Chapter 18

Self-development Through Service-Oriented Stress-Adaption-Growth (SOSAG) Process in the Engagement of Computational Thinking Co-teaching Education

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Abstract In this chapter, we propose the service-oriented stress-adaption-growth (SOSAG) process based on the existing intercultural transformation theory (ITT), through the engagement of cross-institutional tertiary students in computational thinking (CT) education at primary schools. Students from tertiary education institutions in Hong Kong are recruited, trained, and assessed to become qualified teaching assistants (TAs) for providing in-school co-teaching support in CT education in 32 primary schools. TAs are monitored and dispatched to different years and different classrooms in multiple regions in Hong Kong. Through service engagement, and the proposed service-oriented stress-adaption-growth (SOSAG) process, each TA has to undergo self-development in multiple stages, including pre-assessment, training, teaching practice, and in-class co-teaching. We summarize the ongoing challenges and future directions of SOSAG in this chapter.

Keywords Computational thinking · Teaching assistant · Co-teaching · Stress-adaption-growth · Service-oriented · Service learning · Intercultural transformation theory

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18.1 Introduction

Programming and computing-related skills are vital in the information age both for personal and social development. In CoolThink@JC, City University of Hong Kong (CityU) aims to provide professional education support to enhance programming literacy among Hong Kong citizens through a series of elaborative teaching and learning activities, in particular targeting the primary school student group in the Hong Kong population.

Programming/coding has now become a global initiative in multiple countries, such as the “Hour of Code” campaign was first initialized by Code.org in the US in 2013 providing free educational resources for all ages. Now, over 100 million students worldwide have already tried an “Hour of Code”. In the UK and Australia, programming has been put into the primary education curriculum. In Hong Kong, CityU Apps Lab (CAL) (<http://appslab.hk>) is a leading University organization offering free workshops to the public to learn to code, and officiated the first “hour of code” in the territory. Over 2,000 h of programming has been achieved in the previous “Hour of Code HK” workshops, and we, at CityU of Hong Kong, have offered over 10,000 h of programming lessons to the beneficiaries by running “We Can Code” and “Go Code 2015” with the Sino Group.

In the world’s major economies, students from elementary to postgraduate level are getting increasingly involved in understanding the fundamentals of computer programs and programming skills. In the UK, a new version of the relevant curriculum was established a year earlier on July 8, 2013 by GOV.UK, putting a significant emphasis on computing skills. The new curriculum replaces basic word processing skills with more demanding tasks such as programming and understanding algorithms. Primary school children are proposed to be taught how to write simple programs using computer languages.

In Singapore, Hong Kong’s Asian competitor of diverse areas is a plan being fermented by the INFOCOMM Development Authority (IDA), which prescribes the progressive introduction of software programming classes into public schools. This would provide students with a unique opportunity to write programs in classroom settings employing the teaching and educational resources, which are available to other fundamental curricula. A talk is now being initiated by the nation’s Ministry of Education regarding the necessity of incorporating programming into its national curriculum.

Estonia is beyond all doubt taking the lead in programming skill education by launching a nationwide scheme to teach school kids from the age of seven to nineteen the methodology of writing computer programs. It is one of the first countries to have a government that was fully enabled. The ProgeTiger initiative was started in January 2012 by the Estonian government, aiming at bringing programming into classrooms to help raise Estonia’s technical competency. This small country with a population of 1.3 million is the home of Skype and has been attracting sponsoring activities from well-known organizations such as the Mozilla Foundation.

It is of great significance that Hong Kong citizens could grasp the basic principles of mechanisms of the digital devices that play such a large role in modern life and be aware of the fundamentals of programming. It is also important to know that when running the “Hour of Code HK” Campaign, we observe that youth group can achieve the programming tasks in a much shorter time when compared with University students or adults. In this connection, it is identified that there is still a lack of momentum in Hong Kong in the present day to catch up with the world’s best.

We believe that students at their early age are able to understand and acquire computational thinking skill at a faster pace; therefore, in this project, we provide the students in the participating schools three years of in-class training and out-of-class mentoring support from junior, intermediate, up to advanced level. For the in-class training at each level, there are 8–14 lessons with each lasting around 35–45 min. The out-of-class mentoring support is provided by our university student mentors on a group basis (around two student mentors take care of a class of 40 students). The student mentors take part in this project through our established campus internship and other cocurricular experiential learning schemes.

In CoolThink@JC, a sustainable learning environment was created for a period of 3 years for the participating primary students to learn the skill to program and keep up the learning attitude. The main role of the CityU team is to provide in-class manpower support and parent involvement support, and to facilitate effective learning in target schools. CityU Apps Lab, an education community at CityU consisting of more than 600 University student members, is able to provide such manpower support throughout this project. It is expected that in 3 years’ time, this community can grow up to 1,000 members on campus involving the CityU Alumni network. Students from other Hong Kong higher education institutions who are passionate about computational thinking (CT) and programming education are also recruited to join this project.

Yet, one challenge identified by the research group is the diverse cultures and backgrounds of the recruited students, which the cultural difference is expected to be overcome in the stress-adaption-growth (SOSAG) process in the recruitment.

In order to provide interactions with primary school students, we will provide support to the whole project to create a structured curriculum with the partnering organizations on this project that eventually integrates learning existing subjects such as mathematics and sciences with the computational thinking skills that the students have picked up. This has the potential to galvanize knowledge sharing and learning among the students.

18.2 Roles and Responsibilities of TAs

In CoolThink@JC, 100 and 500 teaching assistants (TA) were recruited by CityU from over 10 tertiary institutions of Hong Kong in the academic years of 2016/17 and 2017/18 to serve 32 pilot primary schools that participate in the computational thinking education in Hong Kong.

The main roles of TAs are to assist teachers in dealing with classroom teaching, e.g., co-teaching CT and answering students' enquiries in class in the pilot primary schools. They also help in creating a joyful and innovative learning environment, and act as a role model in the classroom (e.g., by providing a passionate and responsive presence).

Another major responsibility of TAs is to provide professional support to teachers in relation to teaching and learning. They have to motivate students' learning and encourage them to interact with others, for example, by praising students who have successfully completed the class exercises with creative ideas and are behaving well, and encouraging them to assist other classmates. Also, they take the role of inspiring students to generate creative ideas by encouraging students to finish their tasks by themselves with appropriate guidance. They have to be aware of student progress and achievements, and report any concerns regarding student matters to their supervisors, namely teaching leads (TLs).

18.3 Service-Oriented Stress-Adaption-Growth (SOSAG) Process

18.3.1 Assessment and Stress

TAs take the main role in providing support in CT lessons and act as an ultimate executor of co-teaching in primary schools. Before being assigned to serve in primary schools, potential candidates are trained and assessed based on their performances on a series of tests and teaching practices to become "qualified TAs".

Unlike other subjects or skill set training, teaching CT is not easy as learners are required to have thorough understanding of both concepts and mechanisms to acquire the thinking skills needed for asking questions, understanding problems, and identifying solutions. Training TAs to be qualified to provide support to CT teaching at a large scale is even more a challenging task. Instead of "spoon-feeding" candidates for the essential soft and hard skills as the knowledge for co-teaching CT, candidates are expected to have a good attitude and high motivation, especially in Stage 1 where there are frequent interactions between candidates and the assessor for examining candidates' understanding on CT concepts, CT practices, and CT perspectives. This ensures the training and assessment at a large scale can be conducted smoothly while maintaining quality.

Among hundreds of TAs recruited from various academic background and experience, some do not have relevant education background while some lack relevant experiences, e.g., teaching or interacting with children. To overcome the cultural difference of a large group of TAs, assessments are crucial to evaluate and maintain the standard of TAs via various kinds of assessment methodologies. Potential candidates are exposed to stress in four stages of assessments, which include a test via electronic submission and interview screening (Stage 1), training assessment (Stage 2), teaching practice assessment (Stage 3), and probation assessment to be qualified TAs (Stage 4). The assessment stages are summarized in Fig. 18.1.

In various stages of assessments, stress is caused by the intercultural differences including but not limited to (i) education background (e.g., education, programming) and (ii) work experiences (e.g., teaching experience or experience with children). The potential challenges that new recruits for this program may face are highlighted and emphasized with an increasing extent in each stage to enlarge their stress, and therefore the adaption and growth eventually.

Many candidates expressed that they suffered from varying degree of anxiety, sorrow, and even pain in different stages due to the various reasons: some candidates are not confident to learn CT when being given a test related to Scratch in Stage 1; some are distressed when being asked to handle student issues during interview while some feel worried to handle a big class of students and answer all enquiries from students properly in the lesson.

To resolve the stress, adaptation takes place to promote qualitative transformation toward growth (Kim, 2001). We consider the “cultural shock” as a “catalyst” for potential TAs to adapt quickly and grow to make them fit in the roles in the service engagement.

18.3.2 Adaptation

Although stress may be considered as a negative emotion, an appropriate level of stress can be beneficial (Spencer-Oatey & Franklin 2009). Studies show that people under higher frequency of stress have higher level of adaption (Kim, 2001). Adaptation to “intercultural” differences marks a change in terms of behavior and attitude. In the adaption process, we offer TAs debriefing and reflection in different assessment stages to allow for self-review and lesson observation for self-improvement; for example, some candidates showed stress when failing in teaching practice caused by lateness or unsatisfactory performance. They reflected on the importance of time management and preparation.

Fig. 18.1 The stages of becoming a qualified TA in CoolThink@JC of Hong Kong

Table 18.1 ITT factors in the stages to become qualified TAs in CoolThink@JC of Hong Kong

ITT factors	SOSAG process			
	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching (at least 2 sessions)
Stress	✓	✓	✓	✓
Adaption		✓	✓	✓
Growth		✓	✓	✓

18.3.3 Growth

Adaptation also leads to psychological growth and better understanding of who we are, what we value, and where we might want to go (Shi, 2006). The journey of becoming qualified TAs of CoolThink@JC in the form of service learning helps to achieve a balance between service outcomes and learning goals (Furco, 1996). Service and learning goals are of equal weight and each enhances the other for all participants in service-learning (Sigmon, 1994). In the case of TAs in this project, service refers to the co-teaching support provided to teachers and students at primary schools while learning refers to the growth of TAs.

During the service, TAs are required to identify a problem, propose a solution, and learn from the experience (Crutsinger, Pookulangara, Tran, & Kim, 2004). During the lessons, TAs observe the students' learning progress to identify their problems, then think of a way to present the problem and to inspire the students to solve it. Experienced TAs usually learn from past experience to respond to students of different levels and characteristics for a better learning outcome.

We consider it a stress-adaption-growth process which eventually leads to the self-development of TAs. As an extension to the existing intercultural transformation theory (ITT), we propose that this multiple-stage service-oriented process leads to TAs' self-development as the "service-oriented stress-adaption-growth (SOSAG) process" highlights the growth via engaging candidates in service. The self-development of TAs is examined in Sect. 18.4—Evidences (Table 18.1).

18.4 Evidence

In this study, data was being collected and presented in the form of in-depth reflective summary submitted by TAs. The extracted content of the reflective summary was mapped against the corresponding factors of the stress-adaption-growth process of the intercultural transformation theory (ITT) (Kim & Ruben, 1988). Five cases were examined in light of ITT factors through the different stages of the SOSAG process.

The TA subjects in this study were invited to reflect on a number of attributes (listed in Sect. 18.4.1–18.4.2) which are expected of a qualified TA in CoolThink@JC.

18.4.1 Attitude

- Understanding the importance of the sense of responsibility (e.g., punctuality, being well prepared).
- Stepping out the comfort zone to accept new challenges which may be out of their profession.

18.4.2 Soft Skills

18.4.2.1 Communication Skills

- Communicating with various stakeholders including supervisors, school teachers, students, and partner TAs (e.g., observing students' learning progress and problems, communicating with students to give them a helping hand, handling student behavioral and disciplinary issues occasionally, and resolve conflicts between students).

18.4.2.2 Time and Stress Management

- For example, handling a certain number of students inquiries and issues within the limited lesson time.

18.4.2.3 Knowledge on CT and Programming

- For example, using CT concepts to solve problems in daily life.

Table 18.2 summarizes the TAs' self-review comments through the SOSAG in the service engagement in CT education. The comments that correspond to the respective ITT factors are highlighted for further analysis.

18.5 Discussion

18.5.1 Add-On Training

For the enhancement of knowledge in computational thinking, supplementary training will be offered to the existing TAs. Based on train-the-trainer model, experienced TAs form a taskforce to be trainers to design and offer add-on training for junior TAs.

Table 18.2 Excerpts from reflective summaries submitted by teaching assistants in CoolThink@JC

<i>(a) Stage 1—Pre-assessment</i>	
ITT factors	Stage 1—Pre-assessment
Stress	<p>“With knowledge on different computer languages such as C++, how come the educational tools for primary school students will beat me? However, I recognized that I might be too arrogant after pre-assessment as my background and knowledge could not support answering. I felt nervous during interview. I actually have no idea nor experience on CT questions and handling problems in given scenarios. There was a lot of stress in the pre-assessment so I did not perform well enough.” (Student 1)</p> <p>“As a linguistics student, several programming languages are required to be learnt for linguistic purposes. Yet, I am not confident of CT and programming. Though it was undoubtedly stressful in the preparation, I successfully went through the stages of online test and interview with sufficient self-learning and online research.” (Student 2)</p> <p>“My journey in CoolThink@JC began with pre-assessment. Without any relevant background as majoring in Finance, I encountered many difficulties in the test which were solved by searching information online and even asking advice from friends. However, as I sowed, so I reaped. The pre-assessment helped me understand some CT knowledge before moving to next stage. Then, I was pretty stressful during interview as there are lots of CT mentioned on the question paper such as parallelism and data manipulation. I tried to understand by relating each concept to the events happened in my daily life.” (Student 3)</p> <p>“Since I am a student studying Computer Science, almost all questions in the quiz could be answered with confident. However, if I wanted to get all correct, I still need to put some effort on revise some materials before start. This made me feel a little worried about the difficulty of learning materials. After that, I was very nervous in interview because I was weak in interview and also afraid of questions out of preparation. During the interview, there were questions asking to deal with some sudden problems in lesson. This made me start to have some stress on the required soft skills of this job, such as how could I handle a class of students and cooperate with teachers and other ambassadors.” (Student 4)</p> <p>“It(CoolThink@JC) aroused my interest. However, there is a big problem as I am not studying a subject related to CT and programming, and I do not have any idea of CT concepts.” (Student 5)</p>
Adaption	
Growth	

(continued)

Table 18.2 (continued)

<i>(b) Stage 2—Training</i>	
ITT factors	Stage 2—Training
Stress	<p>“I just remember that I was quite embarrassed to “perform” in front of the class. Even worse, our demonstration was not comprehensive enough.” (Student 1)</p> <p>“Apart from the soft skill training, the hard skill coaching of Scratch and AI2 in the afternoon definitely enabled me to learn some solid skills. It was quite challenging and stressful for me in the beginning. The learning process generally was pleasurable though I felt a bit left behind and stressful in digesting the excessive new information in a limited time. Luckily, TLs and a friend of mine provided guidance throughout the training.” (Student 2)</p> <p>“Sometimes I found I would lose myself in some steps and did not know where can find some codes or forget what was the next step.” (Student 4)</p>
Adaption	<p>“Luckily, CoolThink@JC is a family; the professors gave us precious and useful feedbacks and suggestions from their expert aspect, also other groups provided supplementary methods from their experience. Besides, we enjoyed the excellent performance of other groups and learnt to handle other situations.” (Student 1)</p> <p>“Coming up with an instruction sheet for other groups to fold a paper plane was also fun-filled. It was a good chance for us to experience and recognize how to clearly deliver a message to our audiences, allowing us to realize if our instructions are clear and understandable for the receivers.” (Student 2)</p> <p>“I was no longer stressful about Scratch because previous knowledge learned from pre-assessment allowed me to adapt new knowledge in CT faster.” (Student 3)</p> <p>“Even though everything seemed complicated to me, I received help from supervisors. They were willing to help me when I had any problems encountered during the training.” (Student 3)</p> <p>“Hence, I took myself as a student that I might help later on and remember what problems I would face and observed how the teacher helped and solved those problems.” (Student 4)</p> <p>“At the beginning, I just think that the CT concepts can only apply in programming and computing. I never thought that CT concepts can exist in everywhere.” (Student 5)</p>
Growth	<p>“Hence, I realized self-study and practice are also important apart from training provided.” (Student 2)</p> <p>“This improved my performance on how could I observe the students who might want to ask some questions and assist them before they ask.” (Student 4)</p>

(continued)

Table 18.2 (continued)

<i>(c) Stage 3—Teaching practice</i>	
ITT factors	Stage 3—Teaching practice
Stress	<p>“Before I went to the teaching practice or co-teaching, I was a little bit worried. In spite of the unknown situation that I might be faced in co-teaching, but I was also worried that programming might be too difficult for the primary school students. When I was in primary school, I just learned some background knowledge about the computer hardware and history, plus some basic controls of computer only, instead of coding or programing. Besides, I am afraid if CT or programming might be too difficult for the immature kids to learn.” (Student 1)</p> <p>“Before getting involved in co-teaching, we were sent to gain practical experience via teaching practice. I thought I was ready to overcome any difficulty. Nevertheless, the thought was proven wrong. Since I was not aware about the school location and arrival time, it took me long time to arrive. As result, I was late for my first ever teaching practice. I felt guilty and ashamed about myself as I was not executing my duty—Always on time. Also, I was stressful and worried about the impact.” (Student 3)</p> <p>“However, I was a bit sad that my first teaching practice was failed due to lateness. Although I was just late for a few minutes, I understood it should not happen since every lesson at primary school is short and valuable. Being late is not permitted and may affect the lesson quality like insufficient co-teaching support to assist lesson delivery and cause extra troubles for the teachers like entering the room suddenly and interrupting the lesson.” (Student 4)</p> <p>“In the second teaching practice, there were more TAs than usual situation in co-teaching. With the help of the currently working ambassadors, the class could be maintained in a good way. There were not many cases that some students were lagging behind a lot. However, TAs and teacher were so busy with the teaching, making me a bit worried of co-teaching and class management to solve students’ problem in the future.” (Student 4)</p> <p>“I still remember that I was very nervous when I had teaching practice in the primary school because there were many things to pay attention, such as assisting quality, classroom discipline and other uncertainties.” (Student 5)</p>
Adaption	<p>“With preparations before the class, I could provide suggestions to help them.” (Student 1)</p> <p>“Since it was my first teaching practice, the supervisor is willing to give me another chance. When participating in another teaching practice, I understood that planning should be always done before moving, which allows me to have sufficient time and effort to complete the duty.” (Student 3)</p> <p>“I had more pressure in the second attempt and prepared more time than the last time for taking transportation, finding ways and walking to prevent being late again, therefore I arrived on time and could try to help the students with their needs.” (Student 4)</p> <p>“Experience really helped a lot. The more problems we handled, the more we experience we had to understand how to handle different cases. Therefore, I always notice how other ambassadors and teacher supported different students, remind myself how can I do in the similar condition.” (Student 4)</p> <p>“In the classroom, there were other experienced TAs. I took them as a reference and I started to imitate the way they are.” (Student 5)</p>

(continued)

Table 18.2 (continued)

Growth	<p>“The teaching practice helped me a lot, as I gained the experience and knowledge to control the whole class and teach the kids, also it strengthens my CT ability.” (Student 1)</p> <p>“Through the teaching practice, I also noticed the duties of a teacher are not only delivering the solid knowledge to students in the lesson, but also paying time and effort to prepare teaching materials beforehand. It is very crucial to ignite students’ passion in the subject and hence motivate them to learn and further develop their skills.” (Student 2)</p> <p>“I was satisfied to prove myself being able to handle the teaching practice.” (Student 3)</p> <p>“I realized the importance of time management” (Student 4)</p> <p>“Gradually, I build up my own set of practice. I am confident to have co-teaching and I can be more mature to handle any difficulties.” (Student 5)</p>
<i>(d) Stage 4—Co-teaching</i>	
ITT factors	Stage 4—Co-teaching
Stress	<p>“However, a certain level of stress came out as I was assigned to be the TA for specific classes cooperating with the same teacher continuously. As I was no longer a trainee conducting teaching practice in one random lesson, I had much more responsibility to help the teacher while taking care the students as a regular TA of the class.” (Student 1)</p> <p>“It is true that the students’ characters from different schools are highly diverse, regarding learning motivation, concentration as well as conduct in class. In some schools, I always found the students are more creative and willing to learn. They understand most of the content and able to work on their own with a little assistance. In contrast, I feel stressed at some schools whose students show no interest in Scratch and hence they are unwilling to listen and work on the assigned tasks. I was frustrated and worried for students being reluctant to learn. It is comparatively difficult to ignite their passion in Scratch.” (Student 2)</p> <p>“The most challenging part was going to different schools for co-teaching as the variations include teachers, partner TAs, lesson venue, and teaching progress.” (Student 4)</p> <p>“Here comes another challenge. Some students were very naughty, who did not stay at their seat properly and kept talking with others. They acted obediently for a short time after my warning and resume their naughty behavior again. I was a bit confused as I did not know what I can do.”</p>

(continued)

Table 18.2 (continued)

Adaption	<p>“Before the lesson, I went through the teaching material with full understanding, and tried the block and app before to confirm the steps.” (Student 1)</p> <p>“During the co-teaching, I had to follow the teaching progress of the assigned class. Although they were just lessons for primary school students, I had to cooperate with the teacher well to make sure that the lesson could continue fluently. Despite the class time was short, normally 30 min to 1 h, there were a lot of uncertainties during the class. Beside of the content delivering to the students, I had to make sure that the students paid attention during the lesson to prevent them missing teacher’s instructions.” (Student 1)</p> <p>“I realized that the attitude and behavior of teachers can actually have direct influences to their students. I believe every student can feel whether his or her teachers are teaching and guiding them from heart or just simply demonstrating the procedures of Scratch to them. Through observation and experience, I deeply understand being teacher is not an easy job. It requires a lot of time, energy and effort in order to be a responsible teacher and even TAs.” (Student 2)</p> <p>“Fortunately, my partner was experienced with the situation. Thus, he told me to report it to the teacher after the teacher finished important slide. Eventually, everyone sat still and worked hard on the scratch together.” (Student 3)</p> <p>“Every co-teaching session may be boring to others, but not to me because I got to know something new every time.” (Student 3)</p> <p>“Since different classes might have different progress, I would read the learning materials and my co-teaching notes in the preparation time so to have a brief idea of what was taught and would be taught in the last and following lesson. Hence, no matter what the teacher was going to teach, I still could pick up quickly and know what and how should I help the students in the lesson.” (Student 4)</p> <p>“During the lesson, apart from students, it was important for ambassadors to pay attention to what the teacher was doing, in order to provide immediate support and response to the teacher to ensure a smooth lesson delivery.” (Student 4)</p> <p>“Between ambassadors, we would have a labor division for looking after different students. If students in this group were in good progress, then we might observe other students.” (Student 4)</p>
Growth	<p>“Not only do I step out my comfort zone to learn a discipline that I was not familiar with, but I also get a taste of being a TA in primary school. Even though being a teacher might not be the first priority in my future career path, various training in this program enable me to understand the importance of the sense of responsibility and having correct attitude at work. I have also realized nothing is impossible if we are willing to learn from our mistakes and get along with stress, and hopefully turn it into our motivation to become a better individual.” (Student 2)</p> <p>“For myself, I learned CT, which encouraged me to solve problem by searching solution from different aspects. When solving problem, I would like to find out what was the root to tackle the problem effectively and efficiently. Besides, it is important to be responsible to perform or complete a task assigned satisfactorily and on time. I am grateful to CoolThink@JC which gives me chances to learn about the computational thinking and correct personality that I need to have for my career. Everyone I met here had always given me direction and feedback to push me one step forward on my career path.” (Student 3)</p> <p>“Up till now, I have joined the CoolThink@JC programme for more than a year. I have participated in different posts such as co-teaching, backup duties and training programme. Meanwhile, I am fortunate to become one of the supervisory TA. I am delighted that I can involve in supervisor duties. Each post provides different experiences for me. It makes me growth and it broadens my horizon. In CoolThink@JC, I do not only learn CT concept, but also equip myself with different knowledge and skills.” (Student 5)</p>

Under sufficient guidance by supervisors, they can become a good trainer to incorporate interactivity and foster thought-provoking conversations among peers.

18.5.2 Promotion

Based on enhanced intercultural transformation theory (ITT) (Sivakumar & Kwok, 2017), promotional exercises can be considered as “motivation” while add-on training and advice from supervisors are “support” in the TAs’ SOSAG process.

After the completion of at least one semester of service, TAs are eligible to apply for promotion via self-application or supervisors’ nomination. They may be promoted to “Senior TAs” or even “Supervisory TAs” based on the following factors:

- Personal motivation and willingness to take up additional duties.
- Experience.
- Performance review.
- Evaluation conducted during individual and group interview for promotion.

Promoted TAs are expected to take up additional duties including to act as the role model for TAs, to help new TAs get acquainted with work environment, and to assist supervisors in managing TAs by conducting a quality inspection in relation to co-teaching support in various schools irregularly.

Some senior and supervisory TAs also involve in designing and offering add-on training to other TAs under the guidance of supervisors. They are trained to be the trainers. This train-the-trainer model allows outstanding TAs to maximize their potential ability.

18.5.3 Challenges

One of the biggest challenges in engaging hundreds of tertiary students in the CT education in primary schools is to maintain manpower bank. Due to the complexity of matching school lesson schedule and TA preferences according to availability and school location, a pool of well-trained TAs is needed to serve more than thirty primary schools.

Fig. 18.2 TAs from CoolThink@JC supported CT-related workshops in InnoTech 2017

If a similar model of providing co-teaching support were to be continually adopted in the CT education in primary schools, TA recruitment may need a wider and stronger support from all higher education institutions. Recognition of the importance of CT education and its impact by various parties in the society could be a significant motivator in the collaboration with higher education institutions. This mobilizes a bigger pool of potential TA candidates ready for screening process, and eventually allowing more suitable candidates can be identified. This is actually a win-win approach for both the service receivers (teachers and primary students) and givers (TAs).

18.5.4 Future Directions

Besides the duties of co-teaching in primary schools, TAs are also actively participating in the support of CT workshops for public, for example, some were sent to support programming workshops for the public in InnoTech Expo 2017, a large-scale innovation and technology event held in Hong Kong Convention and Exhibition Centre. Through co-organizing the events with volunteers from different backgrounds, TAs learned new knowledge like using programs to control drones and gained new exposure and insights to the application of programming in real life. The pictures in Fig. 18.2 show our TAs' engagement in the InnoTech Expo 2017.

In the long run, TAs with the experience in CT education will have a higher chance of engagement in CT education and related industries. Besides CT education, TAs are more likely to serve the community continually in different aspects and be more prepared to become future pillars in the society.

The potential development of qualified TAs is summarized and illustrated in Fig. 18.3.

Fig. 18.3 Potential development of qualified TAs in CoolThink@JC of Hong Kong

18.6 Conclusion

This chapter extends the existing intercultural transformation theory (ITT) and proposes the service-oriented stress-adaption-growth (SOSAG) process in the engagement of computational thinking co-teaching education. Through service engagement in CT education at primary schools, service-oriented stress-adaption-growth process took place and allowed TAs to undergo self-development in multiple stages.

Appendix

Case 1: Ordinary TAs

Student 1 from Electronic Engineering (Years of Service: 2016/17–2017/18)

ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Stress	<p>With knowledge on different computer languages such as C++, how come the educational tools for primary school students will beat me?</p> <p>However, I recognized that I might be too arrogant after pre-assessment as my background and knowledge could not support answering. I felt nervous during interview. I actually have no idea nor experience on CT questions and handling problems in given scenarios. There was a lot of stress in the pre-assessment so I did not perform well enough</p>	<p>Some real situations that will be faced in co-teaching were given, such as how we can handle and help the teacher to control students during the lesson. Each group was required to demonstrate how to solve potential problems in front of other groups. Our group topic was what should ambassador do if students do not follow the instructions of the teacher and harass other students. I did not remember what we played in front of the classroom; I just remember that I was quite embarrassed to “perform” in front of the class. Even worse, our demonstration was not comprehensive enough</p>	<p>Before I went to the teaching practice or co-teaching, I was a little bit worried. In spite of the unknown situation that I might be faced in co-teaching, but I was also worried that programming might be too difficult for the primary school students. When I was in primary school, I just learned some background knowledge about the computer hardware and history, plus some basic controls of computer only, instead of coding or programing. Also, in my generation, computer science or programming was not a core subject or even not important. Besides, I am afraid if CT or programming might be too difficult for the immature kids to learn</p>	<p>After the teaching practice, I started my co-teaching works. Similar with the teaching practice, I found my position to support the teachers while answering inquiries from students. However, a certain level of stress came out as I was assigned to be the TA for specific classes cooperating with the same teacher continuously. As I was no longer a trainee conducting teaching practice in one random lesson, I had much more responsibility to help the teacher while taking care the students as a regular TA of the class</p>

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Adaption		<p>Luckily, CoolThink@JC is a family; the professors gave us precious and useful feedbacks and suggestions from their expert aspect, also other groups provided supplementary methods from their experience. Besides, we enjoyed the excellent performance of other groups and learnt to handle other situations. These role-play games gave me a very good experience</p>	<p>But after the first teaching practice, I found that my worries were unnecessary. During the teaching practice, teachers were well trained with Scratch and App Inventor 2. They controlled the whole class and indicated what ambassadors should do. Also, I found that nowadays primary school students are very talented and enthusiastic. They would like to help their classmates to solve the problems together. Most of them could finish their own work timely or even earlier. Then they would start to observe their classmates' works and see whether they could improve their own project or not. Therefore, I could give them some higher level task and strengthen their computational thinking. Even better, they could use different categories and blocks to optimize and yield their own project. Actually I was quite astonished that students had the ability to use other command block and make the block more concise and efficient. Also, sometimes they could fix the mistakes or change the parameters in the interface by observation. But as they were still primary school students, there might be something that was too difficult for them. With preparations before the class, I could provide suggestions to help them</p>	<p>Before the lesson, I went through the teaching material with full understanding, and tried the block and app before to confirm the steps. During the co-teaching, I had to follow the teaching progress of the assigned class. Although they were just lessons for primary school students, I had to cooperate with the teacher well to make sure that the lesson could continue fluently. Despite the class time was short, normally 30 min to 1 h, there were a lot of uncertainties during the class. Beside of the content delivering to the students, I had to make sure that the students paid attention during the lesson to prevent them missing teacher's instructions. For example, we had to prevent and advice the student to surf another websites, such as Facebook and YouTube, that is not related to CoolThink@JC or teaching material. Also, I was responsible to pay extra attention to some students with special educational needs to make sure that they could follow the teaching material. Sometimes there were some naughty students who did not follow the instructions of the class; we had to help the teacher to maintain the good order of the classroom. Even more, as the teaching materials became more and more difficult, we had to practise ourselves well daily to train our ability and familiarity of the Scratch and App Inventor 2, otherwise we could not follow the lesson too</p>
Growth		<p>Not only does it help me to solve common problems we face in co-teaching, but it also gains my experience in co-teaching and makes me calm down with no disarray. These helped me a lot</p>	<p>The teaching practice helped me a lot, as I gained the experience and knowledge to control the whole class and teach the kids, also it strengthens my CT ability</p>	<p>Until now, I am still just a qualified TA but not a good TA, as I believe a well-prepared TA has to practise and practise more to gain the experience</p>

Student 2 from Linguistics (Year of Service: 2017/18)

ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Stress	As a linguistics student, several programming languages are required to be learnt for linguistic purposes. Yet, I am not confident of CT and programming. Though it was undoubtedly stressful in the preparation , I successfully went through the stages of online test and interview with sufficient self-learning and online research	A series of training and briefing were arranged to all of the ambassadors after the selection. I think the most remarkable part would be the 1-day training workshop on both soft and hard skills. With role-playing training in the morning, we are able to understand how to handle different circumstances in classroom, such as resolving the quarrels between students and dealing with emergencies in class. Coming up with an instruction sheet for other groups to fold a paper plane was also fun-filled. It was a good chance for us to experience and recognize how to clearly deliver a message to our audiences, allowing us to realize if our instructions are clear and understandable for the receivers. Apart from the soft skill training, the hard skill coaching of Scratch and AI2 in the afternoon definitely enabled me to learn some solid skills. It was quite challenging and stressful for me in the beginning . The learning process generally was pleasurable thought I felt a bit left behind and stressful in digesting the excessive new information in a limited time . Luckily, TLs and a friend of mine provided guidance throughout the training	Nil	In the current time, I am co-teaching at two primary schools. It is true that the students' characters from different schools are highly diverse, regarding learning motivation, concentration as well as conduct in class. In some schools, I always found the students are more creative and willing to learn . They understand most of the content and able to work on their own with a little assistance. In contrast, I feel stressed at some schools whose students show no interest in Scratch and hence they are unwilling to listen and work on the assigned tasks . I also observed that most of them rather chitchat with their classmates instead of listening to the teacher. I usually have to guide them from the very first step until the last step, given that they are willing and patient to listen. I was frustrated and worried for students being reluctant to learn. It is comparatively difficult to ignite their passion in Scratch

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Adaption		Hence, I realized self-study and practice are also important apart from training provided	During teaching practice, hands-on experience was the most valuable reward for me. It was my first time being a TA in school and I was glad that the whole teaching process was smooth and manageable	Furthermore, the teaching styles are very distinct in different schools. Through multiple duties in various schools, I have learned that I should always try my best to assist the students to catch up with their teacher. I realized that the attitude and behavior of teachers can actually have direct influences to their students. I believe every student can feel whether his or her teachers are teaching and guiding them from heart or just simply demonstrating the procedures of Scratch to them. Through observation and experience, I deeply understand being teacher is not an easy job. It requires a lot of time, energy and effort in order to be a responsible teacher and even TAs
Growth		Generally, we all think we have stepped out our comfort zone and accepted new challenges beyond our school professions	Through the teaching practice, I also noticed the duties of a teacher are not only delivering the solid knowledge to students in the lesson, but also paying time and effort to prepare teaching materials beforehand. It is very crucial to ignite students' passion in the subject and hence motivate them to learn and further develop their skills	To conclude, it is true to say that I have learned so much since the first day of this program. After going through different stages, I have become a qualified Teaching Assistant in CoolThink@JC. It has certainly been a precious experience in my University life. Not only do I step out my comfort zone to learn a discipline that I was not familiar with, but I also get a taste of being a TA in primary school. Even though being a teacher might not be the first priority in my future career path, various training in this program enable me to understand the importance of the sense of responsibility and having correct attitude at work. I have also realized nothing is impossible if we are willing to learn from our mistakes and get along with stress, and hopefully turn it into our motivation to become a better individual

Case 2: TAs who are required to redo Teaching Practice

Student 3 from business (Year of Service: 2017/18)

ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Stress	My journey in CoolThink@JC began with pre-assessment. Without any relevant background as majoring in Finance, I encountered many difficulties in the test which were solved by searching information online and even asking advice from friends. However, as I sowed, so I reaped. The pre-assessment helped me understand some CT knowledge before moving to next stage. Then, I was pretty stressful during interview as there are lots of CT mentioned on the question paper such as parallelism and data manipulation. I tried to understand by relating each concept to the events happened in my daily life	After successfully entered group of TAs in CoolThink@JC, I must complete the training before I start my duty. In training, I learned more about computational thinking and making my own application such as piano application	Before getting involved in co-teaching, we were sent to gain practical experience via teaching practice. I thought I was ready to overcome any difficulty. Nevertheless, the thought was proven wrong. Since I was not aware about the school location and arrival time, it took me long time to arrive. As result, I was late for my first ever teaching practice. I felt guilty and ashamed about myself as I was not executing my duty—Always on time. Also, I was stressful and worried about the impact	Finally, getting into co-teaching session, as I have planned the route to the primary school before hand, I got to there on time. Here comes another challenge. Some students were very naughty, who did not stay at their seat properly and kept talking with others. They acted obediently for a short time after my warning and resume their naughty behavior again. I was a bit confused as I did not know what I can do

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Adaption		<p>I was no longer stressful about handling the Scratch because previous knowledge learned from pre-assessment allowed me to adapt new knowledge in CT faster. Besides, I learned about how to execute co-teaching practice in next academic year. What I should do and what should be avoided during co-teaching duty. Even though everything seemed complicated to me, I received help from supervisors. They were willing to help me when I had any problems encountered during the training</p>	<p>Since it was my first teaching practice, the supervisor is willing to give me another chance. When participating in another teaching practice, I understood that planning should be always done before moving, which allows me to have sufficient time and effort to complete the duty. Eventually, I came earlier because I did preparation before the practice</p>	<p>Fortunately, my partner was experienced with the situation. Thus, he told me to report it to the teacher after the teacher finished important slide. Eventually, everyone sat still and worked hard on the scratch together.</p> <p>Every co-teaching session may be boring to others, but not to me because I got to know something new every time. The method of creating an application was revised for me every time when I have co-teaching session. Besides, students' creativity can always surprise me. For example, in doing the maze run on scratch, some students made it as Halloween version, while some added elements that were not mentioned. I believe in the future, some of them can become great programmer with lots of creativity and create more useful applications for us</p>

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Growth		Nil	I was satisfied to prove myself being able to handle the teaching practice	For myself, I learned CT, which encouraged me to solve problem by searching solution from different aspects. When solving problem, I would like to find out what was the root to tackle the problem effectively and efficiently. Besides, it is important to be responsible to perform or complete a task assigned satisfactorily and on time. If I don't perform the task satisfactorily and on time, students and teacher may suffer as teacher cannot handle all the students at once and chaos may occur. I am grateful to CoolThink@JC which gives me chances to learn about the computational thinking and correct personality that I need to have for my career. Everyone I met here had always given me direction and feedback to push me one step forward on my career path

Student 4 from Computer Science (Year of Service: 2017/18)

ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Stress	<p>Since I am a student studying Computer Science, almost all questions in the quiz could be answered with confident.</p> <p>However, if I wanted to get all correct, I still need to put some effort on revise some materials before start. This made me feel a little worried about the difficulty of learning materials.</p> <p>After that, I was very nervous in interview because I was weak in interview and also afraid of questions out of preparation. During the interview, there were questions asking to deal with some sudden problems in lesson. This made me start to have some stress on the required soft skills of this job, such as how could I handle a class of students and cooperate with teachers and other ambassadors</p>	<p>After being shortlisted as an ambassador, a 1-day training was conducted to reinforce the knowledge of the programming tools which are the learning materials for students.</p> <p>Sometimes I found I would lose myself in some steps and did not know where can find some codes or forget what was the next step</p>	<p>Before I go co-teaching in the schools, a teaching practice was needed for giving me a preview of what co-teaching is doing in real situation. I think I can learn some soft skills like how to work with other ambassadors and teachers so to make me more confident to do this job. However, I was a bit sad that my first teaching practice was failed due to lateness. Although I was just late for a few minutes, I understood it should not happen since every lesson at primary school is short and valuable. Being late is not permitted and may affect the lesson quality like insufficient co-teaching support to assist lesson delivery and cause extra troubles for the teachers like entering the room suddenly and interrupting the lesson.</p> <p>In the second teaching practice, there were more TAs than usual situation in co-teaching. With the help of the currently working ambassadors, the class could be maintained in a good way. There were not many cases that some students were lagging behind a lot. However, TAs and teacher were so busy with the teaching, making me a bit worried of co-teaching and class management to solve students' problem in the future</p>	<p>The most challenging part was going to different schools for co-teaching as the variations include teachers, partner TAs, lesson venue, and teaching progress</p>

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Adaption		Hence, I took myself as a student that I might help later on and remember what problems I would face and observed how the teacher helped and solved those problems	I had more pressure in the second attempt and prepared more time than the last time for taking transportation, finding ways and walking to prevent being late again, therefore I arrived on time and could try to help the students with their needs. Experience really helped a lot. The more problems we handled, the more we experience we had to understand how to handle different cases. Therefore, I always notice how other ambassadors and teacher supported different students, remind myself how can I do in the similar condition	Before the lesson, there was some time for ambassadors to prepare. Since different classes might have different progress, I would read the learning materials and my co-teaching notes in the preparation time so to have a brief idea of what was taught and would be taught in the last and following lesson. Hence, no matter what the teacher was going to teach, I still could pick up quickly and know what and how should I help the students in the lesson. During the lesson, apart from students, it was important for ambassadors to pay attention to what the teacher was doing, in order to provide immediate support and response to the teacher to ensure a smooth lesson delivery. For example, when the teacher was mentioning some worksheets and we might help teacher to distribute the materials so to save time or when the teacher asked the students to follow to do the tasks, then we might start checking the progress of the students and provide help when necessary. Between ambassadors, we would have a labor division for looking after different students. If students in this group were in good progress, then we might observe other students
Growth		This improved my performance on how could I observe the students who might want to ask some questions and assist them before they ask	I realized the importance of time management	Nil

Case 3: Outstanding TAs

Student 5 from Public Policy (Years of Service: 2016/17–2017/18) who was promoted to supervisory TA after a year of service

ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Stress	<p>CoolThink@JC invited university's student to be a teaching assistant. It aroused my interest. However, there is a big problem as I am not studying a subject related to CT and programming, and I do not have any idea of CT concepts. On the other hand, I realized that it is a rare chance for me to be a teaching assistant. In view of this, I apply to the application. To be honest, it is quite frustrating. It is because there were a quiz and an interview which determine whether I can be a TA. Without any related knowledge, I may not have a good performance</p>	<p>At the beginning, I just think that the CT concepts can only apply in programming and computing. I never thought that CT concepts can exist in everywhere</p>	<p>Before having constant co-teaching, all the TAs must attend teaching practice that TL will assess the performance of TAs. I still remember that I was very nervous when I had teaching practice in the primary school because there were many things to pay attention, such as assisting quality, classroom discipline and other uncertainties</p>	<p>Nil</p>

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ITT factors	Stage 1—Pre-assessment	Stage 2—Training	Stage 3—Teaching practice	Stage 4—Co-teaching
Adaption		Meanwhile, I was excited because I can edit an application of the smartphone myself. Also, it was a first experience for me to learn programming. At the end, it had a quiz which tests TAs understanding toward the Scratch and the App inventor. It was not that difficult after listening to the instruction of the teaching leader	In the classroom, there were other experienced TAs. I took them as a reference and I started to imitate the way they are	Nil
Growth		After accomplishing a set of assessment, I have finally become a TA	Gradually, I build up my own set of practice. I am confident to have co-teaching and I can be more mature to handle any difficulties	Up till now, I have joined the CoolThink@JC program for more than a year. I have participated in different posts such as co-teaching, backup duties and training program. Meanwhile, I am fortunate to become one of the supervisory TA. I am delighted that I can involve in supervisor duties. Each post provides different experiences for me. It makes me growth and it broadens my horizon. In CoolThink@JC, I do not only learn CT concept, but also equip myself with different knowledge and skills

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