

Digital Transformation of HIU's English Placement Test

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北海道情報大学における英語プレイスメントテストのDX化

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Abstract

Digital transformation (DX) is a popular theme at universities recently. This paper reviews the conversion of Hokkaido Information University's English placement test from a traditional paper-based format to a digital format. Using the Socrative™ online platform, we replaced the previous test with a recently updated version of a research-based vocabulary levels test. This allowed our first-year students to take the test using a smartphone, computer, or tablet. The digitally transformed test yielded a range of scores similar to the previous paper-based test. However, it also drastically cut test preparation time, test-taking time, and test-results processing time. The authors argue that digital transformation through utilizing such web applications could benefit other universities with similar placement testing procedures.

要旨

近年、大学ではデジタルトランスフォーメーション（DX）が盛んとなっている。本稿は、北海道情報大学の英語プレイスメントテストを従来の紙媒体からデジタル媒体へ変換した事例を紹介するものである。Socrative™のオンラインプラットフォームを利用し、従来のテストを最新の研究に基づいて更新された語彙レベルテストに置き換えた結果、1年生はスマートフォンやパソコン、タブレット端末を使用してテストを受けることが可能となった。デジタル化されたテストは、従来の紙媒体のテストとほぼ同様のスコアの範囲を示したが、テストのための準備時間、受験時間、結果処理時間は大幅に短縮された。このようなWebアプリケーションを活用したデジタル化は、同様のプレイスメントテストを実施する他の大学にも有益であると考えられる。

Keywords

digital transformation (デジタルトランスフォーメーション, DX化)

digitalization (デジタル化) English placement test (英語プレイスメントテスト)

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1. Introduction: The benefits of transformation

This paper documents the web-based digital transformation of an English placement test at a Japanese university using smartphones, computers, and tablets in place of a paper-based format. Transformation of the test served three purposes:

- (1) to make the test more compact,
- (2) to enable faster and more accurate test processing of test results, and
- (3) to bolster the reliability and validity of test results.

The decision to digitalize the test transformed not only the mode of delivery (paper-based to online-based) but also the contents of the test itself (short and long reading and listening items to short, read-only items).

Preliminarily, the results of this transformation are encouraging. Test preparation, delivery, and processing time has been reduced more than threefold compared to its former paper-based format. Further, test scores suggest a higher level of student engagement with the test than before. Test-givers and test-takers in this environment benefit not only from reduced test-taking time, but also because test items are drawn directly from test that measure takers' vocabulary levels. Scores may reveal helpful information about the vocabulary levels of this particular group of learners (lower-proficiency students in non-English, non-humanities majors), as well as contribute to the continued validation of a

recently updated version of a prominent vocabulary levels test (McLean & Kramer, 2015, 2016).

2. What is “digital transformation”?

Enhancing various processes through digital means has been constantly increasing since computers became household items. The 2020 COVID-19 pandemic accelerated this digitalization trend, and likely contributed to popularizing the term “digital transformation” (DX). This term appears often in business (Durst, Temel, & Ulvenblad, 2021) as well as in higher education (Mahlow & Hediger, 2019; Weil, 2021; Fahey, 2021).

However, as is often the case, new expressions are batted around without much consideration to what they mean, what they imply, or from what contexts they originated. They become buzzwords that sound good in meetings, committees, and classrooms, and their meanings are so loosely defined that they can be interpreted literally and liberally by anyone. One example is the myriad of interpretations that have been applied to the term ‘active learning.’ Bonwell and Eison (1991:2) are credited with popularizing the term in a publication created for the Association for the Study of Higher Education and the ERIC Clearinghouse on Higher Education, defining strategies that promote active learning as “instructional activities involving students in doing things and thinking about what they are doing.”

More than 20 years later, Freeman, Eddy, *et al.* (2014) arrived at a working definition for

'active learning' after collecting and coding definitions provided by 338 attendees of seminars at universities across the U.S. and Canada, stating that "Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work" (8413-8414). While this definition is data-driven, it is still very broad in scope, allowing the term 'active learning' to be interpreted as any kind of learning that is not passive.

In the same way, digital transformation might be thought of as anything that is changed from analog to digital format. This definition is simple, but it risks conflating the terms 'digitization' and 'digitalization.' Digitization is the process of transforming information from a physical format to a digital version, such as typing and saving a document to a computer, recording audio to computer, or scanning images. Digitalization is the practice of utilizing technology to enhance the way things work in an institution. In other words, digitization is related to information, whereas digitalization refers to processes.

Digital transformation, on the other hand, refers to organizations, and the processes they use or the products they produce, which are transformed through the use of cutting-edge digital technology (Matt, Hess, & Benlian, 2015; Hess, Matt, *et al.*, 2016).

Vial (2019:121) derived a conceptual definition from a systematic review of 282 research papers, stating that digital transformation (hereafter, DX) is "a process that aims to improve an entity by triggering

significant changes to its properties through combinations of information, computing, communication, and connectivity technologies."

Attention has been paid to the way businesses digitally transformed their processes as they struggled to cope with the COVID-19 pandemic in 2020 and 2021. Results from a survey included in a European Investment Bank Report for 2022 indicated that 55 percent of European companies that responded to the survey stated that the pandemic created more demand for digitalization. 46 percent stated that they had become more digital.

Other attention has been directed at the higher education sector, which struggled to adapt to an entirely online learning environment (Chiner, Gómez-Puerta, *et al.*, 2021; Chan, Bista, & Allen, 2021). Among the problems universities encountered was the administration of English placement tests, which had traditionally been done in large-group in-person settings. Solutions included conducting the tests outside, or devising ways to proctor the tests in a secure online environment accessible from anywhere (Ockey, 2021). Purpura, Davoodifard, and Voss (2021) note the low-stakes nature of their placement test, for which secure online proctoring was deemed sufficient.

HIU's placement testing was a similar environment with similar problems. Hereafter, we will outline the process of English placement testing at Hokkaido Information University (HIU), and how we digitally transformed it in order to adapt to restrictions brought on by the COVID-19 pandemic. These changes are expected to be beneficial and to continue even as

the pandemic dies down and as restrictions are, over time, gradually lifted.

3. The anachronism: IT-focused university, analog testing system

In 2002, HIU instituted a placement test for incoming first-year students, all of whom at the time were required to take two years of math classes and two years of English classes in order to fulfill liberal arts course requirements for graduation. Two types of courses were required for English: those taught by Japanese instructors and those taught by foreign instructors. Because the Japanese instructors tended to conduct language-forms-focused classes (i.e., reading and writing, as opposed to the speaking- and listening- focused classes taught by foreign instructors), a placement test was deemed necessary to stream students into appropriate levels of English grammatical ability. A placement test was designed by the English teaching staff, and featured three main types of items:

- (1) 55 vocabulary-based items,
- (2) 25 grammar-based items,
- (3) 10 reading-based items (two short passages followed by five comprehension questions), and
- (4) 10 listening-based items, following an audio-recording that was played two times during that part of the test.

Although some items were longer than others, each item out of 100 items carried equal weight—i.e., each item was worth one point. An item-facility analysis was never conducted on the test. All items were multiple choice.

However, it was apparent that some items took significantly longer to answer correctly.

Each year there were seven Japanese instructors, who were each assigned two English classes. Students' scores from these tests determined whose classes they would be assigned to. Test scores were perceived to reflect the English language ability of the students, and Japanese instructors adjust the linguistic difficulty of their materials according to which class they were assigned. The test did not, ultimately, "place" them into any established program. The scores only hinted at the linguistic ability of each class.

By contrast, students were not streamed into the communication-focused classes taught by foreign instructors. Placement test scores were irrelevant to these classes. There was concern among the foreign faculty that streaming students according to (purported) grammatical ability would risk preordaining which were 'good' students and 'not good' students, thereby assigning a stereotype to them based on the results of one test. The debate over the value of streaming students according to placement test scores is ongoing. To date, the argument persists that placement testing is essential, so that less-able students are given material appropriate to their (perceived) ability. Thus, the placement test is still used as a streaming device, with both math classes and Japanese-taught English classes. With respect to English classes, HIU is a small, private, IT-focused university with no humanities-oriented departments, and according to teachers' testimony the 'level' of students' English tends to be homogeneously low. Of those who take the TOEIC test, scores average

under 400 each year.

Originally, the placement test was conducted in three large rooms, each with around 150 students, over a one-hour period. Paper copies of tests questions needed to be prepared in advance. Students filled in bubbles on cards (Figure 1), which were then scanned into a computer using a card-reading machine.

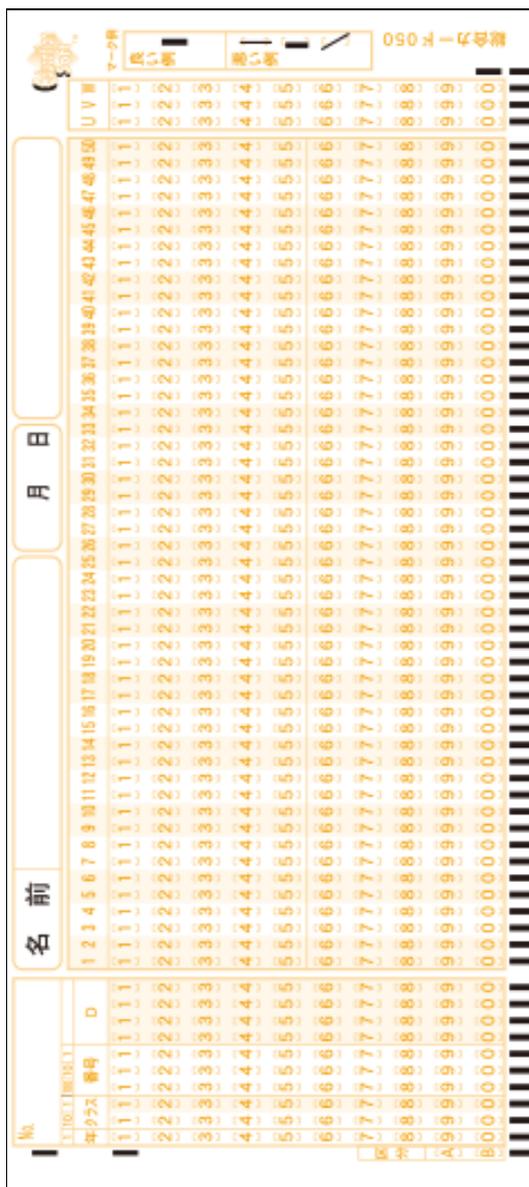


Figure 1: 82.55 x 187.3mm JIS card

Not only were the cards small and unintuitive, the machine reader was, by technological

standards, archaic. As it processed cards, the machine would sometimes freeze, necessitating a hard reset. The software used to scan the cards was even older. The card reader was attached to a computer running Windows XP. Currently, XP is no longer supported by Microsoft, and the proprietary card-reading software was so old that the university's Information Center had no knowledge of it, and no backup materials to reinstall the software to a different device with a newer OS.

Errors on the cards caused by careless marking, such as mistaken or omitted student ID numbers, needed to be corrected before accurate scores could be tabulated from the cards. It took hours to identify and fix errors on these cards. Often the English staff would work from morning until late at night processing the card-reader data before reporting the scores to administration, who then informed students which classes they were assigned to. This process continued from the time of the test's inception in 2002 (when the card reader and software were not so outdated) until April 2020, when the COVID-19 pandemic struck.

The pandemic precluded the gathering of large groups. An ad-hoc decision was made to hold the tests in smaller classrooms, and over a shorter time frame than 60 minutes. The test was cut from a total of 100 items to 50 items: vocabulary-based items were reduced from 55 to 30, grammar-based items from 25 to 15, and one of the two reading passages and its accompanying 5 items was cut. The listening portion was removed entirely. As the test items were halved, accordingly the test time was reduced from 60 minutes to 30 minutes.

The half-test system was used in both 2020 and 2021. Several of the teachers charged with giving the tests to smaller groups in the smaller rooms noted that the time needed for distributing tests and mark sheets, providing instructions, executing, and then collecting the paper tests often exceeded 30 minutes. This extra time, they claimed, impinged on the time needed to conduct other essential tasks during the student orientation process (of which placement testing was a part).

In reply, the present authors proposed digitizing the test—that is, converting it to an online format that could be taken by computer, tablet, or smartphone. Indeed, all-online placement tests have already been implemented at other universities in Japan. The first author's former employer, another university near Sapporo, instituted a computer-based placement testing system using the open-source Moodle platform. Groups of students took the test in large computer rooms. Processing test results was considerably quicker than the paper-based version that HIU had been using.

HIU has several large computer rooms, but these were also unable to be used due to the pandemic. Because most students already have a personal smartphone, we proposed that these could be used for test-taking purposes. Because HIU loans all of its students a notebook PC or tablet at the beginning of their first year, these could be used in the event students did not have, or had forgotten to bring, a smartphone.

We opted to use the online, web-based testing platform known as Socrative™, especially as the second author has experience with it. While Moodle is free, open-source

software, it requires some technical expertise to use effectively. Socrative™ requires nominal annual fees, but is considerably more user-friendly, offering an easy-to-use interface and several features appropriate for test analysis.

4. The platform: Socrative™, a digital testing tool built for students and teachers

Socrative™ is an online platform designed to enhance digital communication between teachers and students. Teachers can create various types of tests, with items that are open-ended, multiple choice, True/False, or short answer. Virtual (online) rooms can hold up to 200 test-takers at any one time. The timing of the test items can be controlled by the teacher, or the students can be allowed to progress at their own pace. Students can be allowed to attempt a question once or multiple times, can be provided with the correct answer after each response, and can be shown their score immediately upon completion of the test.

In the case of HIU's placement test, students were only allowed to attempt each problem once and were not shown the correct answer after each response, but were shown their final score upon completing the test. Like the previous paper-based test, only multiple-choice questions were used, but the type of question was changed (see Section 5). Socrative™ is available on iOS, and for Android and Chrome apps, in addition to being accessible through any common web browser.

We grouped students into virtual rooms according to their departments. To enroll

students, all we needed were their surnames, given names, and their student ID numbers. Students could be enrolled using either Japanese (kana or kanji) or English. We used Japanese. Test-takers were bulk-enrolled using an Excel (.xlsx) template. A simple, illustrated explanatory sheet of how to enter the virtual exam rooms was given to each student, and a more detailed one was provided to supervising faculty.

Students accessed the test in two steps, by: (1) accessing a provided QR code, and (2) inputting their student number. More than 90 percent of students completed the test in this way. In order to accommodate PC users, a unique URL owned by the second author (johodai.info) was set up to automatically forward to the test, which students

could access by entering their student ID number. In the event that any of the test-takers made a mistake logging in, or logged out without finishing the test, a series of dummy accounts was set up. Supervising teachers were instructed to direct students to log into these accounts. were able to allocate where necessary. Among more than 400 test takers, this was necessary in only two instances.

The first four items of the transformed test were set up as non-scoring explanatory items to show students how the test works. Using the feedback facility in Socrative™, after selecting an answer in each of these introductory items, students were provided with a comment to confirm that they are completing the test as required. (Figure 2).

2. ・問題例・

1. I waited for a bus.

waitedは？

0 POINTS

A 食べた

B 待った

C 見た

D 寝た

i 正解はBです。

3. **正解はBです。** waited = 待った

答えが全くわからない場合は、スキップ（未回答のまま）にしておいてください。

わかる可能性があると思ったら、どうぞ挑戦してみてください。

テスト終わったら、必ず **FINISH QUIZ** ボタンをタップしてください。

0 POINTS

A わかりました。

B 帰りたい。。。

i **OK Let's do it!!**

waited

FINISH QUIZ

Figure 2: Introductory items

Students' answers to test items is accessible by teachers in real time. Statistical analyses, such as item facility, item completion rate, and average scores, are also readily accessible. These features help teachers see trends in student answers and evaluate the appropriateness and validity of test items.

No student reported being unable to understand how to complete the test, and no student identification errors occurred. Both of these problems occurred yearly with the earlier paper tests.

5. The transformation: A new digital-format vocabulary levels placement test

Although the old test had been reduced to 50 items, it still included large amounts of text. We recognized the need for an alternative, more compact means of testing, and settled on a simple vocabulary levels test developed by Paul Nation (1983, 1990). This vocabulary levels test was updated by Schmitt, Schmitt, and Clapham in 2001, and further revised (McLean & Kramer, 2015) for use in various bilingual contexts, including Japanese (McLean & Kramer, 2016; Webb, Sasao, & Balance, 2017).

It has been argued that bilingual versions of the test increase accuracy by allowing students to focus on the meanings of single English words, where multiple choices are in the L2 (Figure 3).

PERIOD: It was a difficult period.

a. 質問 b. 期間 c. すべきこと d. 本

Figure 3: Japanese/English bilingual vocabulary test

The monolingual version of the test requires takers to think about all words and all choices in English, (Figure 4).

PERIOD: It was a difficult period.

a. question b. time c. thing to do d. book

Figure 4: English monolingual vocabulary test item

We chose to use the Japanese/English bilingual version of the test, as it seemed appropriate for the non-fluent (beginning-intermediate) level of most HIU students, and therefore less intimidating, as well as requiring less time to take.

McLean and Kramer's (2016) version of the levels test has six parts, each with 24 items (except part 6, which has 30). We chose to include only the first four parts, as the original test was 100 items and took one hour, and we only had limited time available. Pilot testing with 15 second-year and third-year students who volunteered to take the test on the Socrative™ platform completed it within 15 minutes. Seven teachers also volunteered to pilot the test on their smartphones, each taking under 10 minutes.

To help make the items more appealing than the text-only format that the vocabulary test appears in, we added color to the English word that appears in each item (Figure 5).

6. She sat on a stone.

1 POINT

A 石

B 腰かけ

C 数物

D 枝

stone

Figure 5: Test item showing colored word

Lastly, the vocabulary levels test was chosen because (1) its validity and reliability are research-backed, and (2), it is designed to estimate receptive reading ability by measuring takers' knowledge not of individual vocabulary items, but word families (Nation & Beglar, 2007). Put simply, a test-taker's knowledge of the meaning of a word in a test items implies the taker can understand a 'family' of words that are related to the word in the item. For example, understanding of the word 'waited' (待つ) implies that the taker will understand other forms of the same word, such as wait, waiting, will wait, and so forth.

The results of the April 2022 rollout of the test are discussed in the following section.

5. The rollout: April 2022

The transformed test was administered without incident in early April 2022 to 406 incoming first-year students. Thirty minutes were made available to complete the test, but it is difficult to ascertain exactly how much time individual students took or needed. In the case of the earlier 60-minute and 30-minute paper tests, some students commented privately that they put little effort into the test, as they did not want to be placed in 'higher level' English

classes that may require more effort. Others commented that the test was long and boring and that they hated tests. The reverse is also possible, with other students wishing to avoid the so-called 'lower-level' classes, which they may perceive to be boring, or populated with other unmotivated students with negative attitudes toward learning English.

We observed that students who completed the Socrative™ placement test did not appear to be pressed for time, nor did they complain about the test itself. The time frame appeared ample, and the digital format appeared to make the testing process more palatable. Further, there were no issues involving forgotten stationery, untidy (unreadable) shading of bubbles, or losing one's place on the marksheet (where each answer bubble is separated by mere millimeters). We prepared for students who may have mistaken their login and had difficulty accessing the test by providing dummy accounts, and we also had access to an unused computer room where students who had battery issues or connection problems with their smartphone could take the test.

The test scores for all takers over an eight-year period is provided in Table 1, and are discussed in the following section 6.

	100 items 1 pt each 60 min						50 items 2 pts each 30 min		96 items 1.04 pt each 20 min
	2014 n=357	2015 n=392	2016 n=407	2017 n=355	2018 n=389	2019 n=459	2020 n=443	2021 n=488	2022 n=465
Average	54	48	49	49	50	50	57	57	61
St. Dev.	14	12	12	13	12	15	16	15	12
High	89	85	85	94	85	98	95	98	93
Low	17	15	19	12	12	13	7	2	26

Table 1. HIU English placement test scores, 2014-2022

6. Results and discussion

Between 2014 and 2022, the number of test takers ranged from between around 350 and 450 students. In the six years prior to COVID-19, from 2014 to 2019, average scores and their standard deviations remained relatively uniform. When the number of items in the original paper test was halved in 2020 and 2021 (each item being scored two points instead of one), it is notable that the average scores increased slightly, and that the lowest scores dropped. It is unclear whether these were due to having a shorter test period or having fewer test items.

Compared to the 2014-2019 data, we note that the average score increased from a previous middle-mark of around 50 to approximately 61 in 2022. This suggests that more students got more problems correct on the new test than on the previous paper-based tests. Further, we note that while the lowest scores for previous tests were under 20, the lowest score noted in the 2022 test was 26. We are not sure what caused this uptick, although the suggestion is that more students were able to answer more of the easier questions on the new test than on the old. This would not only increase the score, but also likely improve motivation and short-term confidence if takers felt that they were answering correctly. It is possible that the new test format may have some effect on student engagement with the test, as it only involves selecting the best possible meaning from four choices for a single word, as opposed to reading longer test items and then selecting the best answer.

We propose that this new, transformed test is more uniform and easier to take than the old paper-based one, less “test-like”, and less time-invasive. This may encourage higher levels of engagement with the test, which in turn yields more relevant data. In short, results from the new test say more about students’ receptive reading abilities than the old tests.

7. Conclusions and avenues for further research

This short paper catalogued the reasons for, and the process of, the digital conversion from an old paper-based English placement test to a new digital-based one that is easier for both takers and administrators to handle. While we perceive this transformation to have been highly successful, several core issues remain. One is the ongoing debate over the need for an English placement test at all, which as aforementioned remains divided along foreign/Japanese lines at HIU. While the conversion of the placement test to a digital format has been an initial success, drastically reducing the administrative burden of preparers, the fact remains that the scores—however valid they may be as indicators of receptive reading ability—still potentially serve as demotivators for students with prior disappointment in middle school and high school English classes, which are notoriously focused on preparing students to take university entrance exams, and these remain notoriously forms-based and rooted in measuring grammatical/linguistic ability rather than communicative ability.

A large-scale study on university English placement tests by Shimizu in 2002 suggests that the debate over the need for English placement test at Japanese universities is not unique to HIU. The present authors will concede, however, that as arguments in favor of placement testing appear to be mainstream, and thus efforts to revise and streamline them will generally be better received among our peers than a quest to eliminate them altogether.

With respect to data that the new tests yield, there appears to be fertile analytical ground to be tilled. More in-depth examinations of scores are planned for the four word-levels that the test employs. These data can be compared to recent iterations of the test taken by other Japanese students. Results could also be compared with scores from students who take the TOEIC test at HIU. For example, those scoring higher on the vocabulary levels test would be expected to have higher TOEIC scores, and vice-versa.

Most importantly, however, future administration of this transformed test will potentially be valuable in helping continue to validate vocabulary levels testing. In particular, not much is known about how to measure vocabulary levels among lower-proficiency groups of learners. At very least, this new test offers a research-backed estimation of the vocabulary levels of HIU students for the first time ever.

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