'Do rock-paper-scissors and if the last player wins, he can move in front of the first player:' Exploring learning through a video game media translation project at a Japanese children's community center

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Abstract

This study presents an analysis of what Japanese elementary school children can learn about and through game design. Six proficient young board gamers worked extra-curricularly over two days to translate Mario Kart DS from a video game into a board game. The children practised creativity, imagination, literacy, critical thinking, problem solving, collaboration, storytelling and visual design skills. Moreover, they deeply analyzed and better understood the original game media and content. A game translation exercise is an efficient and effective approach to improving children's media literacy. Various suggestions based on the researchers' and students' experiences of this project are made for other media educators interested in conducting game creation projects with their students.

Games at the Jidoukan

Jidoukans are Japanese child welfare institutions, provided by the Child Welfare Act (1947) that give children 'sound opportunities for play in order to promote their health or enrich their sentiments' (Article 40). Jidoukans create playful opportunities to children, parents and the community through board or card games, toys, and monthly events such as seasonal parties or sports competitions.

University of Shizuoka students visit the Kusanagi Jidoukan regularly and teach board and card games to elementary school children in a 'Game Club.' The university student-teachers observe how the children learn and play and socialize through games and conduct subsequent educational research projects. The children in our Jidoukan Game Club consistently

demonstrate remarkable comprehension skills, strategic thinking, and creativity in and around gameplay. They can learn the rules of games while they are playing them, they can strategize on their own and by observing others, and they can add or change some rules to make games more interesting for themselves.

Zagal (2011) defines 'game literacy' in terms of three abilities: 'to play games,' 'to understand meanings with respect to games,' and 'to make games' (23). The children in the Game Club demonstrate developing game literacies, and they engage in creative work around games by 'remixing' (Jenkins et al., 2009) the pieces and systems of the games they play. After reflecting on observations of casual critical and creative play, the current research project, to help students make (i.e., 'translate' (Buckingham, 2003)) a board game based on a video game, was conducted to continue to understand how game creation can contribute to students' developing game literacy and academic and social skills.

Literature Review

Media education

In this project, game design is investigated from the perspective of media education. People spend a great deal of time with media; according to sociological survey data from the Japanese Ministry of Internal Affairs and Communications (2011), people aged 10 and up use nearly three of their four and a half hours of free time every day on media-related activities. Moreover, nearly 35% of the population reported playing videogames, PC games or mobile games and the percentage and reported time spent playing games each week increased from 2006 to 2011.

Because media are a significant source of information, education and entertainment for most Japanese people, the Ministry of Education, Culture, Sports, Science, and Technology (presented in English by Suzuki, 2008) has included media education goals in the national curriculum. The Ministry definition of media literacy is 'the skill of effectively using information' (Suzuki, 2008: 2) and its new educational guidelines address students' developing skills of using computers and the Internet, mostly to gather and use information.

The purpose of media education in Japanese school contexts is largely 'to learn the characteristics of different media and appropriately choose between them,' 'to understand the effects of media on our lives,' and 'to learn how to act safely in the media society (Horita, 2004; 2006; as cited in Suzuki, 2008: 7). This view differs somewhat from that of media educators in other countries. Buckingham (2003) provides a useful overview of media education in the UK context. He is very explicit in his assertion that media education 'aims to develop both critical understanding and active participation' (4) and that the goal of teachers should not be just to protect children from media but to help students enjoy and engage in the breadth of media. Media education from his perspective seeks to give students the tools and knowledge to analyze

a wide variety of media (similar to the Japanese Ministry's aims of having children understand media) but he requires that students apply their knowledge and skills in producing their own media for personal, civic or professional purposes. Buckingham's view of media education seems more student-centered in that children work to understand their preferred media for themselves (with guidance, not from direct instruction) and also more active, creative and connected to society than the Japanese Ministry's model. Buckingham's approach to media education was adopted in this project as it more closely aligned with the child- and play-centered goals of the Jidoukan context.

In order to meet Buckingham's critical and creative goals for student-centered media education, we created an intensive lesson based on his classroom strategy of 'translating' one medium to another, in our case, a video game to a board game. Translation activities focus students on language and representation in different media and can touch on sociocultural context (e.g., audience) as well. An analytic approach has students investigate 'the treatment of a given issue or the use of given source text in two different media, or for two different audiences' and why this change happened. Students analyze ideas, issues and audiences across media. In Buckingham's 'practical' classroom strategy 'students themselves 'translat[e]' a text from one media to another' for example, a newspaper story to a TV show. This largely creative work requires that students 'realize the possibilities and limitations of different media, and the ways in which meanings can change when they are presented in different forms or transposed from one medium to another' (Buckingham, 2003: 77-8). A challenging translation task will, because of the difficulty of expressing ideas and meanings of one media in another, ask students to link design decisions with explicit analyses of what they have experienced in one and what they want to express in another media format. We combined both analytical and practical strategies for the children's translation task.

Active learning in Japan

The Japanese government has mandated a variety of policies that react to (1) the drop in overall academic achievement since the 1990s (often attributed to the earlier 'yutori kyoiku' (reduced intensity education) approach, see Butler and Iino, 2005), (2) the lasting economic recession and (3) the global changes in communication and commerce in the 'post-Fordist' era of the past few decades (New London Group, 1996). A recent major Japanese government push is for 'Active Learning' (Central Council for Education, 2012). This term is generally used in contrast to traditional teacher-fronted classrooms where students listen and take notes; an 'active learning' based classroom requires more activity from students. The concept is notoriously ill-defined and ill-applied (Ito, 2017; Yonezawa, 2014).

We agree with Ito that active and global mindsets and abilities cannot be explicitly taught, but rather developed or constructed through broader projects and experiences and methodology. With the information-centric approach to media education in Japan, and the Japanese government's push for alternative and student-centered learning approaches to meet different goals in mind, one motivation for conducting this project was to better understand young children's actions and reflections with a media education project that had the potential to engage students intellectually and creatively. We are not focused on policy or definitions in this paper, but rather, on offering an example of a practical project to teachers who might be struggling with operationalizing definitions or with putting policy into practice.

Games and learning

Game based learning has become a popular research topic in the past two decades (Gee, 2014; McGonigal, 2011; Prensky, 2001). This project did not explicitly investigate what can be learned from a game, but rather what learning can happen in the teaching and activities *around* games (Arnseth, 2006; Squire, 2002). We drew from connections between games and education in the work that Jenkins et al. (2009) have done around game remixing as an avenue for academic and social agency development, the work of Gee (2003) that explores the power and necessity of understanding and making meaning around complex semiotic systems such as games, and Salen and Zimmerman's (2004) description of games as rules and systems and subsequent work (Salen, 2007) to help students use games to develop their understanding of more complex and real-world systems.

Learning through making games

In addition to addressing media education goals, we also wanted to help students practice social, cognitive and artistic skills. We reviewed both professional game design practice and educational technology research as we designed our project.

At the 2014 Games for Change Conference, Zach Gage, a popular 'indie' game designer, shared why people make games, why games are important, and what game designers learn through making games (2014). To him, game design is:

> a practice that teaches you how to program computers, and maybe how to make visual art, and maybe how to make music, and probably how to work as a team, and definitely how to think about systems, and it might teach you to understand other people better, and it might teach you a little bit about business … Games force us to tackle mathematical learning and creative learning at the same time. It's near impossible to argue that kids making games aren't learning serious viable career skills at the same

time that they're honing their creativity, something that's been sorely lacking in the educational system as of late. Here we have a composite practice that isn't just art or just business, and finally, finally, it's becoming accessible, viable and acceptable to do.

This example of professional introspection offers a clear example of how game creation incorporates media literacy, an active learning approach, and requires a wide variety of skills that may be applied in game, technology or even unrelated fields.

Next, we review several studies of children learning by making educational games. Most of these studies are based on constructionist (Papert, 1991; 1993) models of learners actively creating meaningful knowledge rather than being passive recipients of information. Kafai's projects (e.g., 1995) with elementary school students are some of the earliest and best known investigations of game creation in the classroom. She gave 4th grade students the six-month task of making math games for younger students. Not only did her students gain a deeper understanding of mathematics 'through' their designs, but they also learned 'about' design itself. The elementary students learned how to plan, problem solve, collaborate, manage time constraints, and reflect. They gained a new appreciation for what game designers do. Kafai stressed that game design need not be expensive, referencing editors and free software packages. Salen (2007) and Games (2008) found that students' understanding of the skills and habits of professional game designers improved by creating games using Gamestar Mechanic, a free online game. It seems likely that children would learn effectively about design by creating card and board games.

We found several recent game-centered media education projects with elementary school students that were useful in the design and framing of the current study. We offer highlights in the following table.

Table 1: Game design projects with elementary school students

Authors	Student task	Outcomes
Owston et al. (2009)	Creation of games based on course content	Improved sentence comprehension, logical thinking, content retention, engagement, used a variety of information sources.

Baytak and Land (2010)	Designed health and nutrition games for peers	Learned and practised communication and collaboration skills, were 'active participants and problem solvers' (5245).
Kangas (2010)	Designed playground space science games	Thought imaginatively and creatively, practised negotiation skills, expressed feelings. Teachers experienced difficulty planning the project.
Vos et al. (2011)	Design of a game based on proverbs	High intrinsic motivation, deep learning strategies.
Robertson (2012)	Created a digital game based on 'The Hobbit'	Improved imaginative and creative skills, a consideration of audience, advanced multimodal literacy skills, especially for female students.
Yang and Cheng (2013)	Designed RPG games based on biology course content	Improved critical thinking skills, content mastery, concentration improvements.

A media education framework that includes critical and creative work (Buckingham) is not yet commonplace in Japan (Suzuki). Game design may help to meet broader educational media education goals, develop students' technical and social and intellectual skills like critical thinking and creativity, and shift popular notions of 'learners as game consumers to learners as game creators' (Whitton, 2014). This project investigated a specific media education strategy (translation of a not overtly educational game) for meeting these various educational goals.

Research purpose

The goal of this project was to explore the feasibility of a media translation task with children in their early academic years.

Method

Procedure

The children in the Jidoukan were given the 'converting digital to physical' (59) challenge from the book 'Challenges for Game Designers' (Brathwaite and Schreiber, 2008). Similar to Buckingham's rationale for translations in media education, Brathwaite and Schreiber argue 'if you can't design a non-digital game from a digital game, if you can't work 'backward,' you don't truly understand the nuances of the pure design underneath the art and realized through programming' (59). Designing a board game from a video game can help beginning designers see the strengths and weaknesses and methods of communicating ideas in both media. Converting digital to physical also seemed to be appropriate as a first game design challenge for young children because they would have something to start from.

Four hours over two days were spent with the children. Though the timeframe was relatively short, we wanted to explore the limits of a brief time frame for the project's practical inclusion into traditional classroom settings in Japan; teachers do not often have much extra time to add lengthy projects to the national curriculum.

This project was conducted in Japanese (the children's native language). The children's parents gave informed consent for their children to participate in the project and for data to be collected and used for research. We followed the ethical guidelines of our university, and included an invitation, the detailed research procedure, time requirement, risks and benefits, that withdrawal was possible at anytime, and that privacy would be protected in data collection, data storage and subsequent papers and presentations.

On the first day, each child first completed Questionnaire A (Appendix A) to provide background information about gameplay habits and skills that could be compared with the Questionnaire given at the end of the project.

Then they played Mario Kart DS (Nintendo, 2005). Mario Kart is an action racing video game in the Mario universe with many Nintendo characters, courses and items. Players use Nintendo DSs and 1 to 8 players can play together. Mario Kart was used, not only because Braithwaite and Schreiber suggest it as an example translation project (59) but because some of the children had played Mario Kart. A familiar game was used to lower the cognitive load the children might experience from playing and working with an unfamiliar game. Before the children played the video game, the rules and controls were briefly explained to them. Even though the children were familiar with the game, the game was played in order to have the media be fresh in the children's minds and to give them some shared experience to use in their subsequent work.

After playing the digital game, children discussed the game. A discussion was held in order to have the children articulate their knowledge, and to compare and contrast ideas and

experiences which could be used in the translation design project.

The children then began working to recreate the digital game as a tabletop (board) game. The children were asked to create something in order to apply their knowledge, and in doing so, gain deeper understanding of their ideas and experiences. The children worked as a team. This not only lessened the work that any one of them had to do, but also created an environment in which different students could accomplish different tasks and fill different game design roles. Dividing one task among many participants also created opportunities for communication about the game and also about the team.

On the second day, they completed designing the game and did a playtest of their work. The playtest was included to help the children see and experience if their ideas and actions had resulted in an enjoyable game, to give them experience with professional game design practices, and also to provide them the experience of noticing and altering problematic aspects of the game that might only surface during actual play.

Finally, the children were asked to complete Questionnaire B (Appendix B) to reflect on the project, were thanked, and the project was concluded.

Participants

On the first day, four children participated. We collected data regarding school grade, not specific ages for the participants. Two 5th grade boys (A and B) aged 10 to 11, one 3rd grade girl (C) aged 8 to 9, and one 2nd grade girl (D) aged 7 to 8 participated. A and D were siblings. A, B and D were friends. On the second day, two more children participated: one 2nd grade boy (E) and one 2nd grade girl (F), both aged 7 to 8. D and F were friends. All of the children knew each other from the Jidoukan Game Club. These children were interested in joining the project, or their parents were interested in having their child join the project.

Elementary school is an important and formative time in Japanese children's lives; most children walk or take public transportation by themselves to go to the Jidokan, to their school or to public spaces or events. In Japan, many parents send their children to preschools where basic safety and social skills are practised. Elementary school focuses on fundamental literacy as well as study habits but some schools give students the freedom to explore creative and critical and collaborative learning approaches. Some elementary school children begin afterschool sports or art or study programs, but this is typically not as intense as middle school curriculum and expectations and high-stakes testing. We were interested in a range (from grade two to grade 5) of elementary school children's experiences and capabilities in the media literacy project we explored in this paper. We were interested in the feasibility of a novel media education approach and learning style in the 'early years' of these children's academic paths.

None of the children had made a game before. D and F were not so interested in games

but others were very interested in games. The other four children had a habit of playing games. They played various games but they tended to play digital games like DS, console games and games on smartphones more than card games and board games. All of the children liked making something and were good at concentrating on something. Almost all of the children liked doing something with their friends but B preferred doing something by himself. They liked their math, art and Physical Education classes. Almost all of the children joined this project because the project 'seemed fun.' D joined it because she was told to by her parents. F was invited by her friend.

Location

The group met in one corner in the 'library room' of the Kusanagi Jidoukan. The library is an open space so there were not only the project participants but also other children in the room. It was sometimes a little noisy. In this room, there are many toys and games and books. The group worked at low tables.

Instruments and Data Collection

The project was video recorded. Observation notes and interesting verbal interactions were noted during the project. After the project ended, the final product (the game and rules), the Questionnaires, and the video recording were analyzed.

Results

Translated game

The completed board game can be seen in Figure 1 (board), Figure 2 (car tokens) and Figure 3 (item cards). The children used paper, dice, cards, small glass discs, origami paper, colored pens, colored pencils, and blocks of wood.

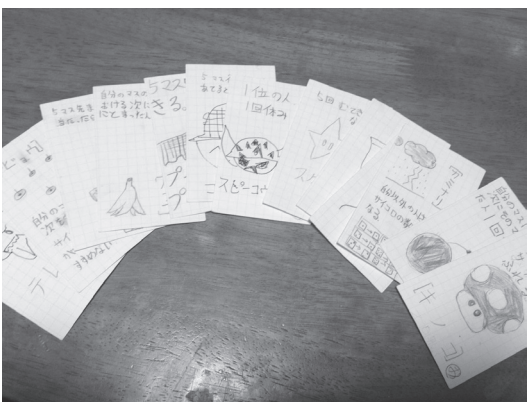

Figure 1. The created game board

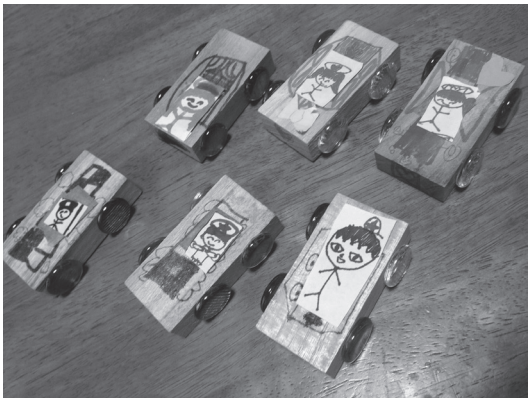

Figure 2. The created car tokens

The children created the following rules for their final game. Each child, especially A and B, suggested rules that were adopted by the group.

- All players roll dice at the same time. (A suggested)
- Players can use items anytime. (A)
- When players pass the 'item spaces,' they roll a dice, and if the dice shows the same number which is written on the board, they cannot get an item. (B)
- On the spaces on which some numbers are written, players roll the dice and if the dice shows the same number which is written on the board, they cannot move. (B)
- When players stop at a 'speed up space,' they can move two more spaces. (B)
- When players stop at 'black spaces,' they lose one turn. (B)
- At the points on which arrows are written on the board, players can choose which way they will go. (B)
- The last player always has a 'Chance card (killer).' (A)
- All players can have only one item at a time. (A)

The older children were especially active in this stage of the project, suggesting that they may have had a better grasp of the rules and system of games, or may have had more experience working on projects with other children. A more homogenous group, in terms of age, might have allowed the younger children to be more active in this early stage, though it might have taken more time and effort from the instructor to help them articulate their ideas.

A comparison of the items in the video and board game versions of Mario Kart can be seen in Table 2. The children collaborated to convey the real-time video game effects of items in a 'roll and move' tabletop board game. The children remembered the video game items and analyzed their purpose and effects by themselves (except for the 'terese' item which was explained explicitly to the children). The children were able to, on their own, successfully

accomplish most of the media translation task, though it seems likely that a teacher needs to observe and be involved at particularly difficult stages of conceptualization and planning. Item cards can be seen in Figure 3.

Table 2: Comparison of items in the video and board games

Mario Kart items	board game items
Spiny Shell (togezou koura) It chases the leading player and explodes.	'spi koura' The leading player loses one turn
Bob-omb (bomuhei) If a player throws it, it explodes when someone gets close to it or a few seconds pass.	'bakudan' A player sets it on his space, and if someone stops on this space, he loses one turn.
Star The user become invincible for a few seconds, and becomes faster.	Star The user becomes invincible for five turns.
Banana A player throws it, and if someone steps on it, his car spins.	Banana A player sets it in front of his space, and if someone stops on this space, he loses one turn.
Mushroom (kinoko) The user becomes faster for a few seconds.	kinoko The user can roll the dice again
Shell (koura) A player throws it, and if someone is hit, his car turns over.	koura The user can hit the player who is within five spaces (in front or behind). The player loses one turn.
Boo (teresa) The user can not get damaged for a few seconds, and steals someone's item randomly.	'dorobou teresa' The user steals someone's item.

thunder If a player uses it, others spin and become small, lose their items, and slow down.	'kaminari' If a player uses it, she lowers the numbers on other's dice by one. 'When a player uses a kaminari, others became small and slow down…'(from A)
Bullet Bill (killer) The user can quickly go forward for a few seconds.	'killer' It is a chance card. The last player can have this card. If he uses it, he does rock-paper-scissors with the leading player. If the last player wins, he can jump in front of the top player, but if he loses, he loses six turns.

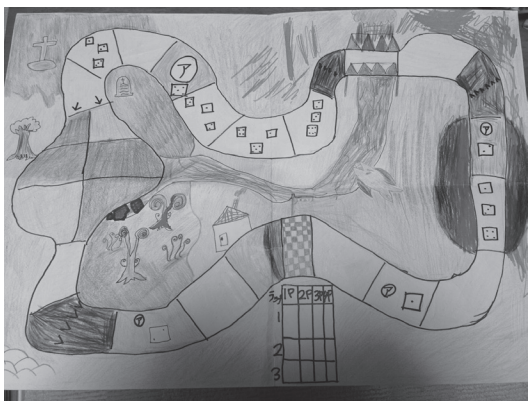

Figure 3. The created item cards

Several new items (Table 3) were created solely for the board game in addition to the items that were directly translated from the video game. It was very interesting to observe how the media translation task did not just entail analytic work of methodically transferring video game rules and interactions to tabletop form. On top of this important work, the task also gave children creative freedom to bring in different game experiences (e.g., rock paper scissors) and the freedom to modify the original game, thereby creating more ownership and engagement of their game project.

Table 3: New board game items

Item	Effect
'gabyou'	The user sets it on his space. If someone stops on this space, he cannot go forward until he rolls 4 or 6. (C)
'nentyaku bakudan'	The user can throw it up to five spaces in front of him. If someone is hit, he loses one turn. (A)
'kyodai ball'	The user does rock-paper-scissors with his neighbor on the right, if the user wins, he goes forward six spaces. if he loses, he goes forward four spaces. (E)
'suketto'	All others except the user lose one turn. (A)
'pu-wawawawawa-pu'	The user can warp 5 spaces. (E)

Participants' efforts

This section presents each child's part in the project. Each child exhibited different aspects of the benefits of media education work. The older children seemed to focus on analyzing the original video game and working to implement it as concretely as possible in the new tabletop form. Other children, usually the younger ones, seemed to care less about retaining the original game's characteristics but were more enthusiastic about adding creative flourishes through art, figures and new rules. The older children seemed immediately more engaged with the media translation project and the younger children required more teacher guidance and also sometimes encouragement from peers to engage in the work. Overall, we were pleased with the diversity in the children's attitudes and abilities, and appreciated the diversity of critical and creative abilities that students showed, sometimes on their own, but also collaboratively, in order to accomplish the given task.

Child A liked games and he was interested in game making. On Day 1, he talked a lot about Mario Kart. He suggested a board game plus card game style for the design. He realized and shared with the group that the last player in the video game can get good items, that one player can have only one item at a time, and that items are random. He reproduced these rules in the board game. He made the 'chance card' named Killer which gives the last player a chance at jumping to first place. He made a rule that each player can have only one item at a time and the player has to take the item card which is on the top of the pile (showing creativity). He suggested dividing the work when he heard that he would make a game with other children. He made item cards with child C (showing collaboration). He remembered the items in Mario

Kart by talking with C. For example, he said 'how was Mushroom?' He remembered the effect of items in Mario Kart and decided the effect of the items of the board game. He decided almost all of the items' effects. He also wrote the effect of the item on cards for others to understood the cards and sometimes asked how to write Japanese Kanji (showing literacy). He always thought about 'whether the game is fair or not.' For example, when he made a chance card, he said 'it is not fair if the last player uses this card many times,' so he made a rule that if the user loses at rock-paper-scissors, he loses some turns. Moreover, when C suggested a new item with which a player can get all of the items, A said 'it is not fair. it makes the player too strong' (showing critical thinking). On Day 2, he remade the item cards and made two new items which did not exist in Mario Kart (showing imagination). When E said that he wanted to make cards too, A told him 'Ok, you make new items and I will remake the cards which I have made before' (showing collaboration).

B liked games. He liked working individually. On Day 1, he volunteered to make a course on the board when A suggested dividing the work. He was asked 'what things were there in the Mario Kart courses?' 'What was the effect of it?' He remembered that there were sharp curves, holes, muddy roads, speed up zones, item zones and branching roads. At sharp curves, someone lost speed. Players could fall into holes. Therefore he wrote some dice numbers on curves and holes on the board, and made a rule that if the player rolls a dice and these numbers appear, he cannot go forward (showing creativity). At muddy roads, the video game cars slowed down substantially, so he made a rule that if the player stops at a muddy space, he loses one turn. At a speed up zone, they sped up, so he made a rule that if the player stops at a speed up space, he can go forward two more spaces. At item zones, there were some items. He realized that not all players can get items. Sometimes they missed items or other players could get items first. He wrote a dice number on item spaces, and made a rule that when a player passes the item space, he rolls a dice and if the dice shows the written number, he cannot get an item. At a branching road, the player could choose on which road they would go so he made a branching road and wrote an arrow on it. Moreover, he remembered the course design. He drew a bridge, trees, rivers and gravestones on the board. He also created a lap tracker when he was asked 'can you remember what lap it is?' He also suggested the rule that all players roll a dice at the same time because it is a race game, not a game about turn order. He listened to the other students' talking and sometimes he talked with them, but he worked in silence most of the time. On Day 2, he remade the course. The spaces on the course were small so he made them bigger (showing creativity and visual design).

C liked games. On Day 1, she said that she wanted to make cards when A suggested dividing the work. She remembered what items there were with A and wrote them on cards. She also developed the components. For example, C drew a face on a shell though it had no

face. Moreover, she came up with new ideas for items. She suggested an item card which the player can use to get all items (showing creativity), however, it was rejected by A because it was not fair. She accepted their rejection when she heard why it was not fair (showing collaborative activities). While making a game, a pen stabbed C's finger. B shared an experience when something stabbed the sole of his shoes. C then came up with the item 'gabyou' (thumbtack) that stabbed car tires. She also changed the names of items. Teresa is an item that steals another's item. She made this item card and named it 'thief teresa' because of its effect (showing imagination). On Day 2, she lost her concentration. She started reading books or left the room sometimes. Others told her to 'do the work' but she did not.

D was not so interested in games. At first, she did not say anything. A told her to made a course with B, however, she did not. She was then invited to make cars with the teacher and she started doing that. After she started, she worked in silence individually. She found some blocks of wood and small glass discs. She came up with the idea to use them as the tires of cars and she remembered the cars in the video game and remembered that an icon was on the front of the cars so drew one on each car. She made four cars: two cars for boys and others for girls (showing creativity). On Day 2, she talked much more than on Day 1. She made two more cars with F and colored the course (showing collaboration). She colored the course. Trees were not only green but also red and blue. She colored the hole black and red and explained 'it is a flame so if the players fall into it, they will be burned down!' (showing imagination and storytelling skill). Moreover, she remembered the courses of Mario Kart and added details, for example, a shark in the river, a house, a mountain, trees, and a rain cloud. The shark is not related to the game play, but she told me 'if the player falls into the river, they will be eaten by a shark!' (showing visual design, creativity and storytelling skill).

E joined the project from Day 2. He liked games. He had played Mario Kart once and played the board game which A, B, C and D made on Day 1. He suggested a lot of ideas after playing the board game and he said that he wanted to change the rule of the chance card. The previous rule was that the last player can move in front of the top player if he wins rock-paper-scissors. He suggested that the last player can move a lot of spaces (twenty spaces), if he wins rock-paper-scissors. However, A said that if the last player is near the top player, the last player moves ahead of the top player too much with that rule. Therefore it was rejected by the others (showing critical thinking). E said that he wanted to make items. A wanted to remake the item cards which were made and E made some new items. E made two new items which did not exist in Mario Kart and he said 'I want to make more item cards!' (showing creativity and imagination).

F joined the work from Day 2 and played Mario Kart and the board game. She was not interested in games. She joined this work because she was invited by her friend. She made cars

with D and colored the course board. She asked D how to make a car and made it (showing collaboration). She decided most of the colors on the course board. The road was tan-colored, speed up spaces were purple, the bridge was red and yellow, muddy spaces were black, and the area off the road was green. It is similar to the original colors of the Mario Kart course (showing visual design). Moreover, she encouraged others while making. For example, when children lost their concentration, she told others 'It is an important time!' 'It won't take so long.' Or, when D became sulky and did not do anything after quarreling with her brother, F told her 'please talk. We need you.' and completed making cars on her behalf (showing problem solving).

Playtesting and iteration

The children playtested their game three times: once on Day 1 after making the game, and twice on Day 2 before continuing to make their game. After the second playtest, children changed the chance card rule. At first the rule of the chance card was 'when the last player uses this card, he and the top player do rock-paper-scissors. If the last player wins, he can move in front of the first player, however, if he loses, he loses 10 turns.' After they played the game, A felt that 'lose 10 turns' was too long and suggested reducing it. Children talked with each other and decided on 'lose 6 turns' (showing problem solving). Moreover, E felt that they should increase the number of items so A and E remade the item cards. A felt that the spaces of the course were too small so B remade the course. B added another item space after hearing other's opinions that they wanted to increase their number (showing creativity). The children worked together to improve their game (showing collaboration). Playtesting is an important element of professional game design, and, in this project, allowed the children to experience and improve their work through continued analysis and creative efforts, and should be included in any 'educational' game design project.

Questionnaire B Results

All of the children answered they had fun, could become better friends with others, and would try making a game again. They did not feel that making a game was difficult. When asked what they had learned, B answered 'cooperation with others.' E and F answered 'about Mario Kart.' The children were often asked 'how was it in Mario Kart?' when their discussion came to a deadlock. Therefore, children looked back on Mario Kart many times. When asked what they had enjoyed, almost all of the children answered the work which they had done, however, B answered 'the playtest.' Children laughed and shouted while playtesting their game.

Discussion

Students are expected to notice and understand media language and representation of ideas

in translation activities (Buckingham, 2003). Students need to see the affordances of various media to express certain ideas effectively. There are several examples of students engaging in this analytical work in this project. For example, the car design and the race track's objects and colors were easily re-created in the board game. However, the children had to think more deeply to simulate the digital game's physics-based movement restrictions in water or mud in a paper game; they used numbers (easily written and noticed on a paper medium) that had to be avoided when rolling on certain squares. The children also realized that to simulate the real-time digital race game in a board game they could break the typical turn-based roll and move game by having all the players roll at the same time. The children also had to consider how to represent the video game's special items. The video game can penalize the player by stalling their car with an animation; the children realized that 'missing a turn' as a penalty (though lacking a visual animation) would create a similar effect for the players. They allowed the board game player to use a special item at any time, just as in the video game. The children not only had to think of the visual aspects, and the item effects, but how the games are perceived by players. They realized that the video game automatically gives powerful items and a chance to catch up or win to the player in last place, and that the physical media would also have to accomplish this in order to balance the game. They used a combination of a special item (a chance card killer), player-player interaction (rock-paper-scissors) and a movement bonus or penalty to balance their board game in a similar fashion. Students in this project were able to better understand and compare and contrast systems from video and board games to successful recreate and elaborate on specific media elements. Moreover, they did this activity enjoyably. A media education translation activity following Buckingham's guidelines improves critical understanding (i.e., improving students' knowledge of digital games and board games) and creative participation (i.e., students making a game for themselves). The students were able to focus on and understand the systems and multimodal communication of games through the project.

The students in this project were also able to learn about media in the manner recommended by the Japanese Ministry. The students were able to 'learn the characteristics of different media;' namely, the differences between digital and tabletop games. They were also able to 'appropriately choose between them;' they did not only rely on paper and dice, but also cards to supplement their design to replicate the experience of the digital game. Not only did the children engage in activities related to Japanese media education goals, but they also were successful in the 'active learning' structure of this project. They worked collaboratively to critically analyze aspects of the video game in order to artistically create them in a tabletop form. While some Japanese teachers might be tempted to rely solely on games to provide physical activity (Ito, 2017), a more effective and wide-reaching approach could be to continue

to draw from and implement media education practices around games to connect multiple directives and goals in Japanese education.

Furthermore, the students practised multiple skills through game design. It is important to state that these skills were observed and not quantitatively assessed as in several prior studies (e.g., Owston et. al., 2009; Vos et. al., 2011; Yang and Cheng, 2013). Similar to the results in Kangas (2010) and Robertson (2012), the students in our project thought creatively and imaginatively in the process of creating a tabletop version of a digital game. The children appropriated and invented the rules, the course, the cards and the item cards in the final game. Like the children in Robertson's study, the children in our study, especially the younger ones, also concentrated on the visual design of their final game. The children did not design the course board, item cards and cars without thinking. One girl who made cars said 'the character wears a hat because Mario wears a hat, and the mark on the car has to be same as the mark on the character's hat.' They colored the course board and there were no blank areas. These details were important for the children. They also exhibited storytelling skills, like the children in the studies by Robertson (2012) and Yang and Cheng (2013), as they created their game. For example, one girl exclaimed 'Look! This car can fly and overcome any obstacles!!' though the car did not have such a characteristic in the game. Many children told the stories using hypothetical language. Though our project was shorter and the final project was less developed than the Kangas and Robertson projects, all three projects illustrate the delight that children express and the opportunities for creativity that can be found in children's game design.

Like the practice found in Owston et al.'s (2009) study, the children in our project also exhibited purposeful literacy skills. The children in our study wrote the effects on the item cards in order for other people to understand the item and asked the primary researcher (a Japanese native speaker) how to write certain words (for example, 'number of times' and 'yourself') in Japanese Kanji characters. In both of these studies, the literacy practices were endogenous to the creative task; sentence logic in trivia questions and Kanji characters that could be read by their parents and other players. A wide variety of productive literacy skills can be practised through game design, though for maximum benefits, teachers should match the targeted writing skills to the nature of the game being designed. Students might develop skills related to conditional grammar and logical connections (i.e., 'if A then B') in longer texts by writing the rules to board games.

Our students also practised a variety of critical thinking skills, as in the study by Yang and Cheng (2013). Our students considered what types of games would be the best for translating Mario Kart DS into, they analyzed the available materials, and realized that they could recreate the actions of Mario Kart in a board game. In addition to critical analytical skills, the children thought critically about fairness and how their players would experience their game. When

someone suggested an idea, others sometimes said 'it is not fair because…;' they did not just accept everything that was suggested. They could discuss one idea in depth and make the best decision for the game and their players. The project also helped our students think about audience, as in the study by Robertson (2012).

Problem solving skills and collaboration were highlighted in the studies by Kafai (1995), Baytak and Land (2010) and Kangas (2010). As in those studies, the children in our study encountered problems (after playtests) that needed to be solved. They felt that the chance card rule (if the last player loses rock-paper-scissors, he loses ten turns) seemed too extreme; therefore, they changed it to six turns. The children not only had to solve problems related to their game, they also had to manage social relations in the group. When one lost his concentration or when another quarreled, the children encouraged their group mates and brought them back to the task. The children in our project seemed to practice, learn and appreciate the collaborative experience of designing a game. The children divided the work amongst themselves, and some of the children cooperated to accomplish certain tasks. They talked constantly with each other about the game. According to Questionnaire B, all of the children felt that they could make friends with the others. Moreover, B explicitly answered that he learned cooperation with others through this project. As suggested by Yang and Cheng (2013), we also see the potential for children to practice cognitive and social skills through team-based game design.

Finally, as was discussed by Kafai (1995; 1998), Salen (2007), Games (2008), Robertson (2012) and Pedercini (2014), the children in our project not only learned various skills through game design, they also learned about games and design. The children reported that they learned about Mario Kart in Questionnaire B. They also learned the importance of problem solving and collaborating, and using playtest data to help them create a better game for their audience. Offering children the opportunity to design games, either in formal or informal education contexts, and through the relatively inexpensive task of translating a video game into a board game can help children learn the content and mechanisms of a game, and experience the professional practices of that game's design (e.g., collaboration, development cycles) though the practical production of their own media.

These various findings and subsequent implications are certainly limited by various factors. Though we observed the children's demonstration of various skills and educational habits in this short media project, we cannot state the children's abilities prior to or following this project with any certainty. As some of the projects in the literature did, it would have been better to follow up with the students several weeks or months after the project with a conversation or follow up activity to investigate how persistent the knowledge and behaviors are. We believe, as well, that these types of projects would be more effective with more extensive post-project

debriefings to help students notice and transfer particular aspects of the experiences, though we recognize that these activities are difficult with young children. Likewise, it would have been useful to better triangulate our qualitative observations with more quantitative measures, such as the Torrance Test of Creative Thinking. We also acknowledge that behaviors and possible development might be very different in other contexts (e.g., typical classroom settings), with other students (i.e., those without interests or experience with many games or creative works), or with teachers less interested in media education or knowledgeable about games.

Implications and Conclusions

Based on the successful implementation of this short project, we would like to suggest that media educators, in Japan or in other countries, also consider and attempt media translation projects in formal or informal educational settings. Translation projects are effective at helping students understand the characteristics of different media, and can be accomplished in a relatively short time frame. Many of the studies reviewed in this paper were 8 or 10 weeks in length, and, although that time frame is often recommended for significant learning outcomes (Kolodner, 2003; Squire, 2008), not many teachers in Japan have that much additional time. A concise four-hour translation project can act as an introduction or capstone project in the mandatory media education classes in Japan, or be appropriate as a capstone project in a 'content class;' students might translate an educational text, video, or TV show into another media of their choosing, for example, a comic book or YouTube video. Making games without a translation task (as in the studies by Kafai, Owston et al, Baytek and Land, Kangas, Vos et al, and Yang and Cheng) would also be appropriate for schoolwork. Through making games, students can learn subjects enjoyably and deeply. For example, in a home economics class, students might make a game about nutrition, either by translating Cooking Mama, for example, or creating a game from their own knowledge and subsequent research. Ideally, students should work in groups and be supported by teachers or older students to practice social skills and avoid the administrative issues of Kangas' (2010) study.

If more time is available, then we recommend that teachers take more time to include more of the contextualizing media literacy activities Buckingham (2003) and others recommend, for example focusing on analyses of representation in games, the game industry, and how and why people play games. Additional time could also be devoted to a more formal debriefing process (Dewey, 1938; Kangas, 2010; Kolb, 1984; Rall et al., 2000) to help children learn from their experience and set up future learning. If additional time or context permits, we also recommend involving multiple ages of students in the projects. Kafai's work with older children designing educational games for younger children, and the diversity in our group generating chances for children to engage in analytical or creative aspects of the project as they liked,

makes us hopeful that teachers will be able to connect students of different ages or backgrounds to create opportunities for similar diversity and multiple styles and approaches to and outcomes from media education projects.

Children can make games. Game design (and game translation) can liberate students and help students gain practical social skills, and help students construct their own knowledge about games and game design. Children play all sorts of digital (smartphone, console, handheld, PC) and non-digital (board, card, playground) games and can be nudged, quite easily as this project demonstrated, to apply their experience and practice many skills in a game translation project. Asking children to convert their favorite digital game to a board game might be an excellent group project in an extracurricular setting or as a meaningful weekend family bonding experience. As games continue to grow in popularity, we hope that more teachers, researchers, community leaders and parents explore the enormous potential in having children make their own games.

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Appendix A: Questionnaire A

1. Have you ever made a game?
   Yes / No
2. Are you interested in games?
   Very / a little / not so much / not at all
3. How often do you play games?
   almost everyday / 3~4 days per week / 1~2 days per week / do not play
4. How long do you play a game in one day?
   more than 2 hours / more than 1 hour / more than 30 min / do not play
5. Which kind of games do you play?
   Console games / Handheld console games (DS, PSP) / smart phone / tabletop game / other
6. Do you like making something?
   Yes / No
7. Are you good at concentrating on something?
   Yes / No

8. Which do you like better, doing something with friends or yourself?
   friends / myself
9. Which school subject do you like?
10. Why did you join this project?
    It sounds fun / told to join by parents / other

Appendix B: Questionnaire B

1. Did you have fun?
   Yes / Somewhat / No
2. Was game making difficult?
   Yes / Somewhat / No
3. Did you cooperate with others?
   Yes / Somewhat / No
4. Do you think you could make friends with others?
   Yes / Somewhat / No
5. Did you say your ideas?
   Yes / Somewhat / No
6. Did you concentrate on the work?
   Yes / Somewhat / No
7. Do you want to make a game again?
   Yes / Somewhat / No
8. What did you learn?
9. What things did you enjoy the most?
10. What things were the most difficult?
11. Write your opinion of this project.