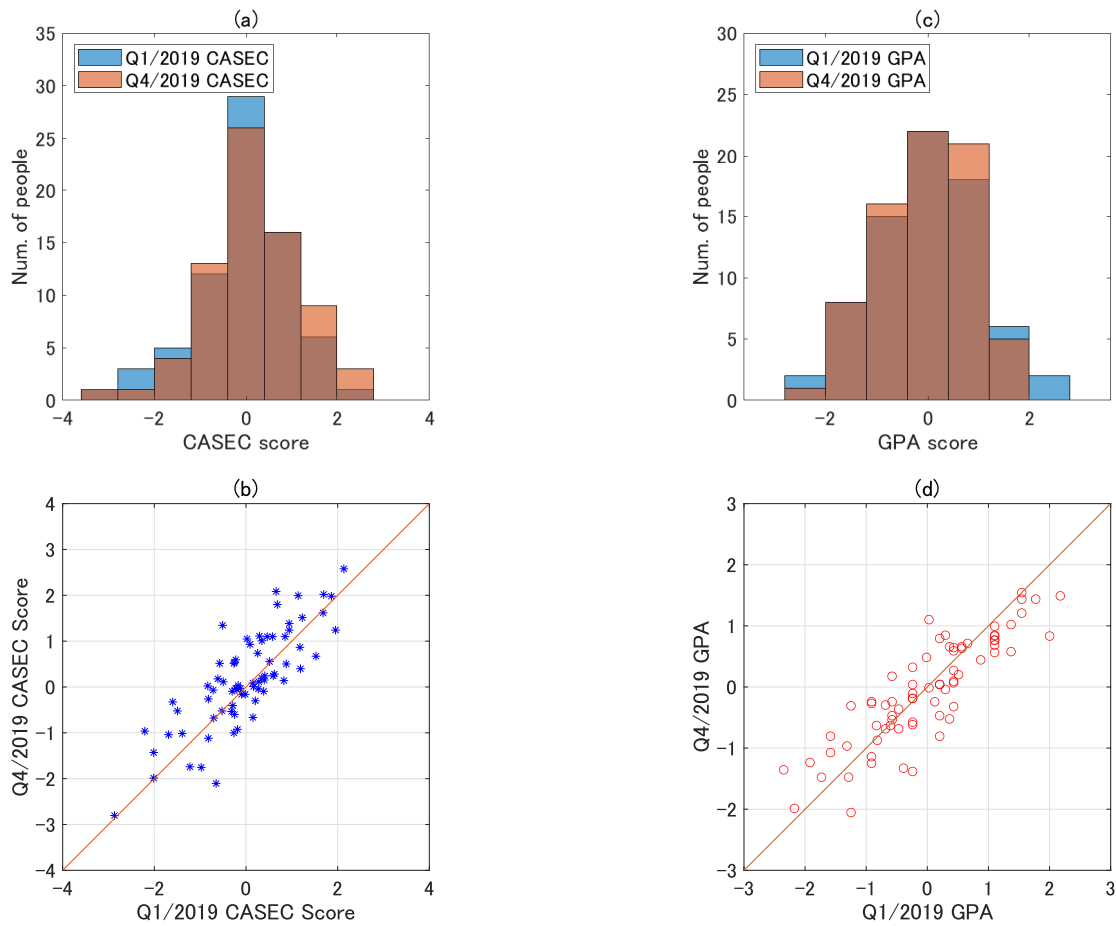
Figure 1. CASEC scores ($n = 73$) from Q1/2019 and Q4/2019 in an overlaid histogram (a) and their crossplot (b). Similarly, GPA scores ($n = 73$) in an overlaid histogram (c) and their crossplot (d).
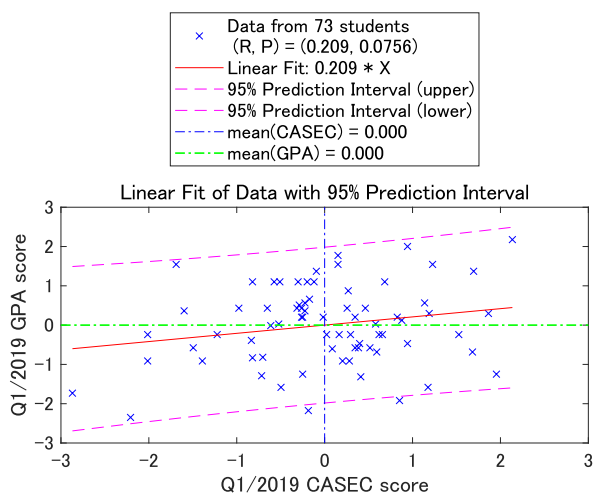

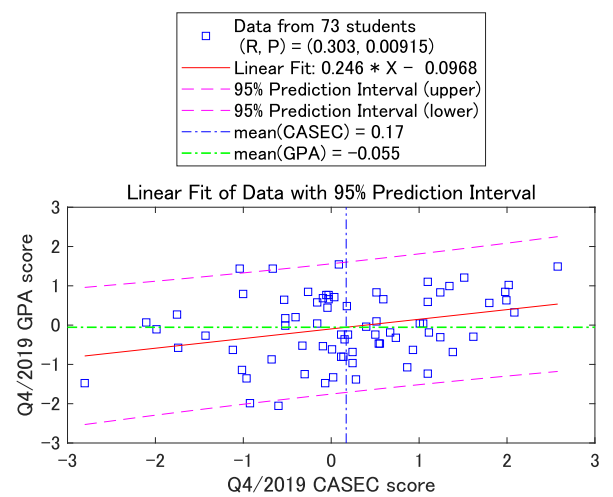Figure 2. Crossplot of CASEC and GPA scores ($n = 73$) from Q1/2019.

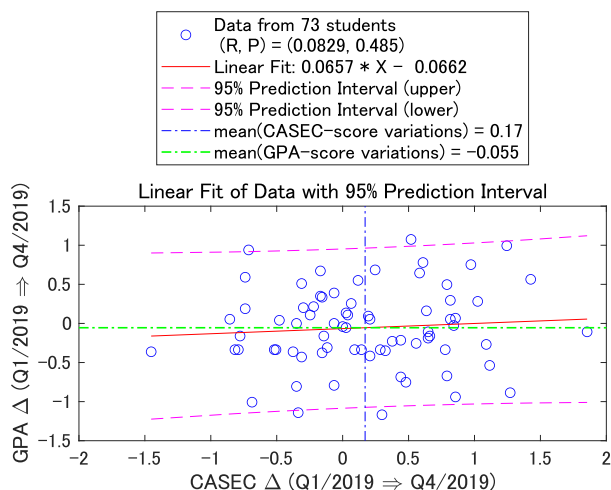Figure 3. Crossplot of CASEC and GPA scores ($n = 73$) from Q4/2019.

Figure 4. Crossplot (*n* = 73) of CASEC-score variations and GPA-score variations from Q1/2019 to Q4/2019.

ing Ideas and 34 enrolled in *Reading Workshop*).

In question 2 of the survey, students were asked which courses they felt were most useful for their future careers. The most popular choices were *English Projects* with 23 responses and *Presenting Ideas* with 18 responses. Students viewed *Reading/Listening*, with 11 responses, and *Reading Workshop*, with 6 responses, as less useful for their future careers.

From the results of questions 3-4, we found that 22 students (37%) took the TOEIC test in the past and 37 students (63%) never took the TOEIC test. Out of the students who took TOEIC, most took it only one time, while a few students responded that they took TOEIC two or more times. The mean self-reported TOEIC score, from the 14 students among the 22 TOEIC takers, was 388 out of 990. Only 2 students, from within these 14 students, scored above 500.

Questions 5-9 revealed that 88% of the respondents feel that English will be necessary in their future job and 87% of the respondents thought English was an important skill for their job placement. 95% of the students considered English language skills are a beneficial asset to finding a better job, but only 15% responded that they were interested in working in a position that requires English language skills. Finally, just under half of the students responded that they would be very interested or a little interested in working abroad, whereas 54% responded that they were not very interested or not interested at all in

working abroad in the future.

4.2 Survey Question Discussion

Typically, students at Kochi University of Technology acquire enough humanities credits within their first year and therefore do not need additional humanities credits in order to graduate. For this reason, the survey focused on students' first two years of English study.

Interestingly, students felt that the productive (speaking and writing) English courses (*English Projects* and *Presenting Ideas*) were more useful to them for their future career as opposed to the receptive courses (*Reading/Listening* and *Reading Workshop*). Note that the two courses that were viewed as more useful for their future career emphasize speaking skills, such as group discussion and presentations. This view is also in line with what progressive Japanese companies are stressing [2]. It is also important to note that Engineering professors have divergent views on what English skills should be stressed. Research and publication focused engineering professors may stress the importance of English reading and writing skills that are useful for the publication of scholarly research journal articles, whereas other engineering professors may stress the importance of communicating with international students within their research laboratory or giving presentations in English at international conferences.

Almost all of the students at Kochi University of Technology take the CASEC English test during their first and second year, as it is a requirement for those enrolling in English courses, but much fewer take the actual TOEIC test. The students' CASEC scores can be loosely interpreted to a TOEIC score equivalent [3], which may be one reason that many students don't go on to complete the actual TOEIC test. Overall, both the TOEIC and CASEC scores of the entire Kochi University of Technology population have been increasing. The average TOEIC (converted from CASEC) score in 2017 was 337.8 for the entire first year student population and in 2019 the average score increased to 354.5. Overall, the average CASEC and TOEIC scores for Environmental Science and Engineering students is slightly higher compared to the averages of the entire Kochi University of Technology population, although it is not fair to make a comparison between the self-reported TOEIC scores gathered in this survey with the average scores of the entire student population.

Putting standardized English test scores aside, it appears that the majority of students understand the importance of English. 88% felt that English will be necessary in their future job and 87% felt that English was either very important or somewhat important for job placement. In addition, 95% felt that English skills can help them to find a better job. But, while most students felt the importance of English, the results also show that the majority of students are not particularly interested in working in a position that requires English or in working abroad. These results are in line with other studies that have indicated that students often see the importance in English language skills but are reluctant to put in extra effort to improve their English. Language learning anxiety, past negative language learning experiences, or preference for teacher-directed lectures may play a role in the reluctance of students to continue to improve their English language skills in their postsecondary education [4]. In addition, Japanese learners often place importance on their teachers' roles in their learning process, so it seems appropriate that teachers need to encourage students to continually improve their English skills throughout their entire university experience.

5. Conclusion

In order to address the two research questions regarding English and employment, we conducted both a data analysis and a questionnaire survey for students in the school of Environmental Science and Engineering, specifically who entered Kochi University of Technology in 2019. The data analysis, based on the CASEC English test scores and GPA scores from 73 students, indicated that English proficiency improved over the first year of English language instruction, and a weak but significant correlation was found between English test scores and GPA scores in Q4/2019. The survey feedback from 59 students showed that although the third-year undergraduate students perceived English as an important skill, the majority of the respondents were not currently making efforts to improve their English skills and were not interested in working in a position in the future that requires English language skills.

## References

1) 平成 29 年度文部科学省高等教育局委託事業,『国内大学の GPA の算定及び活用に係る実態の把握に関する調査研究』報告書, 株式会社 政策研究所, 平成 30 年 3 月.

2) G.-H. Im and L. Cheng, "The Test of English for International Communication (TOEIC®)," Language Testing, Vol. 36, No. 2, pp. 315–324, 2019, `https://doi.org/10.1177/0265532219828252`, (cited 2021-06-29).

3) TOEIC® L&R (Listening and Reading) との関係及び目安について, `https://casec.evidus.com/materials/`, (cited 2021-08-01).

4) Y. Kimura, Y. Nakata and T. Okumura, "Language Learning Motivation of EFL Learners in Japan — A Cross-Sectional Analysis of Various Learning Milieus," JALT Journal, Vol. 23, No. 1, pp. 47–68, 2001, `https://doi.org/10.37546/JALTJJ23.1-3`, (cited 2021-06-22).
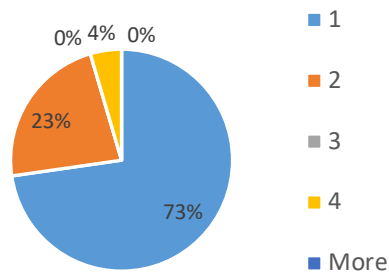
Q1) Which English classes did you take during your first year and during your second year? [*n*=59, multiple selection]
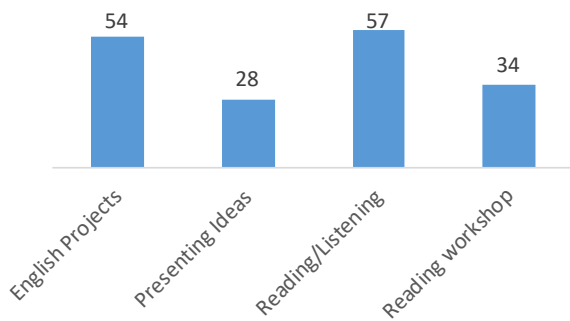

Q2) Which English courses do you feel were most useful for your future career? [*n*=59, multiple selection]
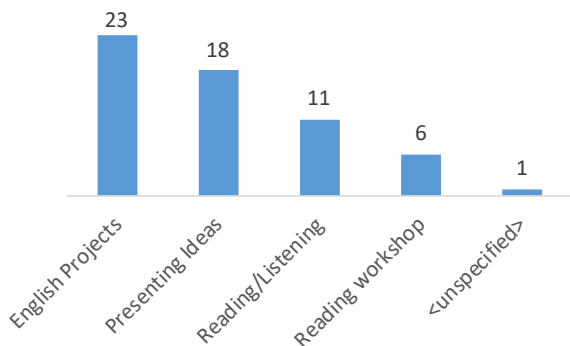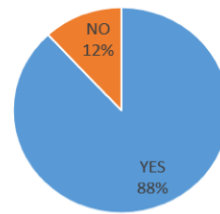

Q3) How many times have you taken the TOEIC exam? [*n*=22, the number of students who took the TOEIC test]
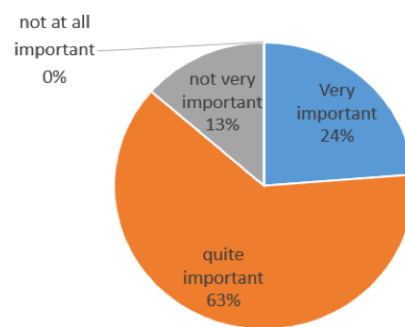

Q4) What was your best TOEIC score, if you are willing to share your score? [*n*=14, limited to 14 out of 22 students who answered; their average score was 388 out of 990]
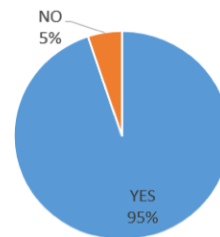

μ=388
from 14 students
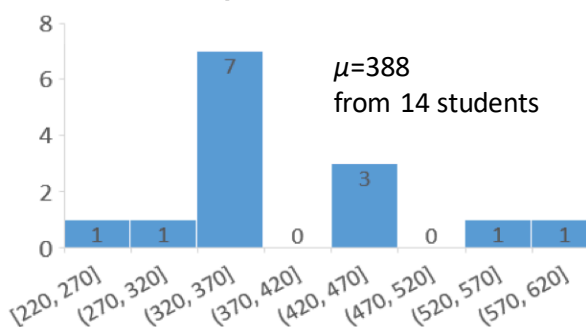
Q5) Do you feel English will be necessary in your future job? [*n*=59]
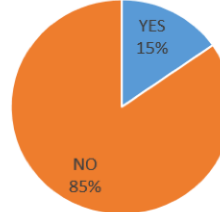

Q6) How important do you feel English is for job placement? [*n*=59]

Q7) Do you feel that good English language skills can help you find a better job? [*n*=59]

Q8) Are you interested in working in a position that requires English language skills? [*n*=59]

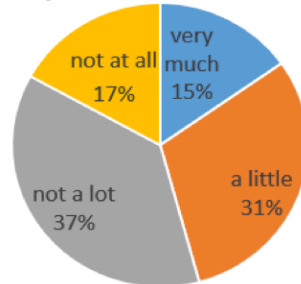**Q9)** How interested would you be to work abroad if your future company asked you to do so? [*n*=59]

Figure 5. 2021 Survey Questions and Answers — The value *n*, in the square brackets, shows the number of students who responded to each question.

英語と就職：環境理工学群学生の場合

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要約：高知工科大学環境理工学群が志願者に求める資質はアドミッション・ポリシーに端的に示されている。その 2 番目には『学んだことを社会で活かすためのコミュニケーション力と語学力』が謳われている。とりわけこの語学力に関して、初年次に於ける共通教室の英語の授業の最初と最後に実施される CASEC テスト結果の推移を通じて客観的な測定を試みた。対象学生は 2019 年度に環境理工学群に入学した学生の内、このテストを 2 度受験した 73 名である。併せてこれらの学生の GPA の推移も調査し、語学力と GPA の各々の推移に於ける相関も調べた。更に 2019 年度入学者の年次が進み 3 年生となった 2021 年度の第 1 四半期において、この語学力に関して別の角度から調査を実施した。それは就職や進学を意識し始めたこの時期に、語学力向上に対しての学生の意識と実践状況、並びに就職や社会人になった際の語学力への思いをアンケート形式で収集した。対象学生は環境理工学群の 3 年次課目キャリア・プラン 1 の履修者の内、応答した 59 名である。前者の試みでは、1 年の英語教育を通してテスト結果が向上し、最後の CASEC テストの得点と学年末 GPA 値には弱い相関ではあるが棄却出来ない有意性を確認した。また後者の調査では、多くが語学力の必要性は十分認知しつつも、実際の向上への取組や将来における活用意欲を示す学生は限定的であることが示された。