An investigation of blended learning in at-home and in-school education of information ethics using tablet PCs

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Abstract. The goal of this study is to develop a blended learning in at-home and in-school education of information ethics using tablet PCs and to evaluate the effectiveness of the lesson. Information technology such as the internet and smart phones in society has been progressing speedily. On the other hand, the negative effects of information technology, such as bullying and calumniation on social media have become social problems for more than twenty years. The education of information ethics has been introduced to schools in order to solve these problems in Japan. However, the problems haven’t been solved yet. Then, the national curriculum standards of elementary and junior high schools stated that the education of information ethics should be brought into the moral instruction in 2008. This requested us to develop a teaching method of moral instruction to educate students in information ethics. Therefore, the theoretical framework of the information ethics was set up, and I established a new judgment model of information ethics. I assumed that ambivalence, the state of contradictory feeling or emotion, exists behind the three types of knowledge and that ambivalence affects inappropriate judgment related to information ethics. Therefore, a teaching method with the aim of overcoming ambivalence should be developed using the structural method. From now on, cooperation with parents is essential to enhance the education of information ethics. I conceived something available to help cooperation with parents. Recently tablet PCs have been brought into the school. Then, I devised the procedure of blended learning. As a result, I developed three steps: 1) Students learn the introduction part of moral instruction in school and learn how to use the tablet PCs. 2) Students take the tablet PCs home and discuss the learning material on the tablet PCs with their parents. 3) Students learn the conclusion part of moral instruction again in school. In order to assess the effectiveness of the lesson, blended learning was practiced on 4rd grade elementary school students. As a result, it was suggested that blended learning was fairly effective in educating the students in information ethics.

1. Introduction
Information technology in society has been progressing speedily. For instance, the internet, smart phones, and social network services have been well developed. On the other hand, the negative consequences of information technology, such as bullying and calumniation on social media have become social problems for more than twenty years. In order to solve these problems, the education of information ethics has been brought into schools in Japan. However, the problems haven’t been solved yet. The MEXT (Ministry of Education, Culture, Sports, Science)-commissioner project (2006) supported schools to educate students in information ethics. The project defined that information ethics consisted of "educating an ability to make the right judgment and the desirable manners in the
information society (the domain to refine one’s mind) " and " educating the understanding of the method for crisis prevention to live safely, the knowledge and technology of security, and consciousness of health (the domain to raise one’s wisdom) "[1].

A lot of associations and education-related companies developed and supplied many teaching materials to enhance students’ wisdom. For instance, “How to walk the networking society” by Japan Association for Promotion of Educational Technology (2005) [2] and “Learning Net Moral from Examples” by Hiroshima Kyohan (2005) were launched [3]. Japan was in a boom for supplying the teaching materials at that time. Sasaki et al. (2005) also created 20 pieces of package of teaching materials for information ethics. They consisted of a reading material, a scene painting, and a lesson plan in order to help teachers use in their lessons rapidly [4]. The objective of this package was to help teachers to teach students how to solve those problems and educate students in information ethics. Although the teachers could teach students how to solve those problems, they couldn’t educate their information ethics so far. Then, the national curriculum standards of elementary and junior high schools stated that the education of information ethics should be brought into the moral instruction in 2008. This requested us to develop a teaching method of the moral instruction. Therefore, the theoretical framework of the information ethics should be set out, and the appropriate teaching method should be investigated. In the previous study, I set up the theoretical framework and investigated the teaching method. I will review them in the section below.

MEXT (2008) described in the guideline for the education of information ethics that cooperation with parents is essential to enhance the education of information ethics [5]. I conceived something available to help cooperation with parents. Recently tablet PCs have been brought into the schools. Then, I devised the procedure of the blended learning model which consists of three steps as shown in Figure 1: 1) Students learn the introduction part of moral instruction in school and learn how to use the tablet PCs. 2) Students take the tablet PCs home and discuss the learning material on the tablet PCs with their parents. 3) Students learn the conclusion part of moral instruction again in school. In order to assess the effectiveness of the lesson, I asked a teacher to practice the blended learning on 4rd grade elementary school students. The objective of this study is to develop a blended learning in at-home and in-school education of information ethics using tablet PCs and to assess the effectiveness of the lesson.

![Figure 1. Blended learning model.](image_url)
2. Methods

2.1. Theoretical framework
Tamada and Matsuda (2005) proposed the instructional method using three types of knowledge [6]. Teachers can teach students how to make appropriate judgments using the three types of knowledge, which consists of ethical code knowledge, knowledge of information & communication technology (ICT), and knowledge of rational judgment (the area surrounded by dotted line as shown in Figure.2). Moreover, Sasaki et al. (2015) presumed that ambivalence which is the state of contradictory feeling or emotion exists behind this knowledge. [7]. For instance, most people know that it is not good to say bad things about others on the internet. However, some of them sometimes can’t help saying bad things if they remain anonymous. I presumed that not only a lack of the three types of knowledge results in inappropriate judgment but ambivalence also affects to inappropriate judgment. Therefore, I added ambivalence behind three types of knowledge and established a new judgment model of information ethics (Figure.2). The education of information ethics will be requested to overcome ambivalence.

![New judgment model of information ethics](image)

Figure 2. New judgment model of information ethics.

2.2. The appropriate teaching method
Japanese teachers and researchers developed several kinds of teaching methods and teaching materials for moral instruction so far. School teachers can choose the teaching method and the teaching material from a large number of reading materials, lesson practices and lesson plans in books and on websites when they make a plan of moral instruction. MEXT decided to change “moral instruction” to “moral instruction as a special subject” in elementary and junior high schools in 2015. Its handbook of moral instruction as a special subject (2015) indicates that the education of information ethics which focuses on the values about legal compliance is important [8].

In this study, a lot of reading materials and lesson practices related to information ethics were reviewed. As a consequence, I selected six sets of reading materials and lesson practices related to legal compliance. Two sets each from three kinds of areas, textbooks, the moral dilemma approach, and the structural method were chosen exactly. I reviewed the reading materials and lesson practices carefully. They were analyzed from the perspective of consistency with the new judgment model of information ethics, in particular, from three points of view as follows. 1) whether the reading material is consistent with the three kinds of knowledge, 2) whether the reading material has ambivalence, 3) whether the lesson practice has guidance to overcome the ambivalence. As a result, I chose the structural method out of three as the most appropriate teaching method.
2.3. The structural method

Kanai (2000) developed the structural method of moral instruction. The structural method is characterized as that to structure values of morality and to put emphasis on internal conflict. He organized the relationships between the values and human nature into five categories, for instance, awareness of values related to the aspect of human weakness and ugliness, awareness of values related to the aspect of human dignity, and so on. He insisted that learners can overcome human weakness by being aware of human dignity in the lesson using the structural method [9]. I showed the new judgement model of information ethics and indicated that ambivalence exists behind three types of knowledge. I assumed ambivalence corresponds to the aspect of human weakness. Therefore, students could overcome ambivalence by being aware of human dignity if the structural method was used in the context of education of information ethics. A lot of lessons using the structural method were practiced in the moral instruction so far. However, only a few lessons to educate students in information ethics have been practiced until now.

2.4. Teaching material

I decided to bring the digital teaching material “Learning Net Moral from Examples” into blended learning. A reading material “A Class Mascot” is includes in the materials. The first reason to choose this reading material is that it is appropriate for teaching the basics of respecting copyrights. Second reason is that it is useful to adapt to the structural method. The abstract of the story is as follows.

| Title: A Class Mascot |
|-----------------------|
| Target: 4th grade students in elementary school |
| Value: Honesty |

A elementary school student, Sayaka was designated as one of the designers of a class mascot at an athletic meeting. She was in a hurry but she couldn’t think of a design. Although she knew that it is not good to copy others designs, she couldn’t help copying the mascot design from her friend Mika since she thought people around her wouldn’t notice.

The next day, she proposed her idea in the classroom and incidentally Mika was absent. Finally, her design was chosen as the class mascot. The classmates drew the mascot on the class flag to use at the athletic meeting. Mika burst into tears when she looked it. The next day, Sayaka decided to tell her homeroom teacher the truth and went to school early in the morning. She told the truth to the teacher honestly.

The objective of the reading material is to live honestly and faithfully as described in the national guideline of the moral instruction. The consistency with the theoretical model is as follows. Ethical code knowledge corresponds to the law observance knowledge, knowledge of ICT corresponds to knowledge of copyrights law, and knowledge of rational judgment of information technology corresponds to knowledge to follow a rule and to obey copyright laws. Based on three kinds of knowledge, the appropriate judgment of information ethics was made so that Sayaka should not copy the mascot design. The teaching method adapting the structural method is as follows. Sayaka was in a hurry but she couldn’t think of an idea of a class mascot. She couldn’t help copying the mascot design from her friend. The teacher interpreted her behaviour as an aspect of human weakness and ugliness. In order to overcome human weakness a method is used that allows the students to be aware of human dignity. In other words, the instruction is introduced that allows them to not only feel remorse her but also to be ashamed to do such things.

On the other hand, there is another objective to teach the basics of respecting copyrights related to information ethics. In particular, it is important to develop a feeling of respect the products which the other people created because the products include their hopes and wishes, and an understanding of copyright law. However, it is impossible to achieve the objectives only in the school education. Therefore, I trust the home education with developing a feeling and an understanding. The bottom line is that I allow the students to take the tablet PCs which the learning material is installed on and ask the
parents to discuss with their children about information ethics with browsing learning materials in the tablet PCs at home.

2.5. Learning material
The target is 4th-grade students in elementary school. Their respect for the products and understanding of copyright laws is insufficient. Therefore, I decided to install the animation learning materials titled “Don’t Change my Picture” and “The Class Mascot Peach-kun” in the tablet PCs. The abstract of “Don’t Change my Picture” is as follows and Figure 4 shows a scene of it.

Yuta learns how to draw his face by using the computer in the computer room. His homeroom teacher said “After finishing drawing, print out the picture and place it in my desk of the homeroom.” So, Yuta went back to his homeroom. Then, there was Akane’s picture on the desk already. He thought her hair in the picture looked strange because it was shorter than usual. He drew her hair longer to fix her picture. Soon after Akane came to the classroom, she burst into tears when she looked at it.

The objective of the animation is to teach respect the products which the other people created because they include their hopes and wishes, and to understand the reason why there are copyrights.

Figure 3. A scene of “Don’t Change my Picture”

Figure 4. A scene of “The Class Mascot Peach-kun”

Figure 4 shows a scene of “The Class Mascot Peach-kun”. This material is an original of a reading “A Class Mascot”. Therefore, these stories are very alike. The objective of the animation is same as “The class mascot Peach-kun”.

2.6. Teaching plan
I devised the procedure of the blended learning which consists of three steps: (1) Students learn the introduction part of moral instruction in school and learn how to use the tablet PCs. After reading the material, the teacher expects the students to empathize with Sayaka’s feeling when she couldn’t help copying the mascot design from her friend Mika. After that, the students learn how to use the tablet PCs and how to discuss learning material with their parents. (2) Students take the tablet PCs home and discuss the learning material on the tablet PCs with their parents. (3) Students learn the conclusion part of moral instruction again in school. The teacher reviews what they learned at home. Then they go back to the previous material and the teacher allows them to contrast Mika’s feeling when she could not look at the mascot on the class flag with that of when she told the truth to her homeroom teacher, and to make them be aware of the guilt and relief that Sayaka felt. Finally, the teacher asks them the reason why Sayaka told the truth, and expects them to be aware of human dignity.

3. Results and Discussion
Purpose: Examining whether the blended learning is useful to educate students in information ethics. Target: Thirty-three 4th grade students in elementary school. Date of the lesson: March, 2017
Practice of the blended learning:
In the beginning of the first moral instruction, the teacher asked the students to answer the sheets of the pre-questionnaire about information ethics to choose one out of five. The students learned the introduction part of moral instruction. The lesson was generally proceeded along with the lesson plan. The teacher put pictures of the scene and the characters on the blackboard to encourage the students to imagine. Figure 5 shows one scene of the lesson. The teacher explained how to use the tablet PCs and how to discuss the learning material with their parents. The teacher also handed out the questionnaire for parents.

Then, the students took the tablet PCs home and discussed the learning material on the tablet PC with their parents.
The next day, the students learned the conclusion part of the moral instruction in school. Almost all students happily raised their hands and shared their thoughts and ideas.

![Figure 5. The moral instruction in school.](image)

3.1. Responses of the students
31 questionnaire sheets were collected from the students. The collection rate was 100%. Table 1 shows the result of average of pre and post questionnaire and t-test between them.

| No | Questionnaire                                                                 | Pre m | Pre SD | Post m | Post SD | t-Test Value | Sig. level |
|----|-------------------------------------------------------------------------------|-------|--------|--------|---------|--------------|------------|
| 1  | If you find something strange in the picture which others drew, you may fix it without saying anything about it. | 1.77  | 1.15   | 1.06   | 0.25    | 3.32         | **         |
| 2  | You may put the pictures of the game character and mascot on your homepage from the internet to make many people browse your homepage. | 2.00  | 1.10   | 1.35   | 0.66    | 3.23         | **         |
| 3  | You may apply your assignment of book report with copying the part which the other people wrote. | 2.00  | 0.68   | 1.03   | 0.18    | 4.99         | **         |
| 4  | You may present a CD copy of music which you bought if your friend is eager to attain it. | 2.26  | 1.21   | 1.87   | 1.23    | 2.34         | *          |
| 5  | You may show the picture of your friend’s funny face to other friends without telling anything him/her about it. | 1.16  | 0.45   | 1.23   | 0.56    | 0.63         |            |
| 6  | You may produce the products using the design or idea of the character and mascot which the other people created. | 1.65  | 0.84   | 1.06   | 0.25    | 3.81         | *          |
| 7  | You think the pictures and products which the other people created contain their hopes and wishes. | 4.94  | 0.25   | 4.74   | 1.00    | 1.03         |            |

The average scores of No.1 to No.3 and No.6 changed significantly (1%) toward the desired direction. The question No.4 also changed significantly (5%) as well. Therefore 5 items out of 7 changed toward the desired direction. On the other hand, question No.5 and No.7 didn’t changed significantly. The average score of No.5 was 1.16 in the pre-questionnaire which means the students answered
appropriately. The average score of No.7 was 4.94 which is relatively high. It means the students answered appropriately. I assumed that the students maintained their recognition about copyrights since they already had appropriate recognition about it. Therefore, it was suggested the blended learning lead the students to the desired direction related to copyrights.

3.2. Respond of the Parents

29 questionnaire sheets were collected from the parents. The collection rate was 93.5%. The factor analysis was conducted using maximum likelihood method and varimax rotation in order to clarify the factors which contributed to the recognition. Three factors extracted are shown in Table 2. The questions whose factor loading ratio was less than 0.6 were excluded.

Factor 1 was interpreted as “Intention to push the education of information ethics” because question No.5 and No.6 indicate the recognition of the education of information ethics in at-home and in-school. Factor 2 was interpreted as “Recognition of their children’s morality” because question No.4 and No.9 were about recognition about morality of their children. Factor 3 was interpreted as “Knowledge about laws of information ethics” because question No.7 and No.8 were asking about parents’ knowledge. Therefore, I can indicate that the consciousness of parents consists of three factors.

Table 2. Result of factor analysis.

| Factor 1 | Factor 2 | Factor 3 | m    | SD  |
|----------|----------|----------|------|-----|
| 6 The education of information ethics at home should be pushed. | .99 | .15 | .00 | 16 | 4.38 | 0.73 |
| 5 The education of information ethics at school should be pushed. | .81 | -.06 | -.16 | 15 | 4.45 | 0.69 |
| 9 Your child has grown his/her self esteem. | .09 | .98 | .02 | 10 | 3.86 | 0.92 |
| 4 Your child acknowledges his/her fault when he/she did bad things. | .39 | .68 | .03 | 4 | 3.76 | 1.18 |
| 7 You (Parent) have knowledge about copyrights. | .11 | .01 | .84 | 13 | 3.97 | 1.02 |
| 8 You (Parent) have knowledge about portraitrights. | -.05 | .09 | .80 | 14 | 3.52 | 1.12 |
| 2 You (Parent) talk with your child about pros and cons of the internet and smart phones. | -.15 | .41 | .10 | 2 | 3.17 | 1.10 |
| 3 Your child does something he/she wants to do without thinking about what others think. | -.17 | -.17 | .24 | 3 | 2.31 | 1.14 |
| 1 The widespread use of the internet and smart phones badly affect children. | .05 | -.04 | -.14 | 1 | 4.00 | 1.13 |

3.3. Responses about learning materials

Table 3 shows the result of the questionnaire about the animation in the learning material. Both of the average scores were more than 4.0 and relatively high. This suggests that most parents recognize that the leaning material are effective in the lessons. From the results of the questionnaires I can conclude that it was suggested that blended learning was fairly effective in educating the students in information ethics.

Table 3. Result of the questionnaire about the learning material.

| Question                                                                 | m    | SD  |
|--------------------------------------------------------------------------|------|-----|
| 1 The animation "Don't Change my Picture" is appropriate to teach that the picture which Akane drew contains her hopes and desires. | 4.38 | 0.73 |
| 2 The animation "The Class Mascot Peach-kun" is appropriate to teach that stealing other's design or idea is not good. | 4.45 | 0.69 |
4. Conclusion
The goal of this study is to develop a blended learning in at-home and in-school education of information ethics using tablet PCs and to assess the effectiveness of the lesson. The theoretical framework of the information ethics was set up, and I established a new judgment model of information ethics. I devised the procedure of blended learning. As a result, I developed three steps: 1) Students learn the introduction part of moral instruction in school and learn how to use the tablet PCs. 2) Students take the tablet PCs home and discuss the learning material on the tablet PCs with their parents. 3) Students learn the conclusion part of moral instruction again in school. In order to assess the effectiveness of the lesson, blended learning was practiced on 4rd grade elementary school students. As a result, it was suggested that blended learning was fairly effective in educating the students in information ethics.

Notes: This work was additionally modified and written from Sasaki (2016) [10] and Sasaki (2018) [11].

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Acknowledgements
This work was supported by JSPS KAKENHI Grant Number 15K01104.