End of AY 2017 Report for SIP – Group 2

Project ID & Title

SIP17-02 GLEG (Global Leaders X Ethics X Games) – Development of a new learning method for primary stages of ethical decision-making using gamification –

Team

GSDM ID	Name	School	Department	Year (e.g. D1)	Leader/ Member
15104	Haruku Shirahata	Engineering	Chemical system engineering	D1	Co-leader
15105	Kai Takeuchi	Engineering	Precision engineering	D1	Co-leader
15208	Akiyuki Masuda	Engineering	Systems Innovation	D3	Member
16102	Meng Su	Engineering	Precision engineering	M2	Member
17108	Guanxiong Wang	Frontier Sciences	Computational biology and medical sciences	M2	Member
17211	Asami Takahashi	Public policy		M1	Member
17201	Santosh Rauniyar	Medical		M1	Member
17205	Harushisa Yamamoto	Engineering	Systems Innovation	M2	Member

Objective: Explain what social/global issues that this project tried to address and why the issue is important.

The ethical capacity building including decision making is a large concern in the high school education. In Fy2016, we developed the interactive game to train the capacity to recognize broad perspectives which are needed to identify the potential ethical issues. The developed prototype games were implemented to GSDM students at the student-led session on March 18th, 2017. However, the educational effect of the prototype games are not declared with quantified analysis, and the target players of the games are limited to future global leaders. Therefore, to broaden the possibility of our game, we aim to implement the games at university or high school classes, which can lead to productization of the learning method including the games updated from the prototypes. For the goal, we set three objectives as follows;

1. Improve and confirm advantages of the game as an educational tool through implementations

To utilize our game as an educational tool, we needed to sophisticate the game to be endurable for the actual lectures in high schools. Since our game had been still prototype in FY2017, productized educational materials and a robust system were necessary to provide proper education. Additionally, the quantitative evaluation of educational effect is also needed to apply our game to high schools.

2. Contribute to educational effectiveness in HS classes about social issues by implementations

To address the issue of the ethics education in High schools, the implementation of our game in actual classroom is highly required. Only the implementation means truly giving a solution to a social problem.

3. Propagate our gamification approach and philosophy in educational society

Once our educational method is proven to be efficient for the issues of the ethics education, our method should be propagated to enhance the contribution for the society. In addition to the implementations at high schools, approach to the educational society would be advised to leave out method in schools.

Method: Explain through what kind of approaches you tried to achieve the objective.

*About the list and details of the interview, add the appendix.

1. Improve and confirm advantages of the game as an educational tool through implementations

To utilize the game as aneducational tool, we developed the new lecture style including the introduction, rules, facilitation and evaluation of the game which are suitable for the condition of high school classes. Additionally, the educational effect can be measured by the number of the ideas that students write down in the game. In the modification of the game, we have fabricated reusable materials which are made of a firm paper instead of nomal paper for the prototype as well as the online version game that enables convenient facilitation than that of the paper-based prototype. To achieve those achievments, we conducted several intervews with experts such as Prof. Kuri in Tohoku University, who is working on the project in which her team prooductized and commercialized an educational game, and Prof. Nishio in Tsuru

University, who provided us advice on the dilemma cases in our game.

2. Contribute to educational effectiveness in HS classes about social issues by implementations

As so far, we have done with four implementations (one at an university and 3 at high schools). Each implementation is conducted with positive feedbacks from the teachers. Our facilitation method is also improved so that the our lecture style got more feasible for high school cllases as we had the implementations. We also had a sinmplified workshop on our game in Musashi HS for next implementation in the next academic year.

3. Propagate our gamification approach and philosophy in educational society

To spread our method, we have presented the result of the implementation at Gakugei Univ. high school in the domestic conference 日本社会科教育学会. Furthermore, we had meetings with experts in education in Kyushu in March 2018 to get advises for propagation of our game. We also conducted the workshop in the Leading graduate program in Kyushu Univ. to share our idea.

Outcome: Explain what kind of results you obtained from this project and discuss how it addressed your focal social/global issues.

1. Improve and confirm advantages of the game as an educational tool through implementations

As the result of the quantitative evaluation of the implementation at Gakugei univ. high school, we demonstrated that our game enhances the capacity of students to imagine other perspectives which are proven by the increase in the number of students' ideas. In the light of the game facilitation, the reusable materials was also effective to reduce the effort to prepare the implementation which means the game have potential to be employed in high schools without our facilitation.

2. Contribute to educational effectiveness in HS classes about social issues by implementations

As we implemented our game, we found that High school teachers preferably employed out method in their classes. We even got an offer to implement the game in Musashi high school in following FY. It is indicated that our method is starting to contribute to the society by meeting the demands.

3. Propagate our gamification approach and philosophy in educational society

At the conference, our concept with the quantitative measurement of the educational effect was highly evaluated. It is suggested that our method has a potential to be employed in high school classes with a room for improvement.

With those outcomes, we addressed the issue of the ethics education in high schools by applying our educational method that has demonstrated the educational efficiency qualitatively and quantitatively.

Budget: List the budget this project implemented. *About the details, add the appendix.

Purposes	**Expense**
Books	3182
Implementation	32366
Travel fee	341160
Conference	7655
Supplies	49580
Online service	7128
Others	0
Total	441071

Appendix (option)

List of interviews

No.	date	Interviewee	Affiliation	place	purpose	contribution to the project	Interviewer	Budget spent (yen)
1	17 Sep, 2017	Prof. Osamu Nishio	Tsuru University	Sociology department, Tsuru University	Having feedback about our presentation at the domestic conference and implementations at high schools	Prof. Nishio is an expert in the social studies at high school, and he has the long-term experience of teaching at high schools. We had a discussion about effective dilemma cases to be used at high schools to attract the students to enjoy the game as well as to let them build the capacity of ethical decision making.	Meng Su, Guanxiong Wang, Akiyuki Masuda	5,460
2	20 Sep, 2017	Dr. Miwa Kuri	International Research Institute of Disaster Science, Tohoku University	Aobayama Campus, Tohoku University	Learning the strategy for productization by her experience with the “Disaster Mitigation Action Card Game”	Dr. Kuri is a faculty member of one of the Leading Graduate School “Inter-Graduate School Doctoral Degree Program on Science for Global Safety”. She is a mentor of a student group, and the group developed a card game for capacity building of disaster mitigation. They have an experience of commercialize their products, which is utilized to make our products propagated to the society.	Akiyuki Masuda, Kai Takeuchi	22,620
3	5 Mar, 2018	Mr. Yoshihiro Fuchigami	Kumamoto prefectural government, the Education bureau, Education instruction station, Senior High School Education Section	Kumamoto prefectural government	To have a discussion about dilemma seeds considering the current issues of high school students	Mr. Fuchigami was introduced by Prof. Yoshida, and he is working with improvement of high school educations. In particular, his group is working to prevent bullying among high school students, which is one of the biggest issues in recent high schools. We are going to find some dilemma seeds to be implemented at Musashi high school in March 2018, and in the next fiscal year.	Kai Takeuchi, Asami Takahashi	318,540 as the whole Kyshu trip)

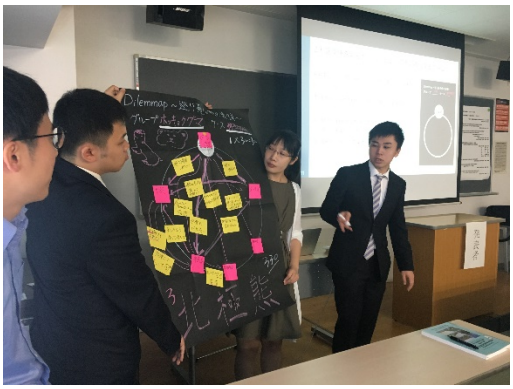
4	5 Mar, 2018	Prof. Michio Yoshida	Faculty of Education, Kumamoto University	Kumamoto University	To discuss the strategy to propagate our games to the society	We have once visited Prof. Yoshida in 2016, and have taken contact with him after the visit. He is an expert in education and has an experience of being a principal at a high school. We are going to have a feedback about educational outcome of our games, and the strategy of propagation.	Kai Takeuchi, Asami Takahashi	318,540 as the whole Kyshu trip)
5	6 Mar, 2018	Mr. MikiakiIwasaki	Foodbank Fukuoka	Headquarter of Foodbank Fukuoka	To learn their activities to reuse wasted food	Foodbank Fukuoka tries to reuse unconsumed food and distribute them to, e.g., children who cannot eat well at their home. The unconsumed food is offered by farmers, retailers, and consumers. We are going to hear their activities to reuse and distribute the unconsumed food to be shared at the implementation at Musashi high school.	Kai Takeuchi, Asami Takahashi	318,540 as the whole Kyshu trip)
6	6 Mar, 2018	Mr. Yasushi Matsuo	The Merry Corp.	Headquarter of Merry Corp.	To learn their activities to recycle wasted food	The Merry Corp. is a waste disposer of mainly wasted food. They have an original technology of decomposition of wasted food to utilize it as farmyard compost. We are going to hear their detail activities of utilizing wasted food to be shared at the implementation at Musashi high school.	Kai Takeuchi, Asami Takahashi	318,540 as the whole Kyshu trip)
7	6 Mar, 2018	Mr. Hironori Kikutake / Mr. Masakazu Yasumoto	Chief of the headquarters, The organization headquarters, FCO-OP / Chief director, Association activity department, FCO-OP	Headquarter of FCO-OP	To learn the countermeasures against food waste as a retailer	FCO-OP is a popular retailer in Fukuoka area, and implemented some countermeasures to reduce food waste by collaborating with food banks. We are going to hear their experiences or philosophy about the countermeasures to be shared at the implementation at Musashi high school.	Haruku Shirahata, Santosh Rauniyar, Meng SU	318,540 as the whole Kyshu trip)

Implementation list

No.	date	Teacher in charge	Affiliation	place	Implemented dilemma cases	Contribution to the project	Visited member	Budget spent (yen)
1	17 Jun, 2017	Mr. Shuntaro Yamakita	Tokyo Gakugei University Senior High School	Setagaya-ku, Tokyo	1. Planning the venue of the high school trip 2. Allowing a maternity leave for high school students	Confirmed the educational effectiveness of our games both quantitatively and qualitatively.	Kai Takeuchi, Haruku Shirahata, Meng Su, Guanxiong Wang, Akiyuki Masuda	7,560
2	30 Nov, 2017	Mr. Hirotaka Hanai	Izumi High School	Saitama-city, Saitama	Reducing food wastes	Experienced to provide a dilemma case from the interests at the high school. Confirmed that our game can be implemented in the environment with no internet access.	Haruku Shirahata, Meng Su, Haruhisa Yamamoto	6,106
3	12 Jan, 2018	Mr. Hiroyuki Toyooka	Yashio-minami high school	Yashi-city, Saitama	Implementation of bike lanes in Yashio-city	Experienced to provide a dilemma case from the concern at the high school. Confirmed that the former part of our game can also be facilitated by teachers at high schools, not by the project members	Haruku Shirahata, Santosh Rauniyar, Haruhisa Yamamoto, Akiyuki Masuda	7,040
4	19 Jan, 2018	Mr. Kiyoshi Karaki	Master's program in education in University of Tsukuba	Tsukuba-city, Ibaraki	1. Planning the venue of a high school trip 2. Reducing food wastes	Had some feedback from students with the experience of teaching at high schools about the educational effect of our games. Propagated our game to the students who will be high school teachers in the future.	Haruku Shirahata, Asami Takahashi	6,760

5	7 Mar, 2018	Prof. Kun Qian	Graduate education and research training program in Decision Science for a sustainable society, Kyushu University	Fukuoka -city, Fukuoka	1. The dilemma case provided by the program in Kyushu Univeristy 2. Reducing food wastes	The program in the Kyushu University Workshop with a Leading Graduate Schools “Decision Science” focuses on making decisions to be successful under uncertainties with various stakeholders. Our game focuses on letting students realize dilemmas, which is the former stage than the one the program focuses on. We are going to have a workshop with them to propagate our game, and to find a possibility to make a collaboration with them.	Haruku Shirahata, Akiyuki Masuda, Kai Takeuchi, Asami Takahashi, Meng Su, Santosh Rauniyar	318,540 as the whole Kyshu trip)
6	13 Mar, 2018	Mr. Hiromasa Kajitori	Musashi high school	Nerima-ku, Tokyo	1. Reducing food wastes 2. To be decided by considering the school’s concerns or interests	We already had a discussion with Mr. Kajitori, the principal of the high school, to discuss about the dilemma seeds of the high school. The school has the characteristic as all-boy schools, and has the unique activities to let the students learn from the actual society. The dilemma cases to be used are going to be decided based on the experience at the interview at Kyushu.	Haruku Shirahata, Akiyuki Masuda, Kai Takeuchi, Asami Takahashi (for the dicusussions)	4,940

Pictures at the domestic conference on Sep. 17th, 2017 (The 67th Japanese Association for the Social Studies annual conference)



Details of budget implementation

Purposes	**Detail**	**Expense**
Books	オムニバス技術者倫理研究会, “オムニバス技術者倫理 第 2 版”	3182
Implementation	Tokyo Gakugei University Senior High School (Tokyo, 4 students)	7560
	Izumi High School (Saitama, 3 students)	6106
	Yashio Minami High School (Saitama, 4 students)	7040
	Master’s program in education in University of Tsukuba (Ibaraki, 2 students)	6760
	Musashi High School) (Tokyo, 10 students in total)	4940
	Total	32366
Travel fee	Interview with Dr. Kuri (Tohoku Univ.)	22620
	Interview with Prof. Yoshida (Kumamoto Univ.)	318540
	Interview with Mr. Fuchigami (Education Agency of Kumamoto Prefecture)	
	Interview with FCO-OP (Fukuoka)	
	Interview with The Merry Corp. (Fukuoka)	
	Interview with FOODBANK FUKUOKA (Fukuoka)	
	Workshop with Graduate Education and Research Training Program in Decision Science for a Sustainable Society (Kyushu Univ.)	
	Total	341160
Conference	Oral presentation in The 67th Japanese Educational Research Association for the Social Studies (JERASS) Annual Conference	7655
Supplies	Blackboard sheets, marker pens	49580
Online service	Web server	7128
Total		441071

倫理的意思決定のための能力育成ゲーム開発

―東京学芸大学附属高等学校における授業実践―

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華井和代（東京大学）

【キーワード】倫理教育、ゲーミフィケーション、可視化

１．はじめに

多くの現実的な意思決定において、多様なステークホルダー（以下、関係者）が存在し、トレードオフ関係が存在する。このような状況における倫理的な意思決定は容易ではない。

高校公民科の学習指導要領では、「倫理」の目標として、「他者と共に生きる主体としての自己の確立を促し，良識ある公民として必要な能力と態度を育てる」ことが掲げられている。この目標の達成には、社会の潜在的な問題や未経験の事例に対して柔軟に対応する想像力を身に着けることが重要になる。本報告では、こうした柔軟な発想を促す手段としてゲーミフィケーションの有効性を示す。近年、ゲーミフィケーションが教育で用いられる事例は増えてきており、能力向上に有効なアプローチとして認識されている[1]。そこで報告者は、倫理的意思決定に資する能力を育成する教材として、高校倫理の授業に適したゲームを設計し、開発した。既往の研究によると、倫理的意思決定のプロセスは、潜在的なジレンマなどの問題認識と意思決定に分けて考えることができる[2]。本ゲームは問題認識の段階に焦点を絞り、広い視野のもとで多様な人々の観点を想像すること、利害関係を可視化することを通した問題構造を理解することに特化した能力向上を意図している。報告者は高校生を対象に授業実践を行い、その内容と教材としてのゲームの効果を報告する。

２．開発したゲームの内容

「Ethics against Ethics（以下、EaE）」、「Dilemmap」と名付けた 2 段階構成のゲームを開発した。両ゲームでは、プレーヤーに対して、予め用意した仮想の社会問題の事例(以下、事例)を提示する。この事例ではある特定の当事者の視点での解決案が一つ提示されている。前者のゲームは 3-4 人で構成されるテーブル内で行われ、仮想事例内で提案が実行された結果について、関係者に及ぼしうる負の影響(観点)についての発想力を競わせる。プレーヤーに着想した観点をオンライン上に投稿してテーブル内で共有させ、質の高い観点に対して相互投票によって得点を決めさせた。その際、事前に前提条件、関係者、内容について発想するよう指示し回答形式を統一した。また観点の相互評価の軸を「なるほど」「あり得そう」「ユーモア」とすることで柔軟な発想を促した。Dilemmap では、各テーブル内で EaE で挙げた観点をもとに、関係者間の利害関係を矢印で図式化させた(図 1)。他の関係者を介して提案者自身に向かう利害関係のループをジレンマとして定義し、認識したジレンマの数とその論理性を競わせた。図式化したジレンマの構造をテーブルごとに発表させ、最も論理的な Dilemmap を相互投票によって評価させる。また、Dilemmap では一つの仮想事例について模造紙上に直接利害関係図を書かせることで、プレーヤーやテーブル間での共有を容易にした。ゲームの設計では色合いなどの審美的側面についても考慮した。

図１　授業風景（Dilemmap の発表）

３．分析方法

ゲームの教育効果は参加者のゲーム中の回答についての統計と事後アンケート調査の結果の二つのアプローチで評価した。EaE では合計 4 回のプレーを行い、1〜3 回目では難易度別の異なる仮想事例を用いた。Dilemmap では全テーブルを二分割し、各グループは EaE の事例のうち別の事例を扱った。

４．授業報告

授業実践は 2017 年 6 月に東京学芸大学附属高等学校の選択科目「探究授業」において、2 年生 22 名（男 19、女 3）を対象として行った。

EaE で投稿された観点の総数をプレー回ごとに測定したところ、3 回目までは漸増し、4 回目では一度用いた事例を再提示しているため、観点数は伸びなかった。また図 2 に示されるように、回数が進むにつれピーク到達までの時間が早くなることがわかる。効果測定のための 4 回目のプレーは 3 回目終了から 90 分後に行われたが、着想の早さは維持されており、発想の能力が定着しつつあることが示唆される。ゲームの手続きへの慣れや、事例の差を除いた正味の効果の評価にはさらなる分析手法の検討が必要であるものの、生徒が EaE を通じて、多様な人々の観点を想像することを学習したことが定量的に示された。

また、授業を通して生徒が躊躇せずに自身の意見を発表する姿が見られ、電子デバイスを用いた匿名での回答方式が効果的であった。アンケートでも、「気軽に意見をだすことができた」「たくさんのアイデアを使って共有できた」といった意見が見られた。

Dilemmap では 6 テーブル中、最大 5 つの関係者が関わるジレンマが見出されており、潜在的なジレンマでの複雑な利害関係が体系的に図式された。また、事例の難易度によるジレンマの数については大きな差は見られず、ゲーム構造自体によって、個々の着想を継ぎ合わせ、潜在的なジレンマを認識するに至ったと言える。アンケートにおいても、複数の事象の利害関係を図式化することによって学ぶことができたという感想が見られた。

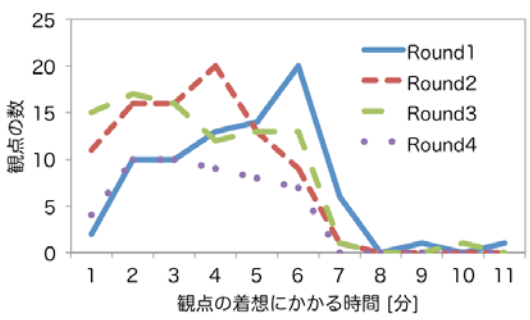

図 2　観点の投稿数推移

ゲーム全体についてのアンケートでは本授業を通じて視野が広がったかという問いに対して、16 名が広がった、4 名が変わらない、2 名がわからないと回答した。このゲームが視野を広げるという意味で、倫理的素養の育成に一定の効果を持つと考えられる。

またこのゲームの効果が単に利害関係を可視化することに留まるという指摘もあった。倫理という言葉が強調されすぎるとかえって発言が慎重になり集合知のメリットが活かされない。このゲームでは倫理は一般的な意思決定の側面であると考え、特段の思考方法のフレーミングは行わなかった。

５．まとめ

本ゲームは潜在的なジレンマなどの問題認識力に焦点を絞っている。高校生を対象とした授業実践分析ではプレーヤーは仮想事例における発想力と、それに基づくジレンマの認識に必要な能力を育成した。電子媒体による回答や、ユーモアを回答の相互評価軸に加えることによって、プレーヤーの積極的な参加を可能とした。生徒のゲーム中の回答についての統計と事後アンケート調査の結果の二つの評価アプローチで、目的とした能力の向上が見られ、潜在的な問題や未経験の事例に対して柔軟に対応できる想像力を身に着ける教材として一定の効果をあげた。

謝辞

東京学芸大附属高等学校の山北俊太郎教諭を始めとする先生方にご協力いただいた。本研究は東京大学 GSDM(リーディング大学院)のプロジェクトの一環として行われた。ゲーム開発は東京大学の呉承哲さんも参加した。

脚注

[1] Davis, M. (1999). Ethics and the university. New York: Routledge.

[2] Kapp, K. M. (2012). The Gamification of Learning and Instruction. San Francisco: Pfeiffer.