

## Ethics Approval

### THE UNIVERSITY OF HONG KONG



July 31, 2019

Mr. Ndudi Ezeamuzie  
PhD Student  
Faculty of Education

Dear Mr. Ezeamuzie,

Application for Ethics Approval  
HREC's Reference Number:EA1907019

I refer to your application for ethics approval of your project entitled "Teaching, Learning and Assessment of Computational Thinking".

2. I am pleased to inform you that the application has been approved by the Human Research Ethics Committee (HREC) regarding the ethical aspect of the above-mentioned research project, and the expiration date of the ethical approval is July 30, 2023.
3. Starting from April 1, 2015, the HREC's reference number of your project (i.e. EA1907019) has to be shown in all materials sent to potential and actual participants to enable participants to link the materials to an approved project.
4. You are reminded to report to the Committee any amendments and new information on the project. Any deviation from the study protocol or compliance incident that has occurred during a study and may adversely affect the rights, safety or well-being of any participant or breaches of confidentiality should be reported to the HREC within 15 calendar days from the first awareness of the deviation/incident by the PI. Application for amendment(s) of an approved project including project extension should be submitted using a prescribed form which can be downloaded from the Research Services homepage (<http://www.rss.hku.hk/integrity/ethics-compliance/hrec>). Application for extension should be submitted well before the initially approved expiration date.

Yours sincerely,

Professor T.S. Veitch  
Chairman  
Human Research Ethics Committee

c.c. Dr. J.S.C. Leung, Faculty of Education  
Office of Research, Faculty of Education

TSV/jw/ak

THE REGISTRY 教務處

POKFULAM ROAD, HONG KONG. TEL:(852)2859 2111 FAX:(852)2858 2549

Printed on environmentally friendly paper

## Parental Passive Consent Form

02/08/2019

Dear parents,

Your child's secondary school has agreed to participate in the "The Teaching, Learning and Assessment of Computational Thinking" project conducted by Ezeamuzie Ndudi, a PhD student in the Faculty of Education at the University of Hong Kong and under the supervision of Dr. Leung Jessica ( [leungscj@hku.hk](mailto:leungscj@hku.hk) ) of the Faculty of Education at the University of Hong Kong. Your child is asked to take part in this educational research and development project that aims to explore how computer programming should be taught in schools.

This project will have the following benefits to the community:

- Improve the teaching and learning of computational thinking in Science and Mathematics classroom.
- Understand the factors that influence the acquisition of computational thinking.
- Participants will learn how to write computer programs in Python.

To assess the effectiveness of this project, students are requested to:

- May be required to participate in a one-one audio-taped interview to provide their opinions on their learning.
- Will allow the researchers to analyze their self-reported form, computer program, artefacts, audio-recorded interview, and other relevant learning experiences.

The training shall be in the form of daily 2-hour in-class training and will last for five days. The entire study including the interviews will be conducted within the school venue.

On the first day of the study, participants will be invited to complete a simple background questionnaire which will last for about 7 minutes. The researchers will make a copy of the computer programs and artefacts developed by the participants during the programming training for analysis. At the end of the study, your child may be invited for a 20 minutes one-one audio-recorded interview. Participation in the interview depends on whether your child is in a list of the twelve randomly selected participants for the interview. Participants may review all the data we collected from them, including the audio recording and/or transcript at any time they wish. We will erase the entire or parts of them upon their request. If any participant wants to withdraw from

the study, we will erase all the data collected from him/her.

All information obtained, including the interview records will be securely stored in a locked cabinet at the researchers' office and accessible to the researchers only. Digital information shall be encrypted and stored in a password-secured computer that can be accessed by the researchers only. Any personal identifiable data shall be destroyed within 3 years after publication of the first paper arising from the research project. To encourage sharing of output with the research community, data will be retained indefinitely in an archive for use by other researchers. However, all personal identifiable data shall be destroyed before the archiving of data for use by other researchers.

Participation in this project is voluntary and your child can withdraw from the project at any time. No action on your part is required if you give consent for your child to participate in the study; however, if you do **NOT** wish to give consent, you are requested to make this known to the school. If you have any questions about the research, please feel free to contact **Mr. Ezeamuzie Ndudi** ([amuzie@hku.hk](mailto:amuzie@hku.hk)). If you wish to obtain further information about the rights of participants in research, please contact the Human Research Ethics Committee, the University of Hong Kong (2241-5267).

We would like to express our gratitude to your child for participating in this project.

Thank you for your attention and support.

Yours faithfully,

Ezeamuzie Ndudi  
Faculty of Education  
The University of Hong Kong  
Email: [amuzie@hku.hk](mailto:amuzie@hku.hk)

HREC Reference No.: EA1907019

## **Student Assent Form for Secondary 4 to Secondary 6 Students**

THE UNIVERSITY OF HONG KONG

Teaching, Learning and Assessment of Computational Thinking

Dear Students,

I am Ezeamuzie Ndudi, a PhD student in the Faculty of Education at the University of Hong Kong and under the supervision of Dr. Leung Jessica ([leungscj@hku.hk](mailto:leungscj@hku.hk)) of the Faculty of Education at the University of Hong Kong. I will conduct a research project on “*The Teaching, Learning and Assessment of Computational Thinking*” and would like to invite you to participate.

### Purpose of the Study

This study aims to understand how computational thinking and computer programming should be taught in the science senior secondary classroom.

### Procedures

You are invited to participate in a 5-day training programme. The training shall be in the form of daily 2-hour in-class training and the entire study including the interviews will be conducted within the school premises.

In the programme, you will learn how to write computer programs in Python programming language and solve given educational problems using computational thinking. On the first day of the study, you will be invited to complete a simple background questionnaire which will last for about 7 minutes. The researchers will make a copy of the computer programs and artefacts you developed during the programming training for analysis. At the end of the study, you may be invited for a 20 minutes one-one audio-recorded interview. Participation in the interview depends on whether you are in a list of the twelve randomly selected participants for the interview. You can review all the data we collected from you, including the audio recording and/or transcript at any time you wish. We will erase the entire or parts of them upon your request. If you want to withdraw from the study, we will erase all the data collected from you.

### Potential Risks / Discomforts and Their Minimization

The participation of this research study is purely on a voluntary basis. You can choose to stop at any time without negative consequences. Your performance in the training programme

will not influence any of your school grades.

#### Potential Benefits

The training programmes will provide you with an opportunity to learn how to write computer programs in python and help you acquire deep learning skill in science and mathematics.

#### Confidentiality

All information obtained, including the interview records will be securely stored in a locked cabinet at the researchers' office and accessible to the researchers only. Digital information shall be encrypted and stored in a password-secured computer that can be accessed by the researchers only. To ensure confidentiality, we will use an assigned code to identify participants. No school, individual or personal information will be identified in any of the publications and public dissemination activities. Any personal identifiable data shall be destroyed within 3 years after publication of the first paper arising from the research project. To encourage sharing of output with the research community, data will be retained indefinitely in an archive for use by other researchers. However, all personal identifiable data shall be destroyed before the archiving of data for use by other researchers.

#### Questions and Concerns

If you have any questions about the research, please feel free to contact **Mr. Ezeamuzie Ndudi** ([amuzie@hku.hk](mailto:amuzie@hku.hk)). If you have questions about your rights as a research participant, please contact the Human Research Ethics Committee, HKU (2241-5267).

Your help is very much appreciated.

Yours sincerely,

Ezeamuzie Ndudi  
Faculty of Education  
The University of Hong Kong

Student Reply Slip

If you agree to take part in this project, please put a tick in the following box and sign your name beside it.

☐ I agree to participate in this project.

I \*\* agree / do not agree to the audio-recording during the procedure.

I \*\* wish / do not wish to be identified in the personal interview.

(\*\* Please delete as appropriate.)

Signature: \_\_\_\_\_

**OR**

If you do not agree to take part in this project, please put a tick in the following box and sign your name beside it.

☐ I do not agree to participate in this project.

Signature: \_\_\_\_\_

Student Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

HREC Reference No.: EA1907019

## Principal Consent Form

02/08/2019

Dear Principal,

I am Ezeamuzie Ndudi, a PhD student in the Faculty of Education at the University of Hong Kong and under the supervision of Dr. Leung Jessica ( [leungscj@hku.hk](mailto:leungscj@hku.hk) ) of the Faculty of Education at the University of Hong Kong. I will conduct a research project on “ *The Teaching, Learning and Assessment of Computational Thinking* ” and would like to invite your school to participate. The purpose of this study is to understand how computational thinking and computer programming should be taught in the science senior secondary classroom.

Students who participate in this research will learn how to program the computer using Python an industry-standard programming language in their mathematics and technology classes . The training shall be in the form of daily 2-hour in-class training and will last for five days. The entire study including the interviews will be conducted within the school venue.

On the first day of the study, participants will be invited to complete a simple background questionnaire which will last for about 7 minutes. The researchers will make a copy of the computer programs and artefacts developed by the participants during the programming training for analysis. At the end of the study, students may be invited for a 20 minutes one -one audio-recorded interview. Participation in the interview depends on whether the student is in a list of twelve randomly selected participants for the interview. Participants may review all the data we collected from them, including the audio recording and/or transcript at any time they wish. we will erase the entire or parts of them upon their request. If any participant wants to withdraw from the study, we will erase all the data collected from him/her.

All information obtained, including the interview records will be securely stored in a locked cabinet at the researchers' office and accessible to the researchers only. Digital information shall be encrypted and stored in a password-secured computer that can be accessed by the researchers only. Any personal identifiable data shall be destroyed within 3 years after publication of the first paper arising from the research project. To encourage sharing of output with the research community, data will be retained indefinitely in an archive for use by other researchers. However, all personal identifiable data shall be destroyed before the archiving of data for use by other researchers.

Please complete the reply slip below to indicate whether your school would participate in this research. Science and Mathematics teachers in your school will gain deeper insight into alternative

dimensions for teaching subject contents and computational thinking. Your students will acquire computer programming skill in Python. Participation is entirely voluntary, and all information obtained will be used for research purposes only. If you have any questions about the research, please feel free to contact **Mr. Ezeamuzie Ndudi** ([amuzie@hku.hk](mailto:amuzie@hku.hk)). If you want to know more about the rights as a research participant, please contact the Human Research Ethics Committee, the University of Hong Kong (2241-5267).

Your help is very much appreciated.

Yours sincerely,

Ezeamuzie Ndudi  
**Faculty of Education**  
The University of Hong Kong

Reply Slip

I have read the information above and decided that my school will collaborate with Ezeamuzie Ndudi, from the Faculty of Education at the University of Hong Kong for “*The Teaching, Learning and Assessment of Computational Thinking*” project.

School's Name: \_\_\_\_\_

Principal's Name: \_\_\_\_\_

Principal's Signature: \_\_\_\_\_

HREC Reference No.: EA1907019



## Teacher Consent Form

02/08/2019

Dear Teacher,

I am Ezeamuzie Ndudi, a PhD student in the Faculty of Education at the University of Hong Kong and under the supervision of Dr. Leung Jessica ( [leungscj@hku.hk](mailto:leungscj@hku.hk) ) of the Faculty of Education at the University of Hong Kong. I will conduct a research project on “ *The Teaching, Learning and Assessment of Computational Thinking* ” and would like to invite your class to participate in the study and to also collaborate with you in co-teaching the lessons. The purpose of this study is to understand how computational thinking and computer programming should be taught in the science senior secondary classroom.

Students who participate in this research will learn how to program the computer using Python an industry-standard programming language in their mathematics and technology classes . The training shall be in the form of daily 2-hour in-class training and will last for five days. The entire study including the interviews will be conducted within the school venue.

On the first day of the study, participants will be invited to complete a simple background questionnaire which will last for about 7 minutes. The researchers will make a copy of the computer programs and artefacts developed by the participants during the programming training for analysis. At the end of the study, students may be invited for a 20 minutes one -one audio-recorded interview. Participation in the interview depends on whether the student is in a list of twelve randomly selected participants for the interview. Participants may review all the data we collected from them, including the audio recording and/or transcript at any time they wish. we will erase the entire or parts of them upon their request. If any participant wants to withdraw from the study, we will erase all the data collected from him/her.

All information obtained, including the interview records will be securely stored in a locked cabinet at the researchers' office and accessible to the researchers only. Digital information shall be encrypted and stored in a password-secured computer that can be accessed by the researchers only. Any personal identifiable data shall be destroyed within 3 years after publication of the first paper arising from the research project. To encourage sharing of output with the research community, data will be retained indefinitely in an archive for use by other researchers. However all personal identifiable data shall be destroyed before the archiving of data for use by other researchers.

Please complete the reply slip below to indicate whether your class would participate in this

research. You will gain deeper insight into alternative dimensions for teaching subject content and computational thinking. Your students will acquire computer programming skill in Python. Participation is entirely voluntary, and all information obtained will be used for research purpose only. If you have any questions about the research, please feel free to contact **Mr. Ezeamuzie Ndudi** ([amuzie@hku.hk](mailto:amuzie@hku.hk)). If you want to know more about the rights as a research participant, please contact the Human Research Ethics Committee, the University of Hong Kong (22445267).

Your help is very much appreciated.

Yours sincerely,

Ezeamuzie Ndudi  
**Faculty of Education**  
The University of Hong Kong

Reply Slip

I have read the information above and decided that my class will collaborate with Ezeamuzie Ndudi, from the Faculty of Education at the University of Hong Kong for “*The Teaching, Learning and Assessment of Computational Thinking*” project.

School's Name: \_\_\_\_\_

Class: \_\_\_\_\_

Teacher's Name: \_\_\_\_\_

Teacher's Signature: \_\_\_\_\_

HREC Reference No.: EA1907019

## Demographic Questionnaire

HREC Reference No.: EA1907019

### Computational Thinking and Programming Development

Thank you for participating in the computational thinking and programming development project. The purpose of this study is to investigate the learning and assessment of computational thinking in schools. The outcome will be immensely useful in understanding how to teach computational thinking and how students learn too.

I would like to invite you to complete this form which will take approximately 7 minutes. The content of this form will be matched to your progress in this computational thinking study. Therefore, the pre-filled pseudo registration number for this programme

CT-

has been randomly assigned to conceal your identity throughout this study. You may choose whether to participate or not to participate. Participation is purely voluntary and whatever decision you make will not prejudice your relationship with the tutors or persons associated with this study. If you chose to participate, you reserve the right to discontinue from the study at any without any negative consequences. Your data shall be kept strictly confidential. Personal or identifiable data will not be disclosed when reporting the result.

Please read the questions very carefully and tick in the box that is correct. There is no obligation to answer the question which you find uncomfortable.

#### BACKGROUND

---

Please [√] only one answer for the following questions.

**1. Please select your age**

☐ less than 14 years   ☐ 14 to 15 years   ☐ 15 to 16 years   ☐ 16 – 17 years   ☐ more than 17 years

**2. What is your gender?**

☐ Female   ☐ Male

**3. What is your current year in school?**

☐ Senior Secondary 1   ☐ Senior Secondary 2   ☐ Senior Secondary 3

**4. What is your ethnicity?**

☐ Hausa   ☐ Igbo   ☐ Yoruba   ☐ Others: \_\_\_\_\_ *'please specify'*

**5. With regards to using a computer in general, how would you describe yourself?**

Note: Computer refers to any of these devices - PC, desktop, laptop, notebook, MacBook that runs on any of the following operating systems – Windows, Unix, MacOS

☐ Expert User   ☐ Advanced User   ☐ Intermediate User   ☐ Novice User   ☐ Never used

**1. Who owns the computers that you can use?**

*Check all that apply.*

☐ Myself ☐ My parent ☐ My sibling ☐ My school ☐ Others: \_\_\_\_\_ 'please specify'

**2. Please estimate the average duration of your daily computer usage.**

☐ less than 1 hours ☐ 1 to 6 hours ☐ more than 6 hours ☐ seldom

**3. How long are you connected to the internet while using the computer daily?**

☐ less than 1 hour ☐ 1 to 6 hours ☐ more than 6 hours ☐ seldom

**Using the following 5-point Likert scale, (5 = Very Often 4 = Often 3 = Sometimes 2 = Rarely 1 = Never), please circle the number that indicates your level of agreement with the following statements:**

		Very Often	Often	Sometime	Rarely	Never
<b>9.</b>	My purpose of using the computer is to browse the internet	5	4	3	2	1
<b>10.</b>	My purpose of using the computer is to do my school homework and assignment	5	4	3	2	1
<b>11.</b>	My purpose of using the computer is to write computer programs	5	4	3	2	1

**12. Have you written any computer program before?**

☐ Yes ☐ No ☐ Not confident

**13. Which of these programs or tools did you use in writing a computer program?**

*Check all that apply.*

☐ Scratch ☐ App Inventor ☐ Python ☐ JavaScript ☐ Others: \_\_\_\_\_ 'please specify'

**14. Where did you learn how to write a computer program?**

*Check all that apply.*

☐ Self-learning ☐ School ☐ Tutorial centre ☐ Family ☐ Others: \_\_\_\_\_ 'please specify'

**15. How long have you been writing a computer program?**

☐ less than 1 year ☐ 1 to 2 years ☐ 2 - 3 years ☐ more than 3 years ☐ Never

## Interview Protocol (**Not used due to Pandemic**)

HREC Reference No.: EA1907019

### Computational Thinking and Programming Development

#### Introduction

Before the interview starts, it is important to arrange a relaxed and friendly environment for the meeting. The convenience of the interviewee should be favourably considered in choosing interview room, venue and time.

Describe the purpose of the study, identify the participant and explain their rights with a thorough understanding of the ethical procedure

- a) Welcome and thanks for agreeing to participate in this interview. This is a one-one interview and it is part of the computational thinking programme you participated in. This interview will last for about 20 minutes.
- b) My name is \_\_\_\_\_. ( *Tell the participant more about yourself like your position and affiliated institution and restrict the introduction to the context of the study. Eg. a research student from the University of Hong Kong etc.*)
- c) The purpose of the study is to investigate the learning and assessment of computational thinking in schools. The outcome will be immensely useful in the teaching of computational thinking. Today, we will like to understand more about your experience in the just conclude programme.
- d) The information you provided shall be associated with your progress in this study. Therefore the pre-filled pseudo registration number CT-\_\_\_\_\_ has been randomly assigned to conceal your identity throughout this study. The voice/audio of the interview shall be recorded for transcription. Apart from the process of transcription, the audio will not be played back for persons not directly involved in the project.
- e) You may choose whether to participate or not to participate. Participation is purely voluntary and whatever decision you make will not prejudice your relationship with the tutors or persons associated with this study. If you chose to participate, you reserve the right to discontinue from the study at any without any negative consequences. Your data shall be kept strictly confidential. Personal or identifiable data will not be disclosed when reporting the result.
- f) Do you have any questions about the purpose or procedure for this interview?
- g) Are you comfortable with proceeding, then? (If the answer is no, thank and politely dismiss the participant. Arrange and contact other participants who may be willing to participate).

### **Interview Questions**

- a) To what extent did the computational thinking course help you to learn to write computer programs?
- b) Can you explain the challenges you encountered in this course?
- c) Can you describe how you solved problems or managed the tasks in the lessons? What approach did you use when you were not familiar with the topic or content?
- d) Did you receive any support during the programme? Please describe the nature of the support you received.
- e) Did the programme motivate you to learn or do anything new? Please describe

### **Summarizing and Wrapping it up:**

- a) Are there any other thoughts you would like to share?
- b) Are there any questions about the research we are doing or the use of this data?
- c) Thank you again for participating in this focus group.

### **Prompts and Stimulators:**

The following phrases are useful prompts to guide interviewee to respond with deeper explanations. They should serve as a guide only and should be used thoughtfully

- a) I want to come back to something you said...
- b) Can you say a bit more about this...?
- c) Tell me how you felt about that...
- d) Why or in what way was this meaningful to you?
- e) Tell me a little more about that/what did you mean?