

Using digital teaching material for cancer education: A pilot study

Koshu Sugisaki¹, Makiko Sawada², Yukiko Sami³, Hirofumi Monobe⁴, Seiji Ueda⁵

¹Department of Health and Sports, Niigata University of Health and Welfare, Niigata, Japan

²Department of Sports Wellness Sciences, Japan Women's College of Physical Education, Tokyo, Japan

³Department of Health and Physical Education, Tokyo Gakugei University, Tokyo, Japan

⁴Department of School Education, Yokohama National University, Kanagawa, Japan

⁵Department of Education, University of the Sacred Heart, Tokyo, Tokyo, Japan

Keywords: health education, junior high school students, online

Received: 1 November 2018 / **Accepted:** 4 February 2019

Abstract

The purpose of this study was to develop digital teaching material for cancer education with the aim to fulfill cancer education and implement digital textbooks. Digital teaching material for cancer learning was produced for junior high school students. The students who participated in this study were taught using this material online. Simultaneously, awareness of cancer was measured for the participating students both before and after providing the education using the online material. A total of 19 out of the 72 students who were invited participated (26.4% participation rate). Results supported the usefulness of the developed online cancer teaching material for junior high school students. The percentage of questions regarding cancer treatment that were answered correctly was high. However, there was misunderstanding regarding one question about the factors that increase risk of cancer; specifically, eating burnt food. It was confirmed that students' understanding of cancer, such as whether cancer can be treated and whether it can be prevented, was enhanced after exposure to the digital educational material. At the same time, the ratio of participants who

thought cancer was scary decreased 10 points. In future, it is desirable to expand the study, including efforts to increase the number of participants, to plan for randomized controlled trials and to measure long-term effects.

Introduction

Cancer has been the number one cause of death in Japan since 1981. Media outlets such as television and the internet broadcast celebrities developing cancers and passing away as a result of them. Citizens, including students, have become familiarized with cancer. In these circumstances, the Ministry of Health, Labour, and Welfare (MHLW) presented a final goal to decrease the number of deaths from cancer in the Basic Plan to Promote Cancer Control Programs in 2012 (the second term), and has implemented the policy to achieve this goal through various programs. These programs include introducing cancer education for students as well as promoting cancer education in school curriculum. MHLW set a goal in the Basic Plan to Promote Cancer Control Programs (the third term) that "the citizens, including cancer patients, should know about cancer and aim to over-

Corresponding author: Koshu Sugisaki

Department of Health and Sports, Niigata University of Health and Welfare, 1398 Shimami-cho, Kita-ku, Niigata 950-3198, Japan

TEL/FAX: +81-25-257-4526, E-mail: sugisaki@nuhw.ac.jp

come the disease.” Likewise, as one of the cancer control, MHLW proposed “Public Awareness of Cancer Education / Knowledge.”

In 2014, the examination committee on cancer education established by the Japan Society of School Health held a discussion from the standpoint of “learning the importance of health and life, managing our own health properly, and obtaining accurate knowledge about cancer and correct understanding of cancer patients” [1]. The committee shared the understanding that the viewpoint of “cancer education that nurtures the importance of life” should be the basis. Furthermore, the examination meeting hosted by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) discussed what “cancer education” should be in 2015, offering the perspective of “nurturing the importance of health and life” [2].

The next term course of study for elementary and junior high schools published in 2017 illustrated the fulfilment of cancer education [3, 4]. Therefore, cancer will be surely incorporated in elementary school education in 2020, and in junior high school health education in 2021.

The revised School Education Law was established in 2018, in which digital textbooks on devices such as tablets, etc. will be allowed as official textbooks in 2020, when the next term course of study will be fully executed. Some textbook publishers have already started using digital textbooks as supplemental materials for health education textbooks, and students can view videos and electronic blackboards on tablets. In future, the development of digital teaching material for health education is desired for strengthening health education at schools.

In order to expand cancer education and starting the full-scale use of digital textbooks, this study aims to develop digital teaching material for cancer education.

Materials and Methods

1. Study Design

Our digital teaching material was produced to provide cancer education with reference to the reports by various examination committees. Participating students underwent the digital teaching material to learn about cancer. At the same time, awareness of cancer was measured for participating students, both before and after providing digital education using the material.

For this study, intervention was the experience of learning about cancer using digital teaching material, while measured outcome was change in awareness of cancer before and after intervention. Although there is no control group in this study, the items on the awareness survey were similar to those of prior studies [5,6], and the comparison was made with the results of junior high school students in previous studies [5].

As an ethical consideration, participants were informed online that they will not be identified in the survey, and were guaranteed privacy and freedom of participation. The study was conducted with their consent.

2. Production of teaching material

Digital teaching material was prepared primarily for cancer education as proposed by the examination committees and the MEXT, along with the factors related to participants’ intention of taking the cancer screenings reported in prior studies [5-12]. All ten questions are in multiple choice form with four options, and the correct answers and their explanations are displayed immediately after answering the questions online. The survey takes approximately 10 minutes. The student chose according to instructions, and learn individually online.

3. Survey method

The survey on awareness was conducted using the items of the previous studies [5,6], in addition to the digital teaching material created. Participating

pants were asked to respond to the survey before and after using the digital teaching material.

The participants were junior high school students in Japan. A letter requesting participation in this survey was sent in early June 2017 to all families with children enrolled at one of the junior high schools whose principal had agreed to cooperate in the survey. The letter contained the purpose of the study, the handling of privacy information, the QR code, and the URL. The online survey was arranged so that it began once the guardians of the participants provided consent and the intention to participate, and had access to the URL. Summary of the study was explained to the principal of one small junior high school and carried it out throughout the whole school with their cooperation.

A one-month deadline at the end of June was set for responses. Participants received a gift card of 500 Japanese yen as a token of appreciation. The

collection and management of privacy information related to gift card shipment and the actual shipment of gift cards were entrusted to a supplier who obtained the privacy mark.

4. Ethics statement

The experimental procedures were approved by the Ethics Committee of the Niigata University of Health and Welfare (Number:17792-170303). The consent procedure was approved by the ethics committees. Students were informed that their answers would remain anonymous and that they were free to refuse participation in the study without penalty.

Results

The digital teaching material was created based on previous studies [5-12]. A total of 19 out of 72 students at the junior high school participated (26.4% participation rate, 13.7 years old mean

Table 1. Items of digital teaching material and percentage of correct answers (N=19).

Items / Correct answer(s)	%
Which one is not correct about cancer treatment? No treatment.	100.0
Who needs to take the cancer screenings? Everyone (healthy people, people who have subjective symptoms, people who are recommended to do so by a doctor).	94.7
Which one is not correct as cancer prevention? No exercise.	89.5
What is the ranking of cancer in the causes of death of people in Japan? First.	84.2
Which one of the following statements is incorrect? Young people cannot get cancer.	78.9
Which one is not correct regarding the types of cancer? Cancer that can be contagious.	78.9
Which one is not correct for cancer screenings? All children need to get cancer screenings.	78.9
Which one is not correct about people who have cancer? All cancer patients receive the same treatment.	78.9
What is the ratio of Japanese people who have cancer in their lifetime? One out of two.	73.7
Which one is not correct among the factors that will enhance the risk of cancer? To eat the burned part of food.	63.1

age) in the survey. Table 1 shows the ratio of the students who had a correct answer of each item in the digital teaching material quiz. The maximum percentage score was 100%, the minimum was 63.1%, and the average was 82.1%. The top three correct answers were on the following topics: cancer treatment (100%); followed by who should take the cancer screening (94.7%); and finally, cancer prevention methods, (89.5%). On the other hand, the lowest three were about: factors that increase the risk of cancer (63.1%); and the ratio of having cancer in a lifetime for the Japanese population (73.7%). The remaining four questions had an average percentage score of 78.9%.

Table 2 shows the results of the awareness survey before and after the using the teaching material. In addition, the results were shown along with the results of the nationwide survey, conducted in a previous study [5,6]. The question about whether cancer is scary showed a result of 57.9% before, and 47.4% after using the learning material, showing a lower percentage after using the learning ma-

terial. Among the results that demonstrated higher percentages, the question about whether cancer can be cured with treatment, showed a result of 21.1% before and 42.1% after using the learning material. The question about whether the participant thinks that he/she will ever have cancer showed a result of 5.2% before and 10.5% after using the learning material. The question about whether cancer can be prevented showed a result of 47.4% before and 68.4% after using the learning material. The question about whether the participant thinks he/she will undergo cancer screening in the future showed 68.4% before and 78.9% after using the learning material.

The results of this study and those of the nationwide survey were compared using the topic of cancer [5]. All of the questions about whether cancer can be prevented, whether cancer can be cured with treatment, and whether the participant wants to undergo cancer screening showed almost the same results as the previous study. On the other hand, the questions about whether cancer is scary

Table 2. Change in awareness of cancer among participants (N=19).

Item —Answer	Pre (%, SE)	Post (%, SE)	Result of Nationwide Survey * (%, SE)
What is your impression of cancer? — Cancer is scary.	57.9, 11.3	47.4, 11.4	66.3, 0.9
Do you think cancer can be cured with treatment? —Yes, I do.	21.1, 9.3	42.1, 11.3	23.9, 0.8
Do you think you will have cancer in the future? —Yes, I do.	5.2, 5.0	10.5, 7.0	13.2, 0.6
Do you think cancer is preventable? —Yes, I do.	47.4, 11.5	68.4, 10.7	47.9, 0.9
Do you think you will get cancer screenings at the appropriate age? —Yes, I do.	68.4, 10.7	78.9, 9.4	68.3, 0.9

* Note: Nationwide survey on cancer awareness was carried out for approximately 3,000 junior high students in 2013 [5]. This survey was conducted by the questionnaire which contained the same items as we did in our survey. Based on the results of this nationwide survey, we evaluated the outcomes by using our online material for cancer education.

and if the participant thinks he/she will ever have cancer were about 10 points and 8 points lower respectively, before learning the material in this study, as compared to the previous study.

Comparing the results of this study with the nationwide survey, the question about whether cancer is scary was about 20 points lower, and the questions about whether cancer can be cured with treatment and whether cancer can be prevented showed a result about 20 points higher. The question about whether the participant wants to undergo cancer screening was about 10 points higher. The question about whether the participant thinks he/she will have cancer was about 3 points lower after using the digital learning material, as compared to the nationwide survey.

Discussion

The lowest rate of correct answers in the digital teaching material was due to choosing the wrong answer, “to eat the burned part of food,” as a risk factor for cancer. This fact was once listed as one of the preventive methods for cancer in Japan, but has since been removed. In a previous study among Japanese junior high school children aged 13–14 years, 40.2% of participants answered, “to eat the burned part of food,” as a risk factor for cancer [12]. Moreover, this is an example of old information which was included in high school textbooks on health education previously. Therefore, the junior high school student participants might have obtained this revised knowledge either through direct or indirect means.

Regarding cancer treatment, the answers were 100% correct. It has been reported that junior high school students’ awareness ratio of standard treatment for cancer was 88.7% for surgery, 78.0% for chemotherapy, and 64.3% for radiation [6]. In the future, new treatment methods that are available, such as immunological therapies, will require an update to school content of cancer education.

For the question regarding who should get cancer screenings, the percentage of the correct an-

swers was 94.7%. This question was an important factor associated with cancer-screening intentions [6]. In the previous study, it was discovered that awareness of healthy individuals taking cancer screenings correlated with the intention of actually going for cancer screenings. It is desirable to help high school students foster the awareness that healthy people also undergo cancer screenings, rather than an understanding that cancer treatments are only for people who have symptoms and who are referred by doctors.

In the awareness survey before learning from the material, the percentage was low for some questions, such as whether cancer is scary and whether the participant thinks he/she will ever get cancer; the participants of this study seemed to be rather optimistic towards not getting cancer. The fact that the ratio of Japanese people getting cancer in their lifetimes is one out of two has been proclaimed on TV advertisements, etc. However, the ratio currently is on the rise to two out of three of Japanese people. Therefore, this increasing percentage of cancer should be correctly recognized [14]. Students should also be made aware that the death rate is decreasing.

After learning from the material, there was an increase in answering yes to the question of whether the participant thinks he/she will have cancer, at the same time answering yes to the question of whether cancer was scary was lowered. In addition, answering yes to the questions of whether cancer was curable with treatment or was preventable also increased. It is presumed that learning that cancers are cured with treatment, can be prevented, and that risk cancer can be screened weakened the impression that cancer is scary.

There are several limitations of this study. First, in the pilot study, the effect was confirmed for junior high school students, so it is necessary to plan a randomized controlled trial [15,16]. Second, the comparison of the awareness survey was limited to only before/after using the teaching material, and it is necessary to also make a follow up of one

month or three months after learning to measure long-term effects. Third, the number of participants was small due to it being an online survey which may have caused hesitation in participation. However, the author hopes to expand the number of participants by having the involvement and consent of multiple schools and allocating participation based on individuals. Despite the limitations to this study, it has accomplished a certain level of achievement regarding the development of digital teaching material for cancer education.

Conclusion

In this study, the digital teaching material developed for cancer education was proven to be useful for junior high school students. After using the digital material, it was confirmed that students' awareness of cancer changed, for example, the awareness that cancer can be prevented and treated. At the same time, the percentage of those who found cancer scary decreased. It would be desirable to expand the study by increasing the number of participants, to plan a randomized controlled trial (RCT), and to measure the long-term effects of these digital teaching materials.

Acknowledgements

Gratitude is expressed to the students who participated in this survey and the concerned officials in the cooperating school. This work was supported by JSPS KAKENHI Grant Numbers, JP16K16581, JP18H00998. We are grateful to the WITH UP CO., LTD. for providing technical support. We also wish to thank Eriko Oizumi and Miho Somiya for their support and cooperation.

Conflicts of interest

The authors have no conflicts of interest directly relevant to the content of this article.

References

1. Public Interest Incorporated Foundation of the Japan Society of School Health. Examination committee about the education of cancer report; 2014. Available from: https://www.gakkohoken.jp/book/ebook/ebook_H250020/H250020.pdf (accessed March 1, 2018) (in Japanese)
2. Examination meeting hosted to discuss what "cancer education": Report about the way of the cancer education in the school; 2016. Available from: http://www.mext.go.jp/a_menu/kenko/hoken/_icsFiles/afieldfile/2016/04/22/1369993_1_1.pdf (accessed March 1, 2018) (in Japanese)
3. Ministry of Education, Culture, Sports, Science, and Technology Japan: Junior high school teacher guide for course of study. health and physical education; 2017. Available from: http://www.mext.go.jp/component/a_menu/education/micro_detail/_icsFiles/afieldfile/2017/07/25/1387018_8_1.pdf (accessed March 1, 2018) (in Japanese)
4. Ministry of Education, Culture, Sports, Science, and Technology Japan. Elementary school teaching guide for course of study: physical education; 2017. Available from: http://www.mext.go.jp/component/a_menu/education/micro_detail/_icsFiles/afieldfile/2017/07/25/1387017_10_1.pdf (accessed March 1, 2018) (in Japanese)
5. Ueda S, Sugisaki K, Monobe H, Eto T, Watanabe M, Yako-Suketomo H, et al. Actual status of cancer awareness among Japanese school students. *Jpn J Sch Health*. 2014; 56: 185-198. (in Japanese)
6. Sugisaki K, Ueda S, Ueji M, Monobe H, Yako-Suketomo H, Eto T, et al. A Cross-sectional investigation of cancer-screening intentions, sources of information, and understanding of cancer in Japanese adolescents. *J of Cancer Educ*. 2018; 33: 102-108.
7. Yako-Suketomo H. Health instruction and cancer education in the elementary school. *Child and health*. 2016; 92: 2-3. (in Japanese)
8. Ueda S. Cancer education from the point of

- view of education. *Public health*. 2016; 80: 91-96. (in Japanese)
9. Eto T. Cancer education in the school health education. *Health Care*. 2017; 59: 724-730. (in Japanese)
 10. Ueda S. How to lead and thinking of cancer education in the school. *Health Care*. 2017; 59: 731-735. (in Japanese)
 11. Sugisaki K, Ueda S, Monobe H, Yako-Suketomo H, Eto T, Watanabe M, et al. Cancer understanding among Japanese students based on a nationwide survey. *Environ Health Prev Med*. 2014; 19: 395-404.
 12. Monobe H, Ueda S, Sugisaki K, Eto T, Watanabe M, Yako-Suketomo H, et al. A study of information sources and recognition of causes of cancer in Japanese school students. *Jpn J Sch Health*. 2014; 56: 262-270. (In Japanese)
 13. National Cancer Center Japan Cancer Information Service. Cancer prevention based on scientific evidence. Available from: https://ganjoho.jp/public/pre_scr/cause_prevention/evidence_based.html (accessed March 1, 2018) (in Japanese)
 14. Editing committee of cancer statistics 2016. Available from: https://ganjoho.jp/data/reg_stat/statistics/brochure/2016/cancer_statistics_2016.pdf (accessed March 1, 2018) (in Japanese)
 15. Thabane L, Ma J, Chu R, Cheng J, Ismaila A, Rios LP, et al. A tutorial on pilot studies: the what, why and how. *BMC Medical Research Methodology*. 2010; 10:1.
 16. Moore CG, Carter RE, Nietert PJ, Stewart PW. Recommendations for planning pilot studies in clinical and translational research. *Clin Trans Sci*. 2011; 4: 332-337.