

# The Possibility of Social-cultural Creativity Education: A Case Study of “Imaginative Innovator” at H University

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**Abstract:** As the fourth industrial revolution accelerates, universities have made great efforts to develop and reform creative convergence courses for improving the students’ creative convergence capabilities. Although various subjects such as “Capstone” and “Design Thinking” to the improvement of students’ creative convergence competences, many courses focus on creativity education in the direction of creating new products or outputs such as engineering, design, and art, so there is still a lack of systematic education and subjects on creative convergence capabilities from a humanities and sociological perspective. In order to overcome their limitations of creative courses, “H” University developed a ‘Imaginative Innovators’ class with the purpose of solving creative problems on social issues related to sciences, culture, politics, economics, and so on. In this study, we introduced the purpose, methodology, students’ best practices etc. of the “Imaginative innovator” course. In addition, we discussed the limitations and complements as well as the advantages and possibilities of the course. These findings are expected to contribute to the development and expansion of creativity education.

**Keywords:** Creative General Education; Social Issues; Creative Problem Solving; Problem based Learning

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## 1. Introduction

As the discussion of the 4th Industrial Revolution becomes more active, universities are making great efforts to develop and reorganize creative convergence education under the framework of creative convergence capabilities. Various courses such as creativity education, capstone, and design thinking are being offered in various forms to contribute to the improvement of students’ creative convergence capabilities<sup>[1]</sup>, but there are still areas that need to be developed. Despite the importance of creativity education, satisfaction levels are still low<sup>[2]</sup>, and it has been noted that current university creativity curricula do not reflect the needs of the times and society<sup>[3]</sup>. For example, many subjects focus on output-oriented creativity education such as engineering and design<sup>[4-5]</sup>, and social creativity education that addresses social and cultural impacts is still lacking<sup>[6]</sup>.

In response, creativity education researchers have proposed various directions for the future of creativity

education. Based on a multi-year analysis of the current situation and content analysis of creativity education, Hwasun Lee and Insoo Choi emphasize the need for “creativity education as character education,” which emphasizes morality and ethics in the creative process, and “creativity in the Korean context,” which refers to the characteristics of creativity that are evaluated differently depending on the time and culture <sup>[7]</sup>. In a study of university students’ perceptions of creativity and creativity education, Park showed that students perceive that they need a more supportive environment from their professors in order to develop their creativity <sup>[8]</sup>. Hyunwoo Kim also suggested that future creativity education should be organized to help students find the core of problems through communication and sharing in an uncertain and ambiguous reality so that they can solve them creatively and contribute to society <sup>[9]</sup>.

Taken together, their opinions suggest that future creativity education should be able to cultivate ethics and humanity, and to do so, it should include reflection and consideration on how to contribute and live as a member of society. Therefore, this study aims to explore the direction of social and cultural creativity education proposed by the researchers through the case of the ‘Imagination Innovator’ course at H University. To this end, this study introduces the purpose, operation method, and student cases of the ‘Imagination Innovator’ course, and discusses the advantages and possibilities of the course, as well as its limitations and complementary points, to examine how this course proposes a new creativity education.

## **2. Theoretical background**

### **2.1. Purpose of imagination innovator course development**

This course, ‘Imagination Innovator’, was planned and developed to realize the core competency of University H, ‘Creative Convergence Competency’. In particular, since University H aims to foster ‘creative talents that pursue the common good’, the development of this course was well aligned with the direction of ‘social and cultural creativity education based on character and morality’. The research was developed in three phases. In the first stage, a research team consisting of three full-time professors and two lecturers was formed, and regular meetings were held for about a year. In the second stage, textbooks were developed based on the regular meetings, and efforts were made to secure the validity and reliability of the course proposal through two lecturer meetings and summer and winter workshops organized by the College of Liberal Arts. Finally, the syllabus was finally agreed upon through textbook development and instructor workshops.

### **2.2. ‘Imagination innovator’ course purpose explained through the course name**

‘Imagination Innovator’ aims to become an ‘innovator’ who discovers various social issues such as politics, economy, society, management, education, and culture, including scientific issues of the 4th industrial revolution, based on sociological ‘imagination’ and proposes solutions to social issues through divergent and convergent PBL (project based learning) activities.

‘Imagination’ in this course refers to sociological imagination. ‘Sociological imagination’ is a concept proposed by sociologist Mills and refers to the application of ‘imagination’ to social phenomena, which can be defined as ‘the power of picturing in the mind about phenomena or things that have not been experienced in reality’ (National Language Institute of Korea Standard Korean Dictionary, 2020). Sociological imagination is defined as “the ability to move from one point of view to another, from the political to the psychological, from seminary to the military, from discussions of the oil industry to the study of contemporary poetry, and the ability to encompass distant topics and see the relationships between them. The sociological imagination

allows me to see how social phenomena, issues, and problems that I have not paid attention to are related to each other and how they affect me, and furthermore, to imagine how I can solve these problems, which is the agency and motivational aspect of creative problem solving.

Next, ‘innovator’ means an actor who has creative problem-solving skills for social issues. Based on ‘creativity’, students will learn how to apply the existing concept of creativity to social issues by learning the definition and concept of creativity for solving social issues, creative problem solving methods, and creative examples of successful social issues. After learning the theory of creativity, students will actively utilize PBL exercises to apply it in practice. The key to creative competency education is for learners to actively set their own challenges and experience the process of finding their own answers to problems, rather than finding standardized answers. PBL has already been recognized as an effective learning method for this purpose. In this class, PBL was utilized as a creative problem-solving learning method for social issues. What is important about the use of PBL is not that it is applied to the class, but how it is implemented to enhance students’ creativity.

## 2.3. Contents and best practices for each lesson topic

‘Imagination Innovator’ is organized into four parts, which are divided into 15 weeks by topic, with the goal of creative problem solving for social issues. The four parts are as follows [Table 1].

**Table 1.** Key topics and components of an Imagination Innovator lesson

| Order                      | Topics                                                                                            | Key takeaways                                                                                                                                                                                                                                                                                     |
|----------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Orientation (1 week)       | Introduction to classroom operations and assessment methods                                       | Introduction to Imagination Innovator course features and objectives<br>Introduction to flipped learning, PBL (introduction to evaluation methods)                                                                                                                                                |
| Topic 1 (2-3 weeks)        | Major issues in our world : 4th industrial revolution, changing times and the spirit of the times | Learning about the 1st-4th industrial revolutions4th industrial revolution and social change <Social issues in the world we live in> Mind map drawing                                                                                                                                             |
| Topic 2 (4-5 weeks)        | Creativity in Social Issues Concept and Methodology of Creativity for Convergent Problem Solving  | Learning the definition of creativity and the concept of 4Ps of creative solution to social issues and application of socio-cultural issues                                                                                                                                                       |
| Topic 3 (6-8 weeks)        | PBL topic selection and implementation methodology: learning through PBL best practices           | Topic 1: Example PBL on social issue problem selection and solution (fast fashion, development and problems of YouTube, etc.)<br>Topic 2: Creative figures who solved social problems 4P PBL (Submit a plan to finalize a PBL topic such as Gambridge, Amuse Travel, Director Bong Joon-ho, etc.) |
| Topic 4 (10~14 weeks)      | PBL Practice and Presentation                                                                     | Week 10 Individualized feedback on PBL topic selection                                                                                                                                                                                                                                            |
|                            |                                                                                                   | Week 11 PBL topic table of contents organization and content feedback                                                                                                                                                                                                                             |
|                            |                                                                                                   | Week 12 Finalize PBL presentation PPT                                                                                                                                                                                                                                                             |
|                            |                                                                                                   | Weeks 13-14 Team presentation evaluation, feedback                                                                                                                                                                                                                                                |
| Final Assessment (Week 15) | PBL Evaluation                                                                                    | Submit individual PBL activity report Finalization                                                                                                                                                                                                                                                |

### 2.3.1. Orientation

Before the class begins, a detailed orientation is given to the class. As the Imagination Innovator is a semester-long class where students are expected to be active and self-directed by choosing their own topics, the motivational aspect of the class is important. Therefore, the orientation provides a general picture and detailed explanation of the purpose of the class and how it will be conducted to motivate students to be interested in

social issues and to solve them creatively.

Another important aspect is to provide quality information about the textbooks and references that may be utilized in the class. With the development of the Internet and telecommunications, the ability to search for quality information is a necessary skill in this age of information overload and fake information. By providing students with basic information on what information to look for when they need it and how to search for it, we have laid the foundation for them to actively approach the subject.

To this end, the Imagination Innovator curriculum development researchers developed a textbook for PBL activities for creative problem-solving on social issues before the curriculum was fully operationalized and helped them to utilize it in the classroom. The table of contents and contents of the textbook are organized into four parts in the same order as the classroom.

### **2.3.2. Topic 1: Major issues in our society**

In Topic 1 of this course, students are asked to think about the social issues that are happening in the society we live in. There are three specific areas of focus in Topic 1. First, you will learn why we, as individuals, should care about social issues; second, you will learn about the impact of the industrial revolution on society and the major issues it has created through history by looking at the first, second, and third industrial revolutions before looking at the specific issues of the current Fourth Industrial Revolution. Third, we will discuss the characteristics of the fourth industrial revolution that we are currently facing and the social issues that are emerging along with it, and based on this, we will identify how many social issues exist through a group mind map.

#### **(1) Learning the relationship between individuals and society**

The main theory for learning about the relationship between individuals and society is Prosenbrenner's human ecological system model <sup>[10]</sup>. Recognizing the relationship between the individual and society is important in order to learn why we need to know and change society in an age where the value of our own lives has become paramount. Prosenbrenner categorizes human ecosystems into micro, meso, external, macro, and temporal systems, and emphasizes that we need to understand the relationships between them because they affect and are affected by each other. In particular, it is important to understand how the Industrial Revolution, which is the key to a time system with global implications, has affected humanity and why it affects us and me in our time. This emphasizes the importance of social issues and creative problem-solving lessons, as students learn how many of the problems and issues in our society today are relevant to them.

#### **(2) The first through Third Industrial Revolutions and social issues**

Students will study the social and cultural impact of social change in the first through third industrial revolutions. For example, examine the Luddite Movement, the Red Flag Laws, and the Enclosure Movement, and discuss the shadows that emerged with the development of machinery and how they can be analogized to phenomena in our own society through the sociological imagination.

This has the following implications First, students will learn that the industrial revolution, which they have been learning by rote, is related to many social issues beyond just scientific and industrial revolutions, and will be able to imagine the social phenomena brought about by the fourth industrial revolution. Second, students learn that it is necessary to look at social phenomena from multiple perspectives, including positive and negative aspects, by discussing various perspectives. Third, they will see how past history is relevant to the current industrial revolution, and learn from the past to think about current and future solutions.

The course is taught through lectures and discussions over the course of two to three weeks, and the

students' response to the course has been very positive.

"Recently, I've been hearing about various social issues that are constantly emerging every day and wondering, 'Why do I need to hear and think about these news,' but I was reminded that the reason is that we live in a society and the relationship between society and human beings is a mutual relationship. It seems to be a simple but not so easy reason. It was very good to be able to reflect and organize my thoughts after a long time away from the instructional education."

### (3)The Fourth Industrial Revolution and social issues

In the Fourth Industrial Revolution, mind mapping activities are key to understanding the main features of the Fourth Industrial Revolution and the social issues it generates. There are several things to consider when creating mind maps. The first is that many students have difficulty identifying issues, which is surprising given the amount of time and access to the internet and smartphones they have. In the activity of writing down as many issues as possible, students who are used to always looking for the right answer may have doubts about whether the issue they wrote down is really an issue and may not be bold enough. Therefore, you should help them think about many issues in different ways, emphasizing that there is no single right answer and that they can think about many different things. To help students create mind maps, you can encourage them to create mind maps in a number of ways, such as listing the issues under the higher-level concepts of politics, society, economics, education, culture, and so on, showing them a demonstration, or outlining existing student work.

The second important aspect of mind mapping is to see how many and varied issues there are by sharing your own ideas, those of your teammates, and those between teams. This is why working in a PBL classroom with a whiteboard on every wall is so effective. Individuals work on paper, teams work on one wall, and then the instructor acts as a facilitator to share each team's issues and organize them all together to facilitate divergent thinking about many issues.

What's important about the third mind map is that it reminds them that they are doing PBL this semester on one of these issues. You don't have to make a decision right away, but you can help motivate yourself to PBL by identifying which topics you are interested in and which other students are interested in.

## **2.3.3. Topic 2: Concepts and methodologies of creativity for creative problem solving in social issues**

In Topic 2, you will learn theories and concepts of "creativity" as a springboard for creative problem solving for social issues. Although the emphasis of creativity education varies depending on the instructor and the purpose of the course, it usually includes the following content categories: creative product, creative person, creative thinking, creative process, and creative place, which are the core 4Ps of creativity theory and creativity concepts <sup>[4,11]</sup>. What distinguishes this course from traditional creativity education is that it focuses on how the concepts and theories of creativity can be applied to social issues.

The definition of creativity varies from scholar to scholar and from academic background to academic background, but it is generally defined as "something new and useful" In this case, many students often consider only new objects, goods, designs, works, etc. that have not existed before as creative products, so they will learn what creativity is from the humanities and social sciences perspective of connecting phenomena, recognizing problems, and analyzing causes and solutions from multiple angles with a sociological imagination. Topic 2 consists of two parts: the definition of creativity and the content of the 4Ps of creativity, and takes about two weeks.

### (1)Defining creativity

If you ask students the question, "What is creativity?", there isn't a single student who doesn't know the

definition. However, they are often unclear about the many controversies and misconceptions surrounding the definition of creativity. Depending on the academic background of the instructors teaching creativity classes, there are many questions and debates, starting from ‘can creativity be defined or not’ to ‘can creativity be learned’. In particular, since this course emphasizes learning about social issues and creativity, we emphasize the following two points. First, you will practice sociological imagination through divergent and convergent thinking. For example, when you hear the word “food,” your sociological imagination might go something like this

Through the word food, we can discover social problems, issues, and various phenomena, and the process of associating many things with a single word is intriguing to students.

Second, there is an emphasis on “usefulness,” which is based on being a force for good and having a social impact. It emphasizes that creativity is not only about being new and original, but also about solving needs and problems that exist in society. In other words, new and original ways to meet problems and needs are important, and it shows that we can propose ideas from different perspectives and viewpoints on various social problems around us. In particular, it introduces examples of people and organizations that have creatively addressed social problems, including their perceptions of the problem and their solutions, which helps students realize the importance of having a perspective on solving a social problem that they have always thought of as a problem or need, and helps them be more specific in choosing a PBL topic.

Examples covered in this lesson include: “Amuse Travel,” an organization that developed and implemented travel products and services for people with disabilities, based on the phonetic memory of people with disabilities saying “travel” when asked what they most wanted to do; and “discarded gum,” which can be transformed into a work of art instead of being dirty and messy. A case of reverse thinking about discarded gum that proposes a way to collect and recycle discarded gum, and Gambridge Studio, a social enterprise that creates online games about helping and rescuing others by turning international social problems into games, will be introduced to show how creativity is being used to solve social issues.

## (2) The 4Ps of creativity as learning issues

The 4Ps, the components of creativity proposed by Rodes, are important concepts in creativity education because they provide a theoretical basis for how creativity research has been categorized and what leads to creative output. Learning the 4Ps serves three purposes <sup>[12]</sup>.

First, the 4Ps have many implications not only in terms of theory but also in terms of one’s own creative output. The 4Ps are creative people, creative process, creative process, and creative place, including creative products. It theorizes that all three elements are necessary to produce a creative product, so students can understand the interrelationships and complexities of how creative products are produced and examine what it takes to be a creative person.

Secondly, each element of the 4Ps is studied in detail, so that students can see which elements have strengths and weaknesses. For example, “expertise” is mentioned as a common trait of creative people. You’ll learn that creativity in creative people doesn’t just come from open-mindedness and divergent thinking, but from years of practice and training. This gives them the confidence that creativity is not something that only special people have, but that anyone can be creative.

Third, the theoretical concepts of the 4Ps are the basis for PBL, where creative people are selected and analyzed. What distinguishes personal development knowledge from university studies is that it has a theoretical and conceptual foundation based on academic disciplines. Analyzing the case of a creative person within the theoretical framework of the 4Ps can be an important element of creativity education through an academic approach.

### **2.3.4. Topic 3: PBL topic selection and implementation methodology**

Theme 3 aims to make a final decision on which topic to do PBL on. For this purpose, it takes three weeks: in week 6, students will study examples of social issues and creative problem-solving PBL, in week 7, they will practice an example of creative water 4P analysis PBL to solve social issues, and in week 8, they will select a PBL topic in groups and write and submit a plan.

#### **(1) Social issues and Creative Problem Solving PBL**

Social Issues and Creative Problem Solving PBL involves selecting a social issue and undertaking a task to solve it. In social issue PBL, it is not the outcome of the creative problem solving that is important, but the process that leads to the creative problem solving. To this end, use class time to conduct a simple exercise in teams. It is very helpful for students to practice one of the topics included in the textbook, including various issues such as “How to resolve the conflict between generations” and “Can I try the sharing economy?” and finally show how previous students solved the problem, drew results, and presented them.

#### **(2) 4P analysis PBL of creative figures with social impact**

The 4Ps analysis of a creative person requires a significant amount of time to collect data, so it is not practical to do the PBL with students. Instead, by looking at previous students' creative figures and their best practices, I get second-hand experience on how to analyze a creative figure that I am familiar with but have never analyzed in detail. For example, you will analyze what aspects of creative people such as chef Paik Jong-won, director Bong Joon-ho, etc. are through the 4P analysis, which is an analysis of creative people, and discuss what efforts you should make to imitate them.

#### **(3) Choose a topic and submit your plan**

In week 8, give the group enough time to discuss the topic and how they will divide the roles in choosing the topic. In week 8, they will submit a plan based on the examples they have studied before.

### **2.3.5. Topic 4: PBL practice and presentation**

The real PBL activity begins in week 9 with the lab. Theme 4 consists of PBL labs and presentations. The PBL lab will last for two weeks, from weeks 10 to 12, and the presentation will take place in weeks 13 to 14.

#### **(1) PBL Labs**

How to organize the lab is probably the most important question for every PBL instructor. Given the pace of the group, individualized coaching is an effective method.

With a typical semester enrollment of about 40 students, there are about eight groups with five students per group. The practical week consists of about three weeks, and the group activities are carried out in the following order: ① selecting a topic after meeting with the professor, ② organizing the table of contents, ③ dividing roles according to the table of contents, ④ collecting information, ⑤ writing a PPT, and ⑥ completing the PPT. At this time, the instructor will have about two mandatory group meetings. The first meeting is the topic selection meeting. In week 8, students will propose a social issue that they would like to creatively address in their group and select two topics centered on that issue. The main purpose of the first meeting is for the professor to confirm this with the groups. The first meeting is mainly for the professor to confirm the topic with the group, and the group will discuss how to proceed, how to divide the roles, etc.

The second meeting is organized when the PPT is initially finalized. This is to double-check that nothing has been left out and that there are no aspects of creative problem solving that have not been thought of. In particular, it is recommended that the creative problem solvers distinguish between the existing creative problem solving and the creative problem solving proposed by their group, and also think about the limitations

and directions of the creative problem solving so that it can be included in the PPT.

During the three weeks of the lab, the other groups will have three weeks of group meetings in class, based on the order in which the other groups are working and the order in which the groups are progressing. Emphasize that in addition to the mandatory individual meetings, students can interact with you at any time with questions.

Each week, students will be asked to keep an individual journal to address the various challenges of group work. These will be checked by the instructor to provide individualized feedback and action to help foster collaborative, ongoing teamwork. Remind students that the weekly journal entries will be submitted as part of the final report in Week 15, so it will be advantageous for the final report to have a detailed record of their activities each week, and emphasize that they should be honest and sincere in their weekly entries.

## (2)PBL presentation

For the form of presentation, various formats such as video production and theater are suggested, but students tend to prefer a standardized format, so it is usually a PPT presentation. It is suggested that there is no specific format in terms of number of presenters, order, etc. Usually, the team members are divided into groups, and they prefer to read from a script, even though it is important to know the script and speak in their own words. We recommend that students present in their own way because rigor is not the goal of the class, but we also recognize the limitations of suggesting many formats in a creative problem-solving class. The presentations are organized as follows: instructor introduces the topic → presentation (15 minutes) → Q&A (15 minutes) → 4 teams present, and at the end of the presentation, each team writes an evaluation [Table 2] of the other teams' presentations, including any comments. Feedback papers for each team will be given to the presenting team, who will then incorporate the feedback and submit a final presentation in Week 15.

For questions and answers about the presentations, an incentive system will be introduced to award half a point to those who ask questions. After introducing the incentive system, the participation level improved considerably, but it is worth discussing whether it is voluntary.

Since implementing PBL is one of the main goals of this class, it is important to emphasize that this is a class where absolute evaluation is guaranteed, so students are encouraged not to devalue the evaluation of other teams in order to evaluate their own team. In addition, the instructor should lead by example and help create an atmosphere of encouragement and praise for all attempts and comments. Therefore, the important thing about feedback to other teams is that they share what they liked, what they learned, and what it made them think about, and that they share their questions so that they can encourage and praise each other for the work they have done throughout the semester.

**Table 2.** PBL assessment items

| Social Issue Task |                                               | Creative Character Analysis Task |                                                  |
|-------------------|-----------------------------------------------|----------------------------------|--------------------------------------------------|
| Select a topic    | Is the topic relatable?                       | Selecting people                 | Is the person relatable?                         |
|                   | Is the topic fresh?                           |                                  | Is the person new?                               |
|                   | Is the topic useful                           |                                  | Is the person useful?                            |
|                   | Is the topic consistently important?          |                                  | Will they continue to be helpful?                |
| Cause             | Is the cause well understood?                 | 4P                               | Was the 4Ps fulfilled?                           |
|                   | Is the root cause investigation multifaceted? |                                  | Was the analysis done from multiple angles?      |
| Solution          | Is a creative solution proposed?              | Lessons learned                  | Did I learn about creativity from the character? |
|                   | Is the solution convincing?                   |                                  | Is the analysis of the character compelling?     |

### 2.3.6. Imagination innovator assessment items and scoring

#### (1) Absolute evaluation items and scores

Many researchers in creativity education have emphasized an evaluation system that allows free expression and suggestion without being bound by evaluation. Imagination Innovator is organized as an absolute assessment to realize this. The criteria for absolute grading varies from instructor to instructor, but in this class, we decided that an A was worth 90 out of 100 points, and we informed students in advance that all students would receive an A if they scored above 90 points.

However, absolute grading does not mean that you can get away with not doing your work, so it is important to have clear guidelines for grading to ensure that learning takes place and that there is both team and individual grading. The problem with many team-based classes is that there is a problem of free riding, and to prevent this, the weight of individual assessments should be increased and relative evaluations within the team should be made. Therefore, as shown in [Table 3], the evaluation was divided into individual evaluation, relative evaluation within the team, and team evaluation, and among them, the weight of individual evaluation was the highest to prevent free riding.

**Table 3.** Imagination Innovator course assessment items

| Individual Evaluation         | Team peer evaluation              | Team Evaluation         |
|-------------------------------|-----------------------------------|-------------------------|
| Attendance (20%)              | Team member evaluation (10%)      | Team presentation (20%) |
| Midterm Paper (25%)           | Team activity participation (10%) |                         |
| Final report submission (15%) |                                   |                         |
| 60%                           | 20%                               | 20%                     |

#### (2) Student feedback

The main purpose of this course was to promote creative problem solving for social and cultural issues and problems. When looking at the students' impressions of the course, first, they said that they learned about the problems of people with disabilities and marginalized groups that they had not thought about before, and second, they rethought their creativity by coming up with solutions to social problems from different perspectives and ideas.

## 3. Conclusion

### 3.1. Contribution as a creative subject

Imagination Innovator has contributions as a creative convergence course in the following three aspects.

First, it is significant in that it goes beyond the existing creativity education centered on creative products and attempts to solve creative problems for social issues. This is an effort that is in line with recent practical and research directions in creativity education. Companies are measuring creativity competencies to find creative talents, and there are various ways to measure them<sup>[13]</sup>. In recent years, the measurement of creative competence has gone from the problem method of presenting a problem situation and seeing how original and useful ideas are generated, to the recent method of measuring the extent to which people can look at issues that are actually appearing in society and propose solutions. For example, in 2019, the following questions were

asked in interviews for Samsung Group's wireless division:

(1) Governments and companies want to increase the share of renewable energy. Despite the preconceived notion of environmental benefits, there are ancillary environmental issues that come with it.

(2) A new solar panel compression technology is invented by a company's R&D department.

(3) Propose a solution to minimize the environmental impact and maximize the efficiency of renewable energy in this situation.

The creative problem-solving class through social issues can satisfy students' understanding of their society as well as the instrumental aspect of preparing for employment, and this type of creativity education needs to be further expanded, as the problems are presented from a problem-solving perspective based on society and basic knowledge rather than problems using simplified creative techniques. Second, it is important to note that this class endeavored to implement the directions that have been proposed in creativity education in the past. In this study, students were able to learn about creativity in an interdisciplinary, interpersonal, and socio-cultural context by proposing solutions to social problems that exist in society by dealing with issues such as discrimination and marginalization, technological revolution, and morality, and they were able to learn that the solution of social problems is not far from them, and they tried to implement self-actualizing and motivational creativity education by learning.

Third, by exploring various issues such as science and technology issues (e.g., artificial intelligence, gene editing, GMOs, etc.), education issues (e.g., creativity education), socio-cultural issues (e.g., discrimination, prejudice, etc.), and environmental issues (e.g., plastic waste, etc.), and sociological imagination and solutions for each issue, we attempted to create a convergent education that is not limited to one field but spreads to various fields. By applying the concept of sociological imagination that can be discussed across disciplines, students were able to learn to look at society through various approaches and attempts instead of only looking for the right answers, and that solutions can be achieved through convergent and integrated attempts.

### **3.2. Future directions**

Despite the above contributions, there are also directions for improvement that should be considered for the further development of creativity education that combines social issues and creative problem solving.

First, as PBL exercises are conducted in non-face-to-face situations due to the impact of COVID-19, it is necessary to prepare measures on how to conduct discussions and PBL. There are some aspects that are easier than PBL that requires direct product production or design, such as searching for news or newspapers online to discuss social issues, but it is still difficult to form a rapport and interact smoothly due to the awkwardness of non-face-to-face situations.

I would like to suggest three things to facilitate interaction. First, it is more difficult to form a rapport in advance of a discussion activity in a virtual class than in an offline class. Therefore, it is necessary to organize groups from the beginning of the semester and have them meet several times after the midterm exams and before the full-scale PBL to identify and get to know each other. Second, Zoom provides a way for group discussions and activities to be shared so that work done in the online live class can be shared with everyone. This can be a way to demonstrate efficiency in a virtual class rather than a face-to-face class. A final alternative is to enable bulletin board discussions. Bulletin board discussions are often more effective in a virtual setting because they allow students to take time to organize their thoughts, see what their peers are saying, and offer their own reasoning. However, there is also a negative aspect that students may find it difficult to present different opinions due to the fact that their posts are left in the discussion, and they may

become homogeneous. It seems that it is necessary to prepare a plan for this.

Second, there is an attempt at team teaching with experts. The disadvantage is that one instructor may not be able to provide a deep approach because he/she is dealing with issues in multiple fields. It is true that specialized knowledge is needed to discuss various perspectives and views on an issue <sup>[14]</sup>. Therefore, it is necessary to consider team teaching methods that can efficiently run multiple classes by organizing faculty members with expertise in each issue. It is true that one of the limitations of the existing team teaching is that each instructor teaches separately, resulting in a lack of connection and different teaching methods that do not produce synergy, but if you organize one topic into three weeks, covering four issues and using the same method for each week, you can show your expertise in unity. This would require a policy decision by the school authorities to recognize credit. Once these conditions are in place, it is believed that the participation of experts will be facilitated.

Third, it is necessary to consider the points that should be considered when applying the method in other schools. For example, this lesson was an absolute assessment because it was a creativity education centered on PBL. However, depending on the school environment, absolute assessment may not be possible. If the assessment is relative rather than absolute, this may not be a problem for items where individual accountability is important, such as attendance, midterms, and individual reports. However, in the case of inter-team evaluations, it may be difficult to use the relative evaluation as a basis for the absolute evaluation if fairness is not ensured. Therefore, in this case, it is necessary to listen to team presentations, fill out a questionnaire that asks students to evaluate other teams apart from their own, and show the results in a transparent way to reach a consensus on the relative evaluation.

Lastly, it seems that it is necessary to set goals according to the students' eyesight and motivation level in order to achieve successful PBL practice <sup>[15-16]</sup>. PBL is being tried in various ways in various subjects to foster initiative and proactive skills. However, no matter how good the purpose and goals are, if it is only accepted as a task-oriented learning that is burdensome for the students who accept it, and if the PBL results are not good enough to share together, the collective intelligence-centered participatory learning method may show the opposite effect. It seems that PBL class activities should reflect the level and opinions of students, such as dividing the stages of PBL by week, providing active support using TAs, and opening a window for coaching and mentoring with professors in various ways.

## Disclosure statement

The author declares no conflict of interest.

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