

# A PRELIMINARY INVESTIGATION INTO PARENTS' CONCERNS ABOUT PROGRAMMING EDUCATION IN JAPANESE PRIMARY SCHOOLS

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## ABSTRACT

To investigate parents' concerns about programming education in primary school, a preliminary online survey was carried out as a first step of the study. The result of the survey shows that parents seem to think that aim of programming education in primary school is not only learning coding.

## KEYWORDS

Programming education, primary school, parents' concerns, computing thinking, logical thinking, problem-solving

## 1. INTRODUCTION

Attempts to bring computational thinking to primary/secondary or K-12 education have been widespread (Barr 2011, Grover 2013). The term "computational thinking" was first used by Papert (1993) and popularized by Wing (2006). According to Wing, "Computational thinking' involves solving problems, designing systems, and understanding human behavior, by drawing on concepts fundamental to computer science" (p. 33). Moreover, she stated that computational thinking is a fundamental skill for everyone and that we should add computational thinking to every child's analytical ability. The article received attention from many education researchers and educators, and many researches related to computational thinking in K-12 have since been carried out. In the United Kingdom, a new subject "computing" was introduced into primary/secondary schools. In a guide to the subject "computing" for primary teachers, the importance of computational thinking is repeatedly stated.

As computational thinking gains increasing attention, programming education is also receiving attention as one of the ways of teaching computational thinking. Lye and Koh (2014) state that "[p]rogramming is more than just coding, for, it exposes students to computational thinking which involves problem-solving using computer science concepts and useful in their daily lives" (p.51). In Japan, the central council for education in the Ministry of Education, Culture, Sports, Science and Technology submitted a report that mentioned the introduction of programming education into primary school. In another council report, it is said that programming education in primary school should not aim to teach students coding itself, but rather to foster students' programming thinking. Programming thinking is considered a similar concept to computational thinking and included in computational thinking. Though, having said that, it also appears that a misconception has started to spread among parents that the aim of programming education is to learn coding. The parents' role in primary education is a very important one, and their attitude toward education has considerable influence on children's attitudes. Indeed, some researchers have investigated parent-child collaboration in learning programming (Lin and Liu 2012, Hart 2010). Parents' misconceptions and anxiety related to programming education could become obstacles for their involvement into children's learning. To introduce computer education into primary school smoothly and appropriately, it is important to know parents' concerns about programming education. Moreover, it is necessary to support parents to become involved in programming education. This study aims to make a clear case for establishing a support system for parents to become involved in programming education in primary education.

This paper provides the result of a preliminary investigation into parents' concerns about programming education in Japanese primary school, and constitutes the first step in clarifying this issues in detail.

## 2. INVESTIGATION

The survey for this study was conducted in April and May 2017. Participants were invited to the survey with e-mail which were sent by authors or authors' acquaintance. There were 20 participants in the survey were: 14 were mothers and the rest were fathers of primary school children. Two of them participated in a programming seminar for children, which was held by the authors. The survey was carried out as online questionnaire, which included the following sections: 1) attitudes towards programming education in primary school, 2) expectations for introducing programming education into primary school, 3) views on programming education out of school, and 4) their experiences of computer usage. There were some other questions related to English education and education in general in primary school; however, the results of these questions have not been included in this paper.

Table 1. Ages of participants

Age	Frequency
-39	4
40 - 44	7
45 - 49	7
50 -	1
non-response	1

Table 2. School years of participants' children

School year	Frequency
1	1
2	7
3	2
4	1
5	5
6	3
non-response	1

## 3. RESULTS AND DISCUSSION

### 3.1 Attitudes toward Programming Education in Primary School

Eighteen participants responded that they were strongly or relatively interested in programming education in primary school. All of the respondents but one agreed strongly or relatively with introducing programming education into primary school. Figure 1 shows parents' responses to questions concerned with attitudes toward programming education. It shows that participants generally have relatively positive attitudes toward introducing programming education into primary school, but they do not want programming to be a subject. Moreover, eight responded that they did not know that how programming education would be taught in the next course of study at all and ten answered that they were unsure. And five responded that they did not know what their children learnt about programming.

Table 3. Questions concerned with parents' attitudes

(1) Everyone needs to know how to program.
(2) Programming should be learned starting in elementary school.
(3) Programming will be required in the society of the future, so it should be learned in elementary school.
(4) Elementary school is too early to learn programming.
(5) Programming should be part of the elementary school curriculum.
(6) Programming will affect students' other studies, so it should not be taught in elementary school.

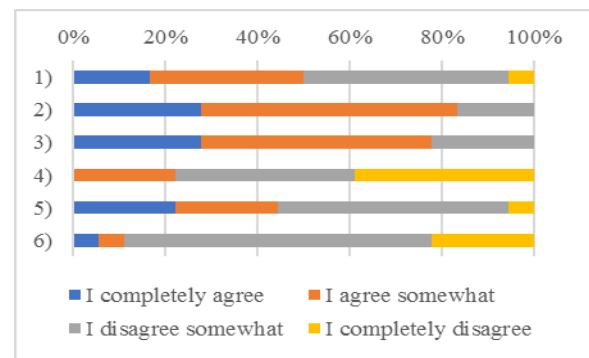


Figure 1. Responses to questions concerned with parents' attitudes

These results show that parents are open to introducing programming education and are interested in it; however, they are not provided with enough information about it.

### 3.2 Expectations for Introducing Programming Education into Primary School

Figure 2 shows the responses to the following question: “Do you expect the following outcomes as a result of introducing programming education?” and Table 2 shows items. Respondents placed high expectations on the usefulness of programming education for work in the future, They also expected their children to become accustomed to the knowledge and skills used in ICT. The outcomes “Children will like using a computer” and “Children will learn to think logically” were also relatively highly expected. On the other hand, the outcomes “Children will learn how to express themselves” and “Children will be better able to communicate” were expected to a lesser extent. By contrast, there was a relatively high expectation that children would become accustomed to creativity, problem-solving and problem-finding skills. Finally, the outcomes of “It will foster personnel with advanced ICT skills” and “It will make Japan a global powerhouse in ICT” were expected to a lesser extent.

It seems that parents’ expectations of programming education are generally high; however, they do not expect that learning programming results in fostering ICT specialists. Moreover, they expected children to become accustomed to logical thinking, creativity, problem-solving and problem-identifying. They understand to a certain extent that programming is more than just coding.

Table 4. Questions concerned with parents’ expectation for introducing programming education

1)Children will become skilled at using a computer
2)Children will like using a computer
3)Children will learn to think logically
4)It will help with work in the future
5)Children will like arithmetic and science
6)Children will learn about using ICT
7)Children will learn ICT skills
8)It will foster personnel with advanced ICT skills
9)It will make Japan a global powerhouse in ICT
10)Children will learn problem-solving skills
11)Children will learn to be creative
12)Children will learn how to express themselves
13)Children will learn how to problem-identifying skill
14)Children will be better able to communicate

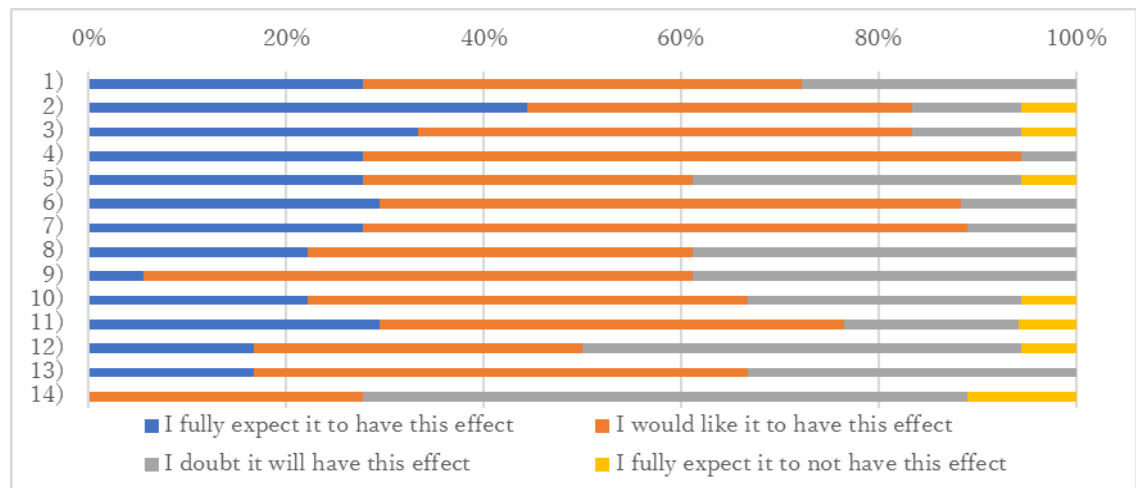


Figure 2. Responses to the question “Do you expect the following outcomes by introducing programming education?”

Figure 3 shows the participants’ responses to the following question: “To what extent do you expect that students will be able to achieve the following as a result of programming education?” and Table 3 shows items. The expectation that their child “Children will understand how a computer works” was highest. It was also expected that children would be “Children will be able to use a computer to write compositions,” “Children will be adept at using a computer,” and “Children will learn how to use the Internet” were expected. Following these expectations, it was also hoped that children would be “Children will be able to write computer programs,” “Children will learn to think logically,” and “Children will think about the steps one must follow when performing a task.”

It seems that parents expect their children to be able to use computer to a certain extent as a result of programming education. Additionally, becoming accustomed to coding and developing logical thinking are regarded as secondary aims. This shows that parents think that the aim of programming education in primary school is not only learning coding.

Table 5. Questions concerned with parents’ expectation for their children’s achievement as a result of programming education

1)Children will like using a computer.
2)Children will be inclined to use a computer.
3)Children will be able to use a computer to write compositions.
4)Children will be able to use a computer to draw pictures.
5)Children will understand how a computer works.
6)Children will be able to write computer programs.
7)Children will be adept at using a computer.
8)Children will learn how to use the Internet.
9)Children will be able to understand arithmetic and science.
10)Children will learn to think logically.
11)Children will think about the steps one must follow when performing a task.
12)Children will be better able to study other subjects.
13)Children will be better able to communicate their thoughts.
14)Children will be better able to work with others.

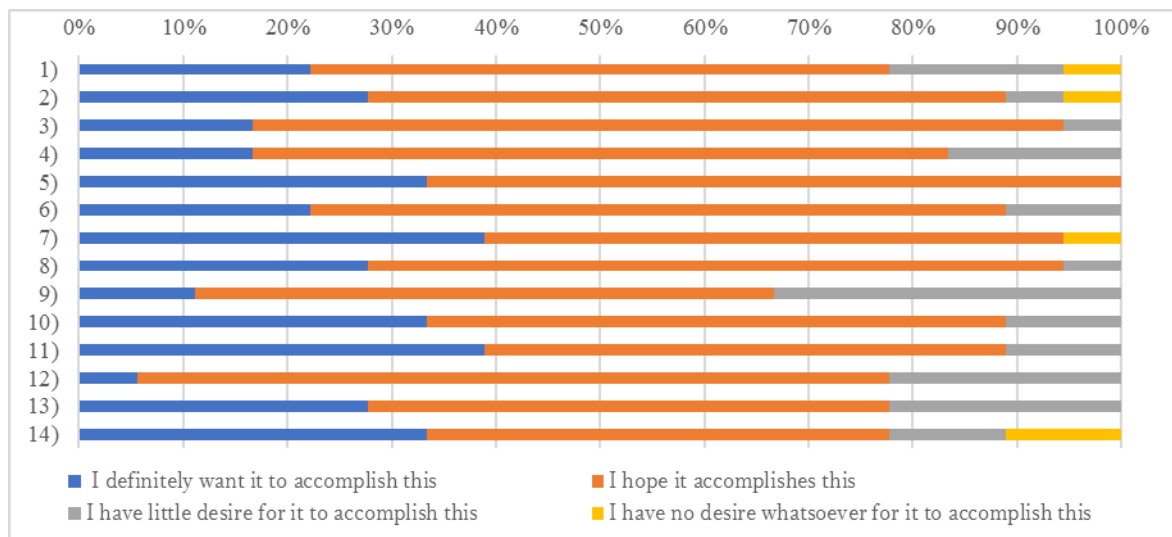


Figure 3. Responses for a question “To what extent do you expect that students will be able to achieve the following as a result of programming education?”

### 3.3 Programming Education Out of School and Parents' Own Experiences of Computer Usage

Six respondents answered that their children had participated in programming lessons or short courses out of school. Thirteen responded that they did not receive information about programming lessons or short courses out of school enough or at all. This suggests that it is necessary to provide parents information about programming education out of school.

Tables 4, 5, and 6 show responses to questions related to parents' own experiences. Almost half responded that they were good at using computers. More than half responded that they use computers at work and in daily life. It thus seems that respondents in this study were relatively familiar with computers. Future work is needed to expand subjects.

Table 6. Self-evaluation for using computers

Quite skilled	3
Capable	6
Basic operations only	5
No skill at all	3

Table 7. Experience of using computers at work

I have a computer-related job	1
I use a computer for work	8
I seldom use a computer for work	4
I never use a computer for work	2

Table 8. Experience of using computers in daily life

I use one often	8
I use one sometimes	5
I seldom use one	3
I never use one	1

## 4. CONCLUSION AND FUTURE WORK

To investigate parents' concerns about programming education in primary school, a preliminary online survey was carried out as a first step of the study. The results of the survey are outlined below.

- 1) Parents are open to introducing programming education and are interested in it; however, not enough information about programming education is provided.
- 2) Parents' expectation of programming education are generally high; however, they do not expect that learning programming leads to fostering experts. Moreover, they expected children to become accustomed to logical thinking, creativity, problem-solving and problem-identifying.
- 3) Parents expect children to be able to use computers to a certain extent as a result of programming education. Additionally, becoming accustomed to coding and developing logical thinking are regarded as secondary aims.

Parents seem to think that aim of programming education in primary school is not only learning coding.

This survey is just a preliminary survey, thus the number of participants was limited. It is necessary to carry out the survey with more participants. The questions were also limited; as a next step, we would like to add questions related to anxiety surrounding the introduction of programming education in primary school.

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