

Engineering Education as Citizenship Education by P4C

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Abstract

Engineering and technology aim to lead a better life for people. But the meaning of “better” is highly contested in modern democratic societies where different citizens have different cultures and values. Engineers, as one of the citizens in such societies, are also living in multicultural and multi-value settings, and therefore they need to be responsible for such diversity when they engage in technological developments.

Therefore, in engineering education, it is necessary to aim at not only acquiring the specialized technological knowledge but also cultivating citizenship. By citizenship, it refers to a set of abilities to communicate and care for people with respect by taking into account different opinions and expertise of others.

Nevertheless, this has not been emphasized much in engineering education in Japan. For example, even in the class of engineering ethics, emphasis is placed more on the acquisition of textbook-based knowledge and virtue of problem cases, and less on abilities to discuss freely and gently.

Then, in general education of NIT we have conducted a dialogue-based educational program where learners/students ask questions, listen together and discuss with others. This program is designed based upon so-called Philosophy for/with Children (P4C). Matthew Lipman, one of the founders of P4C, defined the primary aim of P4C as multidimensional-thinking: critical thinking, creative thinking, and caring thinking. In addition, this multidimensional-thinking may, according to many P4C scholars, have a potential of creating active citizenry.

The discussion by P4C have three characteristics as follows:

1) People make a circle in the classroom and create a space where students can feel an emotional and intellectual “safety”.

2) Questions being discussed is proposed by students themselves based on their interests, not by teachers

3) Rather than rushing to reach a conclusion, students are asked to concentrate on listening to the differences between each other.

This paper begins by explaining what P4C is and why/how P4C is suitable for citizenship education, and then the following sections show our P4C classes in NIT (Tokyo and Ube) and learner's responses. Finally, we claim that the “community of inquiry” created through P4C can prevent the “self-righteousness” of engineers.

Keywords: *Philosophy for/ with children(=P4C), Community of inquiry, Engineering Ethics, Citizenship, Discussion-based education*

Introduction

Today, quite a few people can live without science and technology. Engineering and technology have always aimed at enabling a better life for people. However, in 21st modern democratic societies conditioned by diversity of cultures and values, people are also living in multicultural settings as citizens. Therefore, there is no single conception of “good” that engineering and technology ought to pursue, and thus this fact lets engineers consider multicultural values more seriously. In other words, in a society where people have various cultures and values, engineers *as one of the citizens* should not presuppose their given value of technologies as “good,” but keep on examining their own technological knowledge and abilities from the standpoint of democratic citizenship. Then, in engineering education, it is necessary to aim not only at acquiring the specialized technological knowledge but also at cultivating their sense of *democratic citizenship*, which includes the ability to communicate and care with respect for people with different opinions and expertise.

Nevertheless, this has not been emphasized much in engineering education in Japan because conventional engineering education has been conducted under the *professional* education curriculum of engineers. For example, even in the textbook on engineering ethics, emphasis is placed on the acquisition of knowledge and virtue of the real-world cases, namely professional ethics. (Cf. Kuroda, Todayama& Iseda, 2012; Saito& Sakashita,

2014). What is missed in such context is the premise that engineers were also citizens living in diverse cultures and values and being responsible for making multicultural society democratic.

In addition, the problem of “*self-righteousness*” of the engineer strongly requires the engineer ethics as citizenship education. For example, it is a “*self-righteousness*” that *only experts with technical knowledge can participate in a democratic decision-making process on the controversial ethical problems* (such as Minamata disease, Fukushima Daiichi nuclear disaster) In conventional engineering ethics education, teachers have tried to warn them by showing various ethical cases happened in the real world. However, as Hiyane (2011) rightly indicates, in order to prevent a serious accident due to the lack of ethical arguments, it is not enough to simply know various cases, but “students are *aware of the values that change according to their position* and realize that their sense of ethics is *relative*. By doing so, we can prevent the self-righteousness of engineers that is common in many ethical cases” (p. 11. - emphasis added). In this way, *a deep awareness of the unobviousness of rightness of one's own ethical judgment* is important in engineering ethics education.

Thus, it is clear that what is needed for current engineering education is not education for knowledge acquisition. Rather, *we insist, what is needed is a discussion-based citizenship education*, in which students in the lower grades can share various values, exchange opinions with each other, and think deeply, thereby realizing that *engineers are also citizens*. Of course, it is true that sometimes engineers are expected to serve as a professional figure who makes ethical decisions more frequently than lay citizens. However, there is no contradiction between being a professional engineer and being a citizen. In fact, it can even be said that today, *professionals must be the most civil and democratic persons*. (Cf. Dzur, 2008)

Based on the background, in order to establish engineer education as citizenship education, we have conducted a discussion/inquiry-based program in general education of NIT(KOSEN) by introducing the practice of *Philosophy for/with children(=P4C)*.

This paper begins by explaining what P4C is and why/how P4C is suitable for citizenship education, and then the following sections show our P4C classes in NIT (Tokyo and Ube) and learner's responses. Finally, we claim that the “community of inquiry” created through P4C can prevent the “self-righteousness” of engineers.

What is P4C?

Philosophy for/with Children is one of the inquiry-based education programs, originally started in the USA in the 1970s and now becomes popular across the world. Recently, many Japanese schools have also introduced the P4C style discussion program. Especially, as for NIT, several colleges have worked on the P4C program, such as Tokyo college, Ube college, Fukui college and Akashi College.

Matthew Lipman (2003), one of the pioneers of P4C, argues that the primary aim of P4C is a cultivation of

students' multidimensional-thinking: critical thinking, creative thinking, and caring thinking. Since, from his perspective, thinking had often been omitted from modern school education, creating a “community of philosophical inquiry” is a better way to improve thinking education. In other words, philosophy “*properly reconstructed and properly taught*” (Lipman, 2003, p. 3. - emphasis original.) can bring children's surprise and wonder about the world to the forefront of discussion. To this end, Lipman wrote some philosophical reading books for kids at the various developmental stages to think deeply.

Although most practitioners today are not likely to use Lipman's texts, many of them follow's Lipman's idea of “the community of inquiry” as a primary ideal of P4C. By the community of inquiry, Lipman (2003) defines:

“W[w]e can now speak of “*converting the classroom into a community of inquiry*” in which students listen to one another with respect, build on one another's ideas, challenge one another to supply reasons for otherwise unsupported opinions, assist each other in drawing inferences from what has been said, and seek to identify one another's assumptions. (p. 20. - emphasis added.)”

P4C aims to converting the conventional “classroom” in which teachers teach students various knowledge into “community of inquiry” through philosophical dialogue. In P4C style dialogue, all participants (*both* teacher and students) collaboratively talk and think about open-ended philosophical questions. Since even teachers do not know the answer of the questions being inquired in dialogue, they need to change their role, from a traditional model of knowledge-provider to a co-inquire and facilitator.

Moreover, in order to create the community of inquiry, teachers should be responsible for creating the situation where all participants feel like “I can say anything.” Jackson (2013), the founder of Hawaiian style P4C (= p4c Hawaii), named it “*intellectual safety*” where “*all participants in the community are free to ask virtually any question or state any view so long as respect for all is honored*” (p. 102. - emphasis original). It should be made clear that such intellectual safety is different from a creation of good friendship in the classroom. A genuine intellectual safety is anchored by a relationship where students can feel that they can tell what they truly want to say and that their voice is sincerely considered by others. Once intellectual safety is created, all participants come to feel “intellectual courage (to one's own authentic thoughts)” anchored by deeper mutual respect (ibid.)

Given these characteristics of P4C education (especially p4c Hawaii), it seems that, in the community of philosophical inquiry, students can learn some virtues of citizens, like mutual-respect for different opinions or beliefs.

P4C for citizenship education

Citizenship has traditionally been understood as a legal status. It is widely known that Marshall has distinguished them from civil, political and social rights. “Here, the citizen is the legal person free to act according to the law

and having the right to claim the law's protection. It need not mean that the citizen takes part in the law's formulation, nor does it require that rights be uniform between citizens" (Leydet, 2017, 1.1 Definitions).

In recent years, "active" citizenship learning has been proposed that calls for students' active involvement in the context of citizenship education. "The Crick Report" (Crick, 1988) emphasizes the concept of active citizenship, defining it as follows:

"... [active citizens are] willing, able and equipped to have an influence in public life and with the critical capacities to weigh evidence before speaking and acting... (1.5)".

So citizenship education needs:

"...social and moral responsibility, community involvement and political literacy. 'Responsibility' is an essential political as well as moral virtue, for it implies (a) care for others; (b) premeditation and calculation about what effect actions are likely to have on others; and (c) understanding and care for the consequences. (2.12)"

Therefore, *citizenship education is "not only based on knowledge about democratic institutions and systems, but also developing values, skills and understanding."* (3.1. - emphasis added)

Likewise, in the case of engineering education, citizenship education for engineers is not just about learning knowledge. Rather, it is important to develop various attitudes as active citizens.

Recently, many researchers and practitioners have emphasized that P4C has an aspect of citizenship education. Lipman (1988) also argues:

"One of the most valuable contributions philosophy has to make to the conversation of mankind with regard to civic education is the model philosophers offer of a community of inquiry in which *the participants are profoundly aware of how much they can learn from other participants with whom they strongly disagree.*" (p. 72. - emphasis added)

In this way, by deepening understanding of people with different ideas and values in the community of inquiry, students can learn the required attitudes as a citizen. And the ability to communicate and collaborate with people who have different opinions and value is an important ability for modern democratic citizens.

Kono (2014), Japanese P4C practitioner, emphasizes the concept of "attitude to participations". To cultivate such attitude of students, he indicates that "to speak to people and to society in one's own voice, and to be accepted by people and society. It may seem paradoxical, but the first thing you should do to develop the public nature of social participation is to learn to express yourself and to learn how to listen to others". (p. 55)

Such citizenship dimension of P4C is practiced in the real world. In Hawaii, some practitioners (e.g. Makaiiau, 2017) conceptualize P4C as "deliberative pedagogy" where students create a public sphere in the classroom to

learn democratic citizenship through reason-exchange, rational argumentation, and active listening. These skills are particularly important for creating democratic human relations in deeply divided community (such as Hawaii) where people are not willing to listen with each other.

Citizenship has many meanings. However, we think that *abilities to live with others who have diverse perspectives and to discuss with them are the primary goal of citizenship education in the context of contemporary democracy.* It is precisely these abilities that students should learn, and, as we shall see below, the community of inquiry can be efficient methods for this purpose.

The general process of P4C in Japan

The discussion by P4C in Japan (we often call it "Tetsugaku Taiwa" in Japanese) usually have five steps:

- 1) Participants make a circle in the classroom and *create a space that can feel "safety."*
- 2) Question for inquiry is proposed *by students, not by teachers*, based on their own interests.
- 3) During inquiry, all participants should keep the rules and mindsets (see Table 1).
- 4) *Rather than rushing to reach a conclusion*, students are asked to concentrate on listening to what others say.
- 5) At the end of dialogue, we usually do simple reflection with a show of hands or fill in a portfolio.

Table 1: An example of discussion rule and mindsets in P4C

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| <ol style="list-style-type: none">(1) You can say anything.(2) You should not take a denial attitude toward what people say.(3) You do not need to speak in the community.(4) We ask questions each other.(5) You talk based on your experience rather than the textbook knowledge.(6) We don't have to make an agreement.(7) You can change your initial opinion.(8) Don't worry if you get lost. <p>(Kajitani, 2018, p. 47)
*Some people explain all every time, others just take a few and explain.</p> |
|---|

In the context of citizenship education, it is important that *students, not teachers, decide the questions of the day.* "If the teacher selects the questions to be discussed, the students are likely to interpret that act as a vestige of the old authoritarianism" (Lipman, 2003, p. 98).

The process of question-selection should be based on the student's interest. What is more important is to ask students to propose questions from their own concern and explain this in their own term. This process should be student-centric rather than teacher-centric.

The 'community ball' (see Figure 1) is one of the important tools used for many P4C classes in Japan. It is a talking object made of woolen yarn, which is originally

pioneered by a group of practitioners of p4c HI, intended to create “intellectual safety”, At the beginning of the semester, students made this ball collaboratively so that this ball “becomes a symbol of a powerful symbolic shift in the circle regarding the authorization of the right to speak” (Jackson, 2013, p.102).



Figure 1: community ball

The community ball is used in the following manner:

- 1) A person who has the ball speaks (others who do not have a ball should listen).
 - 2) A person who has the ball can select the next speaker.
 - 3) If there is no student who wants to speak, the facilitator circulates the ball within the community.
- What students can do in this situation is to speak or to pass the ball to the neighbor.

How we are conducting classes in NIT

Based on these pedagogy and method, we conduct P4C in our classes.

In Tokyo college, we conduct the class “Introduction to Philosophy and Ethics as a Dialogue” (“Taiwa toshitenno Tetsugaku Rinri nyumon”). Textbook used in this class is “Rinri” (ethics), which is one of the subjects according to the Japanese Official Curriculum Guidance. The contents of “Rinri” include histories and theories of ethics and philosophy such as deontology, utilitarianism, liberal democracy and so forth. In our class, we teach such knowledge, but also provide students with opportunities to engage the P4C style dialogue.

At the beginning of each semester, our class begins by what we call “*Silent dialogue*”. (Cf. Murase, 2015) In this practice, students write their thought about their own interests on the worksheet (see Figure 2). Students at NIT are often afraid of speaking in front of others. So, the early step of dialogue should be their familiar style – writing on the papers.

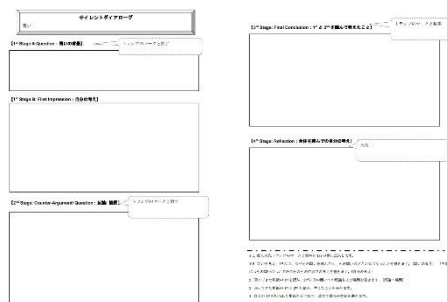


Figure 2: Worksheet of “Silent dialogue”

In “Plain Vanilla”, one of basic methods of p4c HI, students themselves propose the question for dialogue. The various questions are proposed by students. One day, for example, students proposed questions: “What is ‘my thought?’”, “Is homework (during summer vacation) necessary?”, “Should we say nice things to our friends?”, “All living things have life equally. But why do we treat it differently?” and “What is wrong with Baikinman (an antagonist character of the Japanese anime “Anpanman”)?”.

In Ube college, we have the class “Rinri (ethics)” for the second grade students (16-17years old) and “Gendai Shakai” (Civics)” for the first grade students (15-16years old). Like Tokyo college, we used textbook officially authorized by the Japanese Government. We use the textbook not only for transferring knowledge but also for doing P4C dialogue (see Figure 3).



Figure 3: p4c style in Ube

In the class, we repeatedly ask students to describe new questions and their “moyamoya” (their ignorance clarified through dialogue) in the portfolio after lectures and dialogues. Through a continuation of this practice, students are more likely to be aware of their initial assumptions about the subject.

In addition, we use a method called “fishbowl” (Gregory, 2008, p. 44) in order for us to facilitate dialogue among 40 students in one class effectively. In this practice, students are divided into two groups. While the Group 1 (20 students and 1 teacher/facilitator) engages in philosophical inquiry, Group 2 students (20 students) listen to dialogue outside the circle. 15-20 minutes later, the students swap their role (Group 2 students talk, while Group 1 students listen) Using this method, our bioethics classes thought about many questions, such as “Can a designer baby be happy?”, “Should the right to abortion be granted?”, and “Is it justifiable if parents design their child’s life through genetic engineering?”.

Students’ reflection

In the Tokyo college, we focus on student’s descriptive reflection note. That asks “What did you notice and learn from this class?” Examples of students’ answer include, “Each person has a different opinion”, “There are people who have similar ideas, but few people who have exactly the same ideas”. As such, *students found out a diversity of opinions*.

In addition to this, students understand the significance of dialogue and listening to others voice: “(I learned from this class) listening to and understanding others' opinions”, “Even if you think by yourself, there are only a few fixed answers, but adding other people's

opinions creates new ideas.”, “It is important to discuss the process to reach a conclusion.”

One student wrote that “(I learned that) people think various ideas and there are differences in the nuance of words they express”, and he continues, “I want to know the opinion of the others who keep silence during dialogue”. As such, his motivations to know multiple perspectives of the other are cultivated. *This shows that the philosophical community of inquiry fosters their interest in gaining multiple perspectives of others.*

We asked students “When did you think ‘fun(pleasure)’ when you engaged a philosophical dialogue?”. We found out many answers, such as “when I know thought of others,” “when someone says their idea differently”.

One student wrote “when new ideas are shaped through listening to the idea of others”, and on a free comment, he wrote, “It was very interesting that everyone had various opinions in the discussion, and it was good that I could hear many opinions from other people.”

The other students wrote “(I feel fun) when someone notices the point I did not notice previously”, and on a free comment, he wrote, “I like to listen to the other's voice.” What is shown here is not only to notice the presence of diverse opinions but also to find it interesting to hear various perspectives. This means that students find P4C interesting *not* because they listen to the same opinion. Nor do they find it interesting because their initial opinion is strengthened. Rather, they find it interesting *because* P4C enabled them to encounter different, or even opposite, opinions. In other words, *the community of inquiry enables students to learn how interesting listening to new ideas and changing themselves are. This could be the experience that serves as the basis for relativizing one's own opinion, opening oneself up to others without falling into the “self-righteousness”.*

In Ube college, in addition to the classical themes of Western philosophy such as freedom, happiness, religion, and reason, the class also dealt with modern issues such as gender, bioethics, information society, and modern cultural relativism. By writing a new question and unknowns on the portfolio after P4C discussion, students become *ambivalence of their ideas that they initially thought as true*. This awareness is effective from the viewpoint of defeating “self-righteousness” of the engineer. It is because engineer must be able to relativize their positions and listen to the opinions of different stakeholders without being stick to their own values and assertions.

P4C has made various contributions to this purpose. For example, when comparing student's opinion before and after dialogue on the ethics of enhancement (including designer baby, ethics of abortion, ethics of genetic engineering), students critically examined their opinions. What follows are some examples.

1) About the question: “Can a designer baby be happy?”

“Before we talked, I thought it would be unpleasant to make designer babies because they are artificial. But

after I listened to various opinions from everyone and a teacher through the dialogue, part of me it comes to think it might be good to have an edited gene that is not likely to cause diseases. But the equal part of me still thinks that I don't like the situation where I'm designed...” (2th grade, Department of Business Administration – emphasis added)

2) About the question: “Should the right to abortion be granted?”

At the beginning, I thought abortion should not be permitted because abortion may neglect children's rights to live. But *after philosophical dialogue, I agreed with one opinion that points out parents' viewpoint.* For this account, it is meaningless for parents if they cannot raise their kid. And I was thinking that the government should be responsible for supporting such parents. But, I am also wondering whether the government has an enough capacity to make it possible. Thus I thought this issue is quite difficult to consider (2nd grade, Department of Chemical and Biological Engineering – emphasis added)

3) About the question: “Is it allowed for parents to design their child?”

“In philosophical dialogue, *there was an opinion that was opposite to mine.* It said we should not design an “inconvenient” child to be “convenient” to mirror the child's feelings. *I am not sure whether it is ok to remove children's inconvenience on behalf of the children.* (2nd grade, Department of Mechanical Engineering – emphasis added)

Every student became aware that *their initial beliefs and assumptions were not self-evident*, as exemplified by the fact that many students changed their initial opinions through dialogue. This change has occurred mostly because the community of inquiry created a space where students could think and talk with no rush to reach conclusion. *As the inquiry focuses on the process of careful listening and reason-exchange, students can grow their citizenship abilities that engineers should have* – that is, listening, reasoning, critical thinking, and reflective thinking.

Conclusion

In this paper, we have shown that the community of philosophical inquiry created an important space where students learn citizenship. Students in particular learnt *the pleasure of dialogue with different others* (Tokyo) and *the skills for relativizing their beliefs and assumptions* (Ube). As we have seen, these are some of the citizenship that is needed for students who are becoming engineers. By taking such discussion-based education into general courses from the lower grades, we can expect them to learn how to prevent the self-righteousness.

Further consideration should be needed to understand how students' reflective reactions and their opinion-change contribute to the cultivation of their citizenship. To this end, we are currently undertaking a new research working. (Nishiyama, 2019; Nishiyama, Murase & Ogawa, 2019.). In our new project, we have investigated one of the democratic moments in dialogue – that is consensus-making. Although P4C is not a practice aimed at creating “universal” consensus, our research has attempted to identify types of so-called “meta-consensus” (e.g. consensus for collaboration, consensus for making dialogue progress forward, consensus on dissensus) and analysed how such meta-consensus contributes to cultivating students' citizenship abilities (e.g. recognition for diversity, understanding opinion of others with respect). In addition, since the technology college is usually conditioned by like-mindedness (e.g. male-centric, technology optimistic attitudes), our research group also focuses on how the community of inquiry can avoid creating echo-chambers.

It should be made clear that we do not contend that teaching knowledge is totally unnecessary. What is really needed actually is to make *a balance between teaching professional knowledge and learning a practice of citizenship*. Therefore, it should empirically be investigated the way in which we can bridge knowledge-transfer and free dialogue in the upper grades.

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