

Realization and Evaluation of an Information Morals Education System by Experience of an Assailant and a Victim by Virtual Reality

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Abstract

As a method of instruction of information morals education, Tamada and others proposes the method of instruction by three sorts of knowledge, and also supposes that the method called "feedback method" of making one's act examine from a victim's position is effective to the student of low information morals (Tamada et al.1987). In this research, the new teaching materials which combined a feedback method and virtual reality (VR) technology were developed, and the effect was verified. In order for the student of low information morals to make it specifically look back upon the act performed within VR from a victim's position, within VR, the subject's head shot was attached to the face of the avatar which serves as an assailant, and victim experience was carried out. As a result, before and after carrying out victim experience, improvement in the consciousness to information morals and reduction of the act contrary to information morals were seen.

Keywords: *information morals education, feedback method, virtual reality (VR), Sensor Function*

1. Introduction

1.1. Background

With progress in computerization, the importance of information morals education is continuing to increase (The Central Education Council, 2008). Hence the "information morals method of instruction by three sorts of knowledge" to which the methods of instruction of the moral education by three sorts of Murai's (Minoru Murai, 1987) knowledge were applied as a new method of instruction is proposed. Tamada and others further developed the ICT teaching materials for information morals judgment study which used the gaming simulation technique, and is verifying the educational effect (Tamada and Matsuda 2004). It is pointing out the similarity to the unsuitable action which the student performed, and the example by which the student concluded that others' act were immoral (Hereinafter, feedback method). Tamada and others do not verify the educational effect in an act level, but just the teaching materials using a simulation procedure is wanted to have the means which can verify the existence

of the act in the inside of a virtual environment (Tamada et al. 2004). In order to correspond to the above awareness of the issues, Nakayama and others (Hiroshi Nakayama et al.2007) have proposed a practical use of virtual reality technology (following, VR)

1.2. Purpose

This research acts to focus on students of low information morals as the main target, and develops the information morals instruction teaching materials which combine how to detect the act contrary to information morals using VR, and Tamada's feedback method (Tamada et al. 2005). Moreover, the experiment using these teaching materials is conducted and the effect is verified.

2. Teaching-Materials Development

2.1 Usage of Sensor Function

The action information of the subject in VR is specifically (Figure 1) collected in three ways, a distance sensor, a visual sensor, and a position sensing device, and the information was recorded on a database automatically by making a result into a log. This way particularly allows one to confirm the trace by the action after an experiment by establishing the position sensor (Figure 2). Furthermore, through these functions, the movement course and the viewpoint direction of the subject can be improved to detect the contact with the object.

2.2 Realization Method of Feedback Method

It is made to experience about the same subject situation to the student of low information morals with the teaching materials developed by this research in order of "assailant's position -> victim's position -> assailant's position." When making a victim's position experience in this case, by attaching the image of a student's own face to an assailant's VR avatar, it is able to look back upon how the student acts in sight of other victims, and appeals to what influence it has on the other's understanding to create an act leading to that contrary to information morals.

2.3 Situation Setting Outline

In this research, the assailant in a train (Figure 1, Figure 3) and the assailant in the small room (Figure 4, Figure 5) were first prepared as a setup of assailant experience. Moreover, the victim in the train (Figure 6) and the victim in the small room (Figure 7) were prepared as a setup of victim experience.

2.3.1 Assailant Situation in Train: In this situation setup (Figure 1), it is speculated whether a student will look at another's portable phone screen. The situation where the avatar (victim) seen from a student's (assailant) field of view in the train is using the mobile phone is set up. Here, the instruction "get out of the train and go to the signboard" with the written word "Finish" is given. In that case, it is verified how the student moved and how he/she tried to look at the mobile phone's screen used by the avatar. The function and the purpose of each sensor (Figure 1) in the train are as follow.

A: The two types of range sensors establishes that varied in the detection range mainly on an avatar (victim) operating a mobile screen in the initial viewpoint in front of the learner. Thereby, this can detect the degree approaching a portable screen.

B: A visual sensor is installed so that it may react, if carrying of an avatar goes into a student's vision's zone. This detects whether the subject is going to intentionally look at the avatar's activities.

C: The position sensor is to locate it (they are a total of 1008 pieces at 18 rows by 56 rows) in a division, and the action trace which passed the position sensor of the learner is recorded for a database. This detects the action of a student's avatar (victim).

D: In addition, standard to judge "to have peeped" in this setting scene is a case when it is judged that range sensor B and a detection result of the vision sensor and an experimenter approached an avatar from the trace of the position sensor artificially.

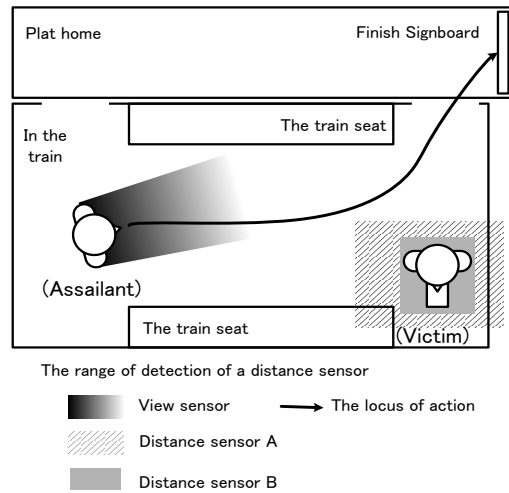


Figure 1. Detection Range and the Position of Each Sensor in a Train

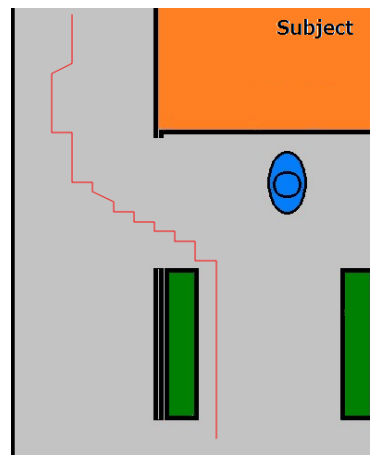


Figure 2. Example of Locus of the Action Acquired With Position Sensing Device

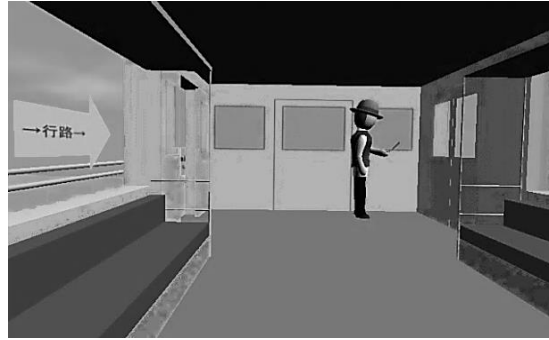


Figure 3. Initial Viewpoint of Subject (Assailant) In Train

2.3.2 The Situation of Assailant in the Small Room: This situation setup (Figure 4) evaluates whether a student looks at the personal information on the screen of a personal computer in the room in which nobody is present.

The instruction is: "Enter from the door and take the documents on the desk, and return to an entrance". Then, it evaluates how the learner moves as he/she approaches a desk other than the designated desk and whether he/she tries to look at the computer screen on the desk.



Figure 4. Initial Viewpoint of Subject of Small Room

The function and the purpose of each sensor (Figure 5) in a small room are as follow.

A: The two types of distance sensors prepared from which the range of detection differed centering on the personal computer screen within the initial viewpoint of the learner. The difference in a range of detection detects the learner approaching a personal computer.

B: A touch sensor was installed so that it would react if a student clicked the screen of the personal computer where it is written, "Touch a screen." This detects whether the student is going to look at the personal computer screen intentionally.

C: The position sensing device can take the locus of the action along as the student passed by the arranged on a grid (they are a total of 682 pieces at 31 rows by 22 rows). The result is recorded on a database.

D: In addition, the standard to judge the peeping in this setting scene is done through the two types of distance sensor and the touch sensor, and the experimenter approaching the avatar intentionally from the focus of the position sensing device.

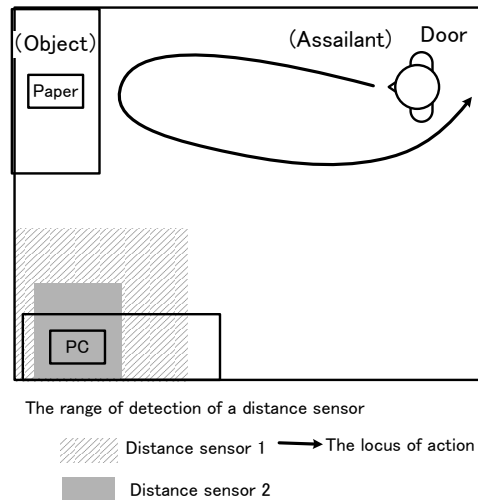


Figure 5. Range Of Sensor of Small Room

2.3.3 Victim Situation in the Train: This situation (Figure 6) is a setup for a student to take the position of the victim who has peeped into a mobile phone screen in a train.



Figure 6. Viewpoint of Victim in Train

A student makes it experience within VR to peep into a mobile phone screen from an avatar (assailant) from the viewpoint of which the mobile phone screen being operated. At this time, the reality was raised by attaching a motion to an avatar. Moreover, it is considered by oneself whether the act which the student itself performed is in charge of a peep by using a student's photograph for an assailant's face.

2.3.4 Victim Situation in a Small Room: In this situation setup (Figure 7), a student assumes that the surveillance camera of the small room in which nobody is present is monitored. There, an avatar (assailant) comes into the room from the outside of a field of view in order to take some documents and looks into the personal computer currently installed in the room, then leaves. At this time, the reality was raised by attaching a motion to an avatar. Moreover, it is considered by oneself whether the act which the student itself performed is guilty of a peep by using a student's photograph for an assailant's face.



Figure 7. Viewpoint of Victim of Small Room

3. Evaluation Experiment

3.1 Experiment Procedure

The following experiments were conducted in order to verify whether VR teaching materials developed by chapter 2 are effective as the technique of performing information morals education to the students of low information morals. The procedure of this experiment is roughly divided into the 1st judgment (A to D) of information morals of the first half, and the 2nd judgment (F to H) of information morals of the second half. Since the purpose of this research has focused on instruction to the students of low information morals, it aims at dividing into the low group of information morals, and the group which is not so in the 1st judgment. And the effect to the subject judged as information morals being low by the 2nd judgment is verified. In addition, the following numbers correspond with the number in Figure 8.

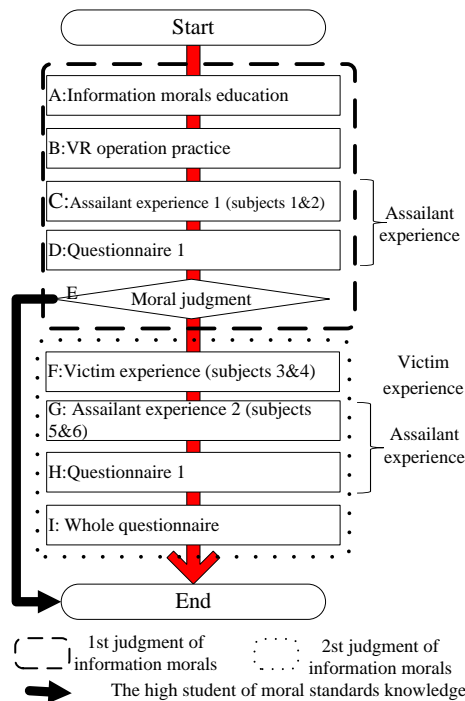


Figure 8. Procedure of Experiment

A: Web page performs information morals instruction based on Tamada's [5] three sorts of knowledge.

B: In order for the action of the avatar in VR to prevent inferring what does not reflect a student's intention (judged with having tried to look into although there was no intention to look at a screen) by operation mistake, the maze of easy VRML as operation practice is made to experience.

C: Experience by the side of the assailant in a small room (subject 2) and in a train (subject 1).

In addition, in analysis of the result mentioned later, it is considered that the reaction in this experience is a prior state.

D: In order to analyze the result mentioned later to estimate the learning effect like C, the questionnaire 1 (Table 1) survey is conducted as a preliminary survey.

E: In this stage, at least one of the subjects 1 of C and the subjects 2 react to a sensor, and only the subject judged that information morals is low from the reply of the questionnaire 1 of D carries out the process of F to I.

Other subjects become the end of a task here, and do the outside of the task of the analysis mentioned later.

F: Experience by the side of the victim in a train (subject 3) and in a small room (subject 4).

A subject's (itself) face is attached to the face of an avatar (assailant) at this time.

G: Once again, experience by the side of the assailant in a train (subject 5) and in a small room (subject 6).

In analyzing the result mentioned later, it is considered that the reaction in this experience is a subsequent state.

H: The questionnaire 2 survey is conducted with the same contents (Table 1) as the questionnaire 1.

I: The whole questionnaire (Table 6) survey about these teaching materials is conducted.

Table 1. Question Item of Questionnaires 1&2

No.	Question item
1	I was able to act honestly in emotion.
2	I only followed the instructions given
3	I was interested in the information on the screen of the mobile phone (#)
4	I tried to see the screen information of the mobile phone (#)
5	I thought it wouldn't be a problem if I looked at the screen information of the mobile phone (#)
6	If I can see the screen information of the mobile phone, I would look at it. (#)
7	I thought I would become sly if I looked at the screen information of the mobile phone.
8	I thought that looking at the information on the mobile phone was not good.
9	I was able to act honestly in emotion.
01	I only followed the instructions given
11	I was interested in the information displayed on the nearby personal computer's screen (#)
21	I tried to look at the information of the personal computer nearby (#)
31	I thought it wouldn't be a problem if I looked at the screen information of the mobile phone (#)
41	If I can see the information displayed on a personal computer nearby, I would look at it. (#)

1	I thought to become ornery If I looked at the screen information of a personal computer nearby
5	
1	I thought that looking at the information displayed on the nearby personal computer was not good.
6	

* All the contents of the question items are affirmative expression. This was done in order to ease the question contents comparison. However, what (#) attaches to the end of the item was shown in the form of the reversal item at the time of the question.

**The questionnaire consists of five steps.

(5: I really thought -- 1: I did not really think so)

3.2 Result and Consideration

In order that these teaching materials might evaluate whether the improvement of information morals is demanded from the student of low information morals, the data collected in the experiment was analyzed as follows. In addition, although there were 92 experiment participants, the number of those who experienced F ~ I was 35.

3.2.1 Result Depended on Log Data of Sensor:It considered that "C: assailant experience 1" and "G: assailant experience 2" of Figure 8 were beforehand and the after the event one, and summarized the existence of the reaction of three sensors (a position sensing device, a distance sensor, a field-of-view sensor) in each in Table 2.

Since a sensor did not react, after the event of experience in a small room experience is 34 persons.

Table 2. Result of Each Sensor of Assailant Experience

Sensor reaction	Experience in a train		Small room experience	
	Beforeh and	Poster iori	Beforeh and	Poster iori
No	8	24	11	26
Yes	27	11	24	8
Significant difference	**		**	

**As a result of chi-square test, when the significant difference was seen 1% level, it is shown as **.

Official approval was performed the chi-squared test and it was examined whether it would be relevant between the reactions of before and after. The relevance in the level was seen 1% by each scenario as a result, "experience in a small room", and "experience in a train". From these experiments, through victim experience, it is suggested that there was an improvement effect over information morals.

3.2.2 Analysis of Questionnaire Result: It considered that the reply to each item in "D: Questionnaire 1" and "H: questionnaire 2" of Figure 8 was a situation of the consciousness of victim experience before and after, and it was Sore wa bunsan bunseki de hikaku shita.もしかして: それは分散分析で比較した。

Compared by analysis of variance, the improvement of information morals was found for the low subject of information morals by two or more items as shown in Table 3. The comment "Since he did or was done, it turned out that change of a feeling appears greatly." was also looked at through free descriptions. Table 4 shows these teaching materials had high evaluation as instruction teaching materials from the reply of the questions 4.5. The evaluation to making the position of both an assailant and a victim experience especially was high.

Table 3. Comparison Result of the Questionnaire 1&2

No	Questionnaire 1		Questionnaire 2		Significant difference
	Avg	S.D	Avg	S.D	
1	3.98	1.14	4.17	1.10	-
2	3.03	1.42	3.77	1.42	
3	2.70	1.70	3.63	1.44	*
4	2.92	1.83	4.00	1.46	*
5	3.55	1.57	4.20	1.02	*
6	3.10	1.55	3.54	1.27	
7	3.50	1.43	3.34	1.45	
8	4.03	1.23	4.20	0.90	
9	4.00	1.28	3.97	1.20	
10	3.33	1.65	3.86	1.35	
11	1.92	1.35	3.03	1.44	**
12	2.15	1.56	3.63	1.37	**
13	2.92	1.65	3.71	1.20	*
14	2.37	1.31	3.17	1.34	*
15	3.28	1.30	3.74	1.31	
16	3.80	1.34	4.34	0.94	

** The significant difference considered that five-step evaluation was an interval scale, and compared it by analysis of variance. When the significant difference was seen 5% level, it is shown as *, and it was seen 1% level, it is shown as **.

Table 4. Average Value of Whole Questionnaire

No.	Question item	Avg.
1	Was operation of a personal computer difficult?	1.97
2	Was operation of a personal computer pleasant?	3.31
3	I wished to do this type of test again.	3.29
4	I thought that VR was useful for education.	3.69
5	I regarded experiencing the position of both an assailant and a victim as a deepening understanding.	4.06

6	Is it contrary to information morals if I had known that my face was used as an avatar?	3. 34
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**The questionnaire consists of five steps. (5: I thought so at all -- 1: I did not think so at all)

From the above work, as far as the example of this experiment is concerned, it is believed that by carrying out the information morals education using these teaching materials that an information morals improvement has an effect.

3.2.3 Compatibility of Self-assessment and Log: Finally, in order to investigate the relation between the reply of a questionnaire, and an actual act, set by "the inside of a train" and "small room" experience, the relation of three factors ("Before or after" x "It tried (or not) to see a screen." x "It was recorded (or not) on the log which shows that the screen was seen.") was summarized in Tables 5.6. Although Nakayama and others [8] also examined, even if it has answered, "It did not try to see a screen", there may be those who "tried" in fact.

Table 5. Comparison of Self-Assessment and Log Record (Experience in A Train)

Experience in a train	Victim experience	Recorded on the log.		Not recorded on the log.	
		Before and	After	Before and	After
It tried to see the screen.	Before and	6	2	3	7
	Posteriori	5	1	4	
It did not try to see the screen.	Before and	1	1	5	2
	Posteriori	6	7	0	

Table 6. Comparison of Self-Assessment and Log Record (Small Room Experience)

Small room experience	Victim experience	Recorded on the log.		Not recorded on the log.	
		Before and	After	Before and	After
It tried to see the screen.	Before and	2	2	6	1
	Posteriori	4	6	8	
It did not try to see the screen.	Before and	2	6	5	2
	Posteriori	4	9	1	

According to Tables 5.6, actually, there were 17 students "the inside of a train" (beforehand: 11, after the event: six), and six students "in a small rooms" (beforehand: two, after the event: four). It is necessary to examine in detail whether it was recorded on the log through a malfunction of a system and the subject's operation mistake, or if these students really tried to see intentionally. However, in this research, it differs in that the touch sensor is added, in the situation of the "small room" adopted in common by Nakayama (2007) and this research. In spite of the answer in Table 6, "It did not

try", as for all of six cases recorded on the log, the touch sensor has reacted. Therefore, it is difficult to interpret whether there was no intention to look at a screen that was there. On the other hand, it is interpreted as the case where "it tried" was not recorded not having carried out a touch, although he/she approached. On the other hand, in the situation "in a train", the case where "I did not try" was recorded on the log is more than twice the case where "I tried" was not recorded. In the situation of "in a small room", since this rate is reversed with about 1/3, a possibility of the sensitivity of a sensor being too high and recognizing cannot be denied. However, in order not to cause trouble over the problem of morals as already stated, it is important to consider this so that the side which receives damage may not do the act which they may think is unpleasant.

So, in order to use the feedback method more effectively, it is necessary to devise the following two points. At first, in the situation of a "small room", when a touch sensor is touched, the shutter sound of a camera carries out and it returns the feedback which shows that the assailant's photograph was taken into the screen. At second, In the situation "in a train", when it is judged that it tried to look into the screen of a mobile phone, an assailant's face is reflected in the screen of a mobile phone, and it is confirmed that a victim turns back. In addition, when it is investigated whether the same person would be contained in the case (six affairs and four affairs) recorded on the log, answering subsequently in the situation "in a train", and the situation of a "small room", "I did not try", two people responded to it.

4. Subject of Conclusion and Future

The validity of the learning effect in the information morals education using the information morals instruction teaching materials which combined the teaching materials using VR and a feedback method was verified. As a result, it not only experiences only an assailant, but it becomes possible to understand both feelings by experiencing a victim's position, and leading to improvement in information morals was suggested. However, since only one person per address can experience and preparation also takes time when using a head shot, for carrying out the education using this function simultaneously in a simultaneous lesson, preparation takes time. Consequently, it is thought that it is necessary to make improvement for employing teaching materials efficiently.

Acknowledgements

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References

- [1] The Central Education Council (2008). *About the improvement of the government guidelines for teaching of a kindergarten, an elementary school, a junior high school, a high school, and a special support school*. http://www.mext.go.jp/a_menu/shotou/news/news/20080117.pdf (Reference day 2014.3.15)
- [2] Minoru Murai. *Is it possible moral education? / The logic of moral education*, Syogakukan, Tokyo (1987).
- [3] Yukie Tamada and Toshiki Matsuda. Development of the Instruction Method of Information Morals by the Combination of Three Types of Knowledge, *Japan Journal of Educational Technology* 28:2, pp.79-88, (2004).
- [4] Yukie Tamada, Toshiki Matsuda and Shinichi Endo. The Construction of Morality Scale and Finding the Groups of Learners' Response Patterns for Information Morals Education by the Combination of Three Types of Knowledge, *Journal of Japanese Society for Information and Systems in Education*, 21:4, pp.331-342, (2004).

- [5] Yukie Tamada, Toshiki Matsuda and Hiroshi Nakayama. Development of Learning System for Information Morals Judgment from Three Types of Knowledge, *Journal of Japanese Society for Information and Systems in Education*, 22:4, pp.243-253, (2005).
- [6] Hiroshi Nakayama et al... Experimental Research for Utilizing VR as Teaching Materials of Information Morals Instruction Dealing with an Information Peep, *Journal of Japanese Society for Information and Systems in Education*, 24:1,pp.26-34, (2007).

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