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Original Article

Including clinic-based English education in dental curriculum, supplemented by e-learning

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Abstract

This study aimed to construct proposals for improving dental English education by assessing the need and importance of dental English proficiency in practical settings and how e-learning might supplement such education in Japan. With the understanding that the dental English education in the Japanese undergraduate dental curricula has been under addressed, computer-assisted simulation modules have been developed. Fourteen fourth-year dental undergraduates were given access to these clinical settings' modules, designed to take learners through decision-making processes for emergency services with the added bonus of learning dental English. Pre- and post-quizzes, a post-questionnaire, and self-rating scale were used to assess the knowledge gained and the perceived need for dental English. Post-quiz scores were significantly higher than the pre-quiz scores (p=0.004), and the questionnaire results (response rate of 100%) provided favorable feedback for this learning method. Results indicated that for improved learning outcome, the interlacing of dental English learning opportunities alongside the regular Japanese dental courses might be the best-case scenario. Practical knowledge and skills, both in one's native tongue and English, were important; and that increasing the amount of clinical/practical training in English may be necessary, while e-learning might be a suitable method for supplementing current dental English education deficiency.

Key Words: Dental English education, Dental education, Globalization, e-learning

Introduction

Decision-making, acquisition of essential expertise, team-building, critical thinking, and communication skills in English as well as Japanese, are necessary for dental professionals in Japan in this continuing era of globalization[1]. However, to date, research regarding practical education for dental professionals in English (hereinafter "dental English"), has been limited in Japan[1-3], leading to a demand for investigation and discussion on the current level of dental English proficiency in dental students, plus new goals and strategies for improving such education. Keeping in mind the current reality of field expansion in dentistry plus the scarcity of dental English education materials suitable for Japanese undergraduate dental education, clinical scenario English e-learning simulation modules that include English dental terminology, on topics of provision of emergency services, and clinical decision-making skills were developed in Tokyo Medical and Dental University (TMDU). TMDU has been producing computer-assisted simulation modules for many years, made available via a learning management system

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(LMS). Use of these modules has been proven beneficial in the acquisition of knowledge and skills for clinical decision-making in English[4].

However, more investigation would be necessary to discuss how to reach a successful level of competency in undergraduate dental English education and come up with new concrete proposals. Therefore, the purpose of this study was to construct proposals by assessing the importance and requirement levels of dental English in the undergraduate years and how e-learning might fill the gaps in dental English education in Japan.

Materials and Methods

This study was approved by the Dental Research Ethics Committee of Tokyo Medical and Dental University (TMDU; approval no. D2018-084; Tokyo, Japan).

Fourteen fourth-year undergraduates from the School of Dentistry at TMDU were given access to three interactive clinical-scenario e-learning simulation modules in English, which included English dental terminology, provision of medical interview and emergency services, and clinical decision-making skills. The modules were made available via a learning management system (LMS) (WebClass; Data Pacific (Japan) Ltd., Tokyo, Japan) in November 2019 (on-site provision). All participants joined this learning opportunity on a voluntary basis and were familiar with this type of e-learning as they had experience using the LMS. In addition, individuals who agreed to participate in this study consented to answer the questionnaire via the LMS.

Assessment instruments: questionnaire, self-rating scale and quizzes

To gain participant feedback, a post-questionnaire was administered for evaluation of the modules, it also inquired about their previous English experiences and international activities. Participants assessed the self-perception of their knowledge level regarding the contents of the modules, usefulness of the modules toward knowledge acquisition, their interests in the module, usefulness of this module for their future, their needs for dental education in undergraduate education and user-friendliness of module operation. Students evaluated questionnaire items on a 6-point Likert scale and provided general comments. After participants finished the self-study, they rated their attitude and skills using the self-rating scale to reflect on their study and assess their current skill level.

Before and after the module learning, quizzes were also conducted to assess participants' prior and acquired knowledge. These pre- and post-quizzes consisted of 5 questions structured to assess knowledge of the necessary dental terminology/vocabulary; 10 points for each question with a maximum total score of 50. The pre- and post-quiz questions were identical.

Interactive modules

By using an authoring tool (SIMTOOL) and Microsoft Moviemaker 2.6 (Microsoft Corporation, Redmond, WA, USA), educators who were native speakers of Japanese or English and had backgrounds or specialties in periodontology, operative dentistry, dental hygiene, dental education, or nursing science, mainly authored the modules. The quality of their contents, interactivity, efficacy of multimedia usage in the scenario were assured before the module provision in two stages: first, by the faculty of dentistry; the Educational Simulation Production Subcommittee established under the TMDU Dental Educational Committee and; second, by two reviewers. TMDU has many years' of experience in producing such computer-assisted modules[5–8].

The interactive modules provided self-learning opportunities and experiences via virtual clinical settings and emergency services situations. Participants could hone their clinical decision-making skills and English dental terminology by reading the explanations, listening to conversations or viewing the visual screen and choosing the correct multiple-choice answer for the situation. Each module was designed to provide 10-15 minutes of study. Figure 1 shows a screen example of what the learner would see.

Statistical analysis

The pre- and post-quiz scores were analyzed with the Wilcoxon signed-rank test, using Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 26.0; IBM Corp., Armonk, NY), with the significance level set at $p<0.05$.

Results

Questionnaire

Fourteen students used the modules, and all of them answered the post-questionnaire with an achieved response rate of 100% (Figure 2). Of the respondents, 36% agreed/somewhat agreed that they already had the level of knowledge regarding the contents of these interactive modules (a); 100% strongly agreed/agreed/somewhat agreed that they acquired more knowledge after studying with the modules (b); and 93% strongly agreed/agreed/somewhat agreed that they were interested in the modules' topics (c). However, less than half, 43%

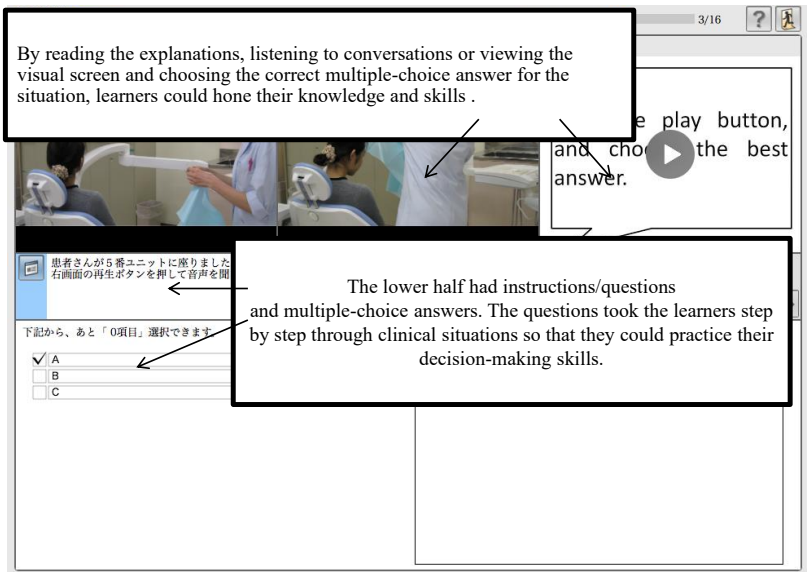


Figure 1: Screen example/image of learners' view

The three windows on the upper half of the screen had audio/visual format to provide learners a virtual clinical setting image. For the scene in which English would be required, the audio materials were prerecorded and uploaded, and learners could listen to conversations related to the situation by clicking the "play" button. The lower half of the screen had instructions/questions and multiple-choice answers. The scenario took the participants step by step through clinical situations so that they could practice their decision-making skills. The next page displayed the answer with explanatory notes as to the appropriateness of their choice.

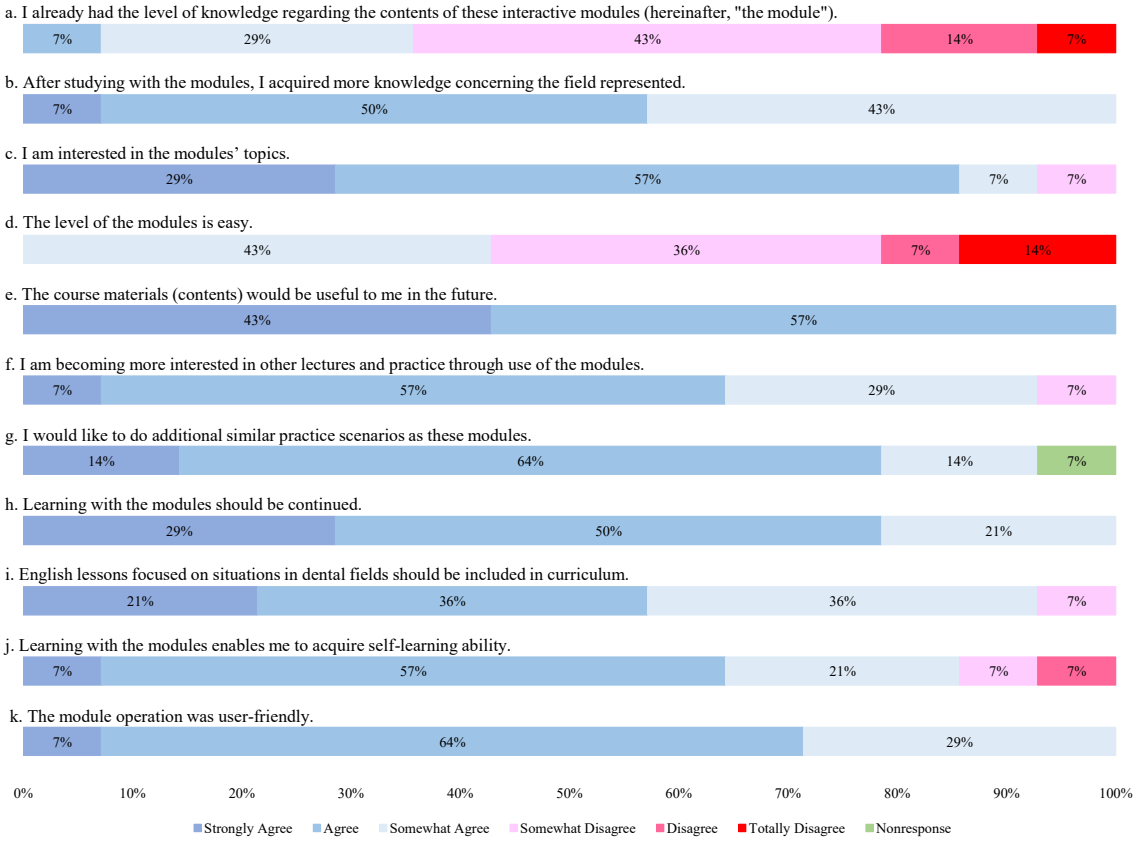


Figure 2: Results from the post-questionnaire survey

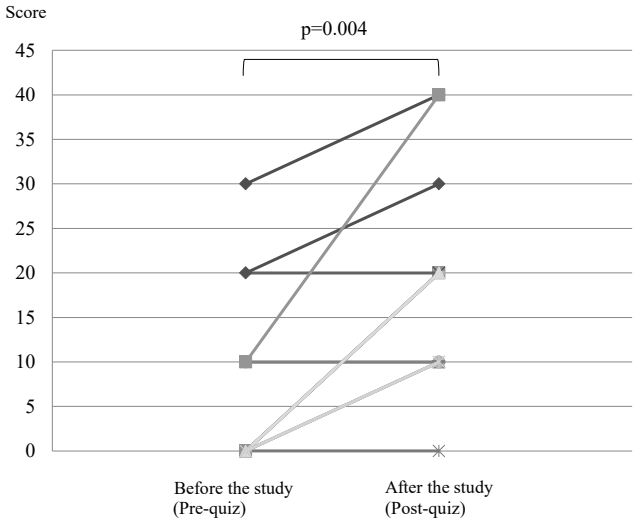
Table 1: Free comments from the participants

	Free comments
List the good points of the modules.	
1	I came to understand that I should use more appropriate English expressions concerning explanations to patients.
2	The modules contained many English words that I did not usually use, so it was a good chance for me to learn them.
3	I could learn interactions such as medical interviews in English.
4	I could learn not only dental words in English but also words that are necessary to communicate with patients.
5	To be able to learn dental terminology by listening.
6	The modules contained questions about sophisticated differences among English expressions.
7	The English pronunciation was clear and the speed was appropriate to understand. I could learn not only English terminology about diseases but also words which are necessary to treat patients, such as words that dentists usually use with patients.
8	The explanations of the questions in the modules included the English transcription of the audio.
9	It was good to play the audios repeatedly, because my English ability is extremely low. But, I wonder if it was appropriate as a survey for English ability. The modules were interesting, because they included from necessary dental terminology to general English.
10	It was especially useful to know how to speak in English to patients in dental chairs during dental treatment. I know the meaning of a word to some extent, but I made a mistake of its usage, because singular and plural of the same word had different meanings and I did not know that. I need to pay attention so as to not talk impolitely. I will remember the English expressions in the modules and try to use polite phrases. During learning with the modules, I just read some words and did not consider the contents of English sentences, but I could surprisingly answer the questions. I thought that it was good to learn by listening to the audio.
11	I learned a lot from the modules, because in our English courses before university, we seldom learn polite English expressions or how people receive what we say.
	3 Nonresponses
List the points that should be improved.	
1	To be able to listen to the audios from any point, not only from the beginning.
2	When learning with the modules, it would be better to type English words when answering.
3	I would like to learn with the modules after I acquire the basic knowledge of dental treatments in dental courses.
4	I would like to learn with more variations of the modules.
5	Even if I listen and understand, I cannot speak in the real situations. So, I would like to practice speaking.
6	To increase the number of clinical cases to many more.
7	It would be better to be able to play the audio for each choice.
8	I would like to have questions about spelling of English words and translation from English to Japanese. The number of questions should be increased. At this point I do not know how to process dental treatments, so even if I know the meanings of English sentences, I could not answer the questions. It was hard for me to answer when questions consisted of long sentences, because my English level was low. If there are modules whose level is appropriate to us (D4, 4th year of undergraduate), I would like to try them even from now on.
9	Nothing special
	5 Nonresponses

Comments were translated from Japanese into English by the authors.

somewhat agreed that the level of the modules was easy (d). All the participants strongly agreed/agreed that the contents would be useful in the future (e); and strongly agreed/agreed/somewhat agreed that the learning with these modules should be continued (h). 93% strongly agreed/agreed/somewhat agreed that they were becoming more interested in other lectures and clinical practice through use of the modules and that they would like to continue use of similar practice scenarios (f, g).

Ninety-three percent strongly agreed/agreed/somewhat agreed that English lessons focusing on situations in dental fields should be included in the regular curriculum (i). Of respondents, 57% have had experiences visiting overseas dental universities for a short or determined period. General comments can also be seen in Table 1.



Wilcoxon signed-rank test.

Figure 3: Changes in the quiz scores

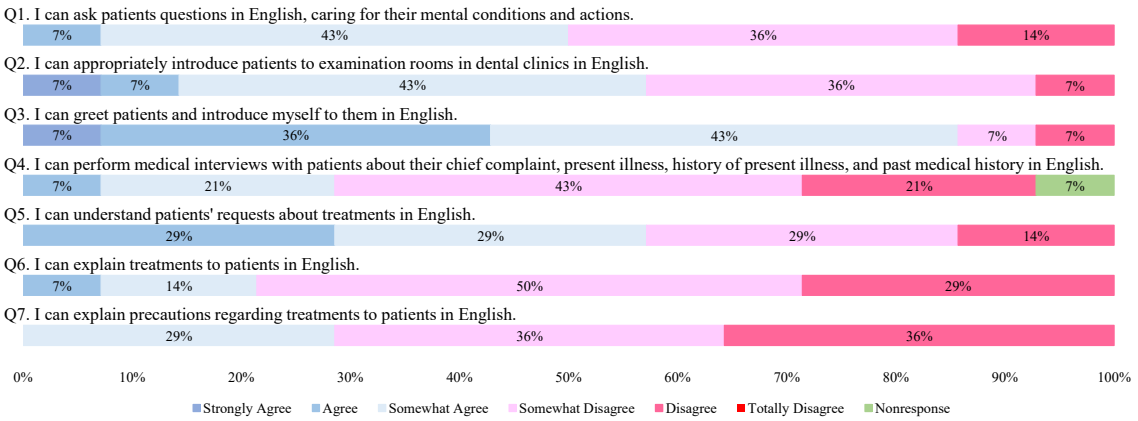


Figure 4: Results from the self-rating scales

Pre- and post-quiz results

All fourteen students took the pre- and post-quizzes. Out of a possible score of 50 points, the mean pre-quiz score was 7.1 points and the mean post-quiz score was 18.6 points. Participants scored significantly higher in the post-quizzes than the pre-quizzes ($p=0.004$) giving the impression that the study modules were effective.

Rating scale

All fourteen students also performed a self-assessment of their medical interview skills in English for a response rate of 100% (Figure 4). Of the respondents, 50% agreed/somewhat agreed that they could ask patients questions in English, while caring for their mental condition and actions (Q1). 57% strongly agreed/agreed/somewhat agreed that they could appropriately introduce patients to examination rooms in dental clinics in English (Q2). 86% strongly agreed/agreed/somewhat agreed that they could greet patients and introduce themselves in English (Q3). 29% agreed/somewhat agreed that they could perform medical interviews with patients about their chief complaint, present illness, history of present illness, and past medical history at the time of their clinic visits in English (Q4). 57% agreed/somewhat agreed that they could understand patients' requests about treatments in English (Q5). 21% agreed/somewhat agreed that they could explain treatments to patients in English (Q6). 29% somewhat agreed that they could explain precautions regarding treatments to patients in English (Q7).

Discussion

With the current reality of field expansion in dentistry and the already overcrowded curriculum, it is not easy to assign time for dental English education. Added to this, discussions regarding implementation of dental English education are scarce. Practical knowledge and skills, including the soft skills both in one's native tongue and in English are very critical for Japanese dental professionals due to the continued influx of international patients, increased globalization of research/education and global networking, and for them to stay on top of new dental procedures. Dental English includes not only communication skills at clinical settings, but also information retrieval skills or critical thinking skills in English, however, in this study, skills at clinical settings was the focus.

The questionnaire results in Figure 2 showed positive feedback of this learning both in content and operation, which were in accordance with previous study results[4, 9-12], therefore the noteworthy point of this survey was that 93% of the participants considered dental English education should be included in the curriculum. Even though undergraduates study English before entering dental schools, they must also learn dental English to function in clinical situations. Thus, providing opportunities to practice this is necessary. The free comments section also supported this necessity, and also suggested that dental English education needed to be provided step-by-step along with the dental curricula in Japanese. The self-rating scales showed the contents might be a bit challenging for the 4th-year of study in an actual clinical setting, yet this might be because the contents themselves were relatively new to them. Studying the subjects in English before studying in Japanese is not bad, however, if done in this order, a longer study period might be needed. Developed modules were an efficient way for fourth-year students to learn new dental terminology and certain knowledge applicable for their year, however, for the actual use of English in medial

interview and treatment planning/explanations, more practical training may be required.

The newest "Model Core Curriculum for Dental Education in Japan (AY2016 Revision)" defined in its objectives under A-7-2)-1. that "By the time of graduation, all students will be able to respect patient's cultural background and respond to different languages beginning with English"*. Consequently, assuming that the trainee residents can provide basic conversation regarding clinical treatments in either Japanese or English, conducting the final or penultimate year of the undergraduate clinical practicum partly in English would be the ideal situation for students to acquire practical skills, along with simulation learning in the middle years and terminology and communication learning in the early years. Actual use of any knowledge in clinical practice requires training based on one's previous experiences and dental English ability, thus, acquiring the necessary level for use in a clinical setting must require continual practice. Consequently, continuous study throughout the 6-year course might be an ideal curriculum plan.

However, with the current already crowded curriculum, e-learning simulation modules and practices might be a practical educational method. The modules can be variable in their ratio of Japanese or English, and the level of difficulty. Computer-assisted learning in dental education cannot completely replace the traditional lectures and/or practicum, but is one of the definite current and future educational methods in dental education[13–16]. Since only a cross section of the fourth-year class was tested, the results of this research may not be a true representation for all dental universities' fourth-year students. In addition, as participation was voluntary, bias toward those students who are motivated for learning dental English and/or learning in general may exist. To apply this proposal across Japan, further studies would be necessary with a larger cohort to investigate the relation between the year of study and the way to reach competency after a designated period of module use.

Within the limitations of this study, under the background of limited dental English education materials and packed curriculum hours, e-learning was considered beneficial for undergraduate dental students to acquire knowledge and attitude/skills. Dental English education was anticipated by the participants and the improvement and increase of dental English education in Japan is further required, following concrete methods and proper assessments.

* https://www.mext.go.jp/component/a_menu/education/detail/__icsFiles/afieldfile/2018/06/18/1325989_31.pdf (accessed on December 26, 2020)

Conclusion

Study findings demonstrated students' need for practical knowledge and attitude/skills, both in their native tongue and in English; and that the addition of undergraduate dental English studies must be considered step-by-step along with the regular dental curricula in Japanese. To acquire practical skills in English, increasing English practical/clinical training may be necessary, while e-learning might be a suitable method for supplementing current dental English education deficiencies.

Conflicts of Interest: All the authors of this report certify that they have no conflict of interest to declare regarding the preparation of this manuscript.

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References

1. Moross J, Seki N, Morio I. English education for healthcare professionals in Japan. Jpn Dent Sci Rev. 2017; 53(4):111-6.
2. Morse Z, Nakahara S. English language education in Japanese dental schools. Eur J Dent Educ. 2001; 5(4):168-72.
3. Rodis OM, Matsumura S, Kariya N, et al. Undergraduate dental English education in Japanese dental schools. J Dent Educ. 2013; 77(5):656-63.
4. Seki N, Moross J, Otsuka H, et al. Dental hygiene learning outcomes obtained through computer-assisted simulation modules. J Dent Hyg. 2020; 94(1):32-8.
5. Kinoshita A, Kawakatsu N, Nagasawa T, et al. TMDU clinical training series for dentists (e-learning system/cloud distribution) (in Japanese). 2nd ed (2015). Tokyo, Japan: University of Tokyo Press; 2012 (1st ed).
6. Seki N, Sunaga M, Fukui Y, et al. TMDU clinical training series for ESL dentists on medical interviews (e-learning system/cloud distribution), Tokyo, Japan: University of Tokyo Press; 2014.
7. Takemawari Y, Miura Y, Sagawa K, et al. TMDU clinical training series for dental hygienists on MFT (e-learning system/cloud distribution) (in Japanese), Tokyo, Japan: University of Tokyo Press; 2014.
8. Seki N, Sunaga M, Fukui Y, et al. TMDU clinical training series for Basic English Conversation Practice for Dental Hygienists (e-learning system/cloud distribution) (in Japanese), Tokyo, Japan: University of Tokyo Press; 2016.
9. Seki N, Moross J, Sunaga M, et al. Development of new interactive materials for medical interviews in English (in Japanese). JJDEA *(The Journal of Japanese Dental Education Association)*. 2014; 30(3):170-5.
10. Seki N, Moross J, Sunaga M, et al. Evaluation of simulation learning materials use to fill the gap in Japanese dental English education. J Med Dent Sci. 2016; 63(1):1-8.

11. Yoshida N, Aso T, Asaga T, et al. Introduction and evaluation of computer-assisted education in an undergraduate dental hygiene course. Int J Dent Hyg. 2012; 10(1):61-6.
12. Kubota T, Cho Y, Kajiwara M, et al. Use of a computer-assisted simulation system in undergraduate education of laboratory technologists (in Japanese). Rinsho Byori (Jpn j clin pathol). 2007; 55(6):517-21.
13. Schittek M, Mattheos N, Lyon HC, et al. Computer assisted learning. A review. Eur J Dent Educ. 2001; 5(3):93-100.
14. Cederberg RA, Bentley DA, Halpin R, et al. Use of virtual patients in dental education: a survey of U.S. and Canadian dental schools. J Dent Educ. 2012; 76 (10): 1358-64.
15. McCann AL, Schneiderman ED, Hinton RJ. E-teaching and learning preferences of dental and dental hygiene students. J Dent Educ. 2010; 74 (1) :65-78.
16. Dragan IF, Dalessandri D, Johnson LA, et al. Impact of scientific and technological advances. Eur J Dent Educ. 2018; 22 (Suppl. 1) :17-20.