

Part C Project Details

2013/0223

I. Needs and Applicant's Capability**1.1 Background**

This project aims to develop a unique training program for inclusive primary school students with ASD to acquire and practice emotional control and social skills.

This project will be an exemplary inter-disciplinary and inter-institutional collaboration, composing of Dr Dorothy FY Chan of Department of Paediatrics, The Chinese University of Hong Kong (CUHK), who is expertized in clinical management of children with ASD; Dr Simpson WL Wong, who is a developmental and educational psychologist at the Department of Psychological Studies, the Hong Kong Institutes of Education (HKIEd), and Prof Horace H S Ip from AIMtech Centre, City University of Hong Kong (CityU) who has established international track-record in virtual / augmented reality technology and technology-assisted learning. 15 inclusive schools have confirmed their interests in participating in this project. A list of these 15 schools is shown in Appendix III. We will elaborate the potential impact and benefits of this project in the following.

1.1.1 Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is one of the most devastating neurodevelopmental disorders which hinder the development of a wide range of learning and life skills. In addition, this disorder affects the children's families and poses a huge challenge to the social support and education systems. Children with ASD are characterized by a triad of symptoms, namely lack of social reciprocal responsiveness, language and communication deficit and rigid repetitive behavior.(1) In recent decades, "Autism epidemic" is noted worldwide. A recent US reported confirmed cases of ASD have increased 1.7 times that those reported 10 years ago (2).

1.1.2 Dramatic Increase of ASD Diagnosis in Hong Kong

Dramatic increase in ASD prevalence is also documented in Asia. In Taiwan, a 2005 national database reviewed a **20 folds increase** in cumulative prevalence of ASD from 1.71 per 10,000 in 1996 to 28.72 per 10,000 over ten years!(3) In Japan, similar prevalence of 27.2 per 10,000 has been reported.(4) These figures which were based on disability registry and single catchment area study respectively, may severely underestimate the actual degree of prevalence in the population. In Korea, a random population sample prevalence study in one single district of Goyang City was recently completed, and the authors found a prevalence of 2.64%.(5)

In Hong Kong, there is a lack of well-designed population based prevalence and epidemiological study on ASD. Child Assessment Service (CAS) in Hong Kong provide tertiary clinical assessment service and they are responsible in diagnosing and arranging subsequent therapy for children with any kind of developmental problems. As documented in one of their annual reports, there was **an increase of 184% in ASD diagnosis** from the year 1997 to 2005.(6) Though CAS captured a great proportion of children diagnosed with ASD, their data remain an underestimate of the true prevalence in the territory. Quite a number of children are nowadays diagnosed in the private sector, and there are certainly children attending mainstream schools without a diagnostic label being given. In 2007, Prof V Wong had estimated 16.1 in 10,000 children under aged 14 were suffered from ASD by retrieving computer diagnostic

code of hospital. Again, this figure was likely to be underestimated as not all children with ASD will be followed up in hospital. (7)

1.1.3 ASD Students: Social and Communication deficit

Student who suffered from ASD commonly has weak eye contact and weak or inappropriate language development and use. They have difficulty in initiating or sustaining a bidirectional conversation. The stereotypic language pattern is another characteristic. Unusual or inappropriate use of language or gestures always prevent them in active participation in social activities. The core social impairment of atypical social and communication behaviour can be accounted by the neurocognitive models of theory of mind (ToM) deficit (8). As the ability to understand others emotional expression and third parties perspective thinking are essential for successful social interaction or communication. A deficit of ToM deficit in student with ASD further hinders their social life.

1.1.4 ASD Students: Emotional recognition problems

Student with ASD was shown to have difficulty in recognizing complex facial expression, compared with typically developed children.(9-11) The impairment on complex facial recognition and dynamically facial expression is attributing to the emotional recognition problems.(12-13)

1.1.5 ASD Students: Emotional expression problems

Beside the weakness in emotion recognition, similar weakness in the expression of emotion has also been documented (14). More specifically, this difficulty is conceptualized as “emotional dysregulation”. Emotional dysregulation, includes difficulties in identifying and describing own feelings. Problem of emotional regulation in ASD is commonly presented with intense temper outburst in reacting to stress, new event or new environment. Emotion dysregulation was not restricted to the low-functioning children with ASD. Instead, it was demonstrated in the full spectrum of ASD. Losh (2006) has demonstrated that high-functioning ASD children who were studying in inclusive mainstream school required overt cues to describe their emotion. (15)

1.1.6 Inclusive Education in Hong Kong Educational system for students of ASD: Major Challenges

In 1970s, the government released the first White Paper for inclusion education - “Integrating the disabled into the community: A united effort” proposed to integrate children with disabilities into mainstream schools (16). Over the past 40 years, the Education Department/ Educational Manpower Bureau has been making important policies on inclusion education and has resulted in an increasing number of children with special learning needs studying in regular classrooms. Autistic children with IQ scores falling within the normal range are entitled a place in mainstream schools creating a multitude of problems in effectively working with ASD students.

As reported from one of the executive summary of equal opportunity in Nov 2012, 43% of teachers were not receiving sufficient resources to implement inclusive education. It was expected that more teacher training and professional support are provided because children with ASD exhibit a variety behavioral symptoms and learning problem in the classroom, teachers are constantly under stress in

handling difficult behaviours. With a large class size and the presence of children with other special learning needs, the situation becomes worse.

To help address these challenges in inclusive education, this project aims to provide the support and resource to mainstream schools having to deal with daily the emotional and social issues of ASD students through the development of a ***VR-based training programme for ASD students and the associated training and resource centre for teachers.***

1.1.7 Addressing Stigmatization of ASD in society

Stigmatization of ASD is observed in the society due to low public awareness. This stigmatization is further reinforced by the children's odd behaviours such as screaming, rocking, stereotypic movements, smelling or touching. It is the parents of children with ASD who experience the most pressure. In Mak's (2010) study, it is indicated that parents of children with ASD have severe internalization of the stigma.(17) Hence, ***an effective method that helps improve ASD children's social skills, increase self-awareness and the awareness of others, would benefit the children and their parents.***

1.1.8 Why Virtual Reality (VR) based training?

Temple Grandin is one of the most famous Professor of Animal Sciences suffering from Autism. She found that autistic people are visual thinkers who are strong in visual-spatial skills, pattern recognition and photographic memories.(18) The success of Prof Grandin has inspired our team to develop visual-based intervention strategies in training social skills in ASD children. We expect to have far-reaching effect on the ASD individuals, their caregivers and educators.

1.1.9 Virtual / Augmented Reality based training for ASD & Our preliminary Work

Nowadays, with the technological advancement, effective training can be achieved with the use of advance virtual reality (VR) techniques. In previous studies, the VR environment is validated to be a good tool for teaching, supporting, educating and motivating students with ASD.(19) In brief: 'children with autism like computers'.(20)

Briefly, Virtual Reality (VR) is a simulation of the real world based on computer graphics and it offers children a user-friendly platform for practicing a variety of skills in a protected, confined, controlled and safe environment.(21) The benefits of VR in supporting learning of social situations in children with autism were well-recognized.(22-26) As shown in Kandalaf's et al. study, a 10-session VR-based social cognitive training improved social skills in 8 high-functioning autistic adult.(27) This study showed the potential of virtual reality technique in applying to children with autism.

Recently, our team has completed a systematic pilot study on nineteen children with ASD at aged of 4 to 6 years old in August 2013, using the virtual reality (VR) facilities installed in AIMtech centre, City University of Hong Kong. Our study focused on fine and gross motor skills training using the 3D and virtual reality environment. Through this pilot study, our own experience of conducting VR-based training sessions for very young children with ASD is that all nineteen children with ASD completed the full motor assessment under the VR environment at first attempt

and our preliminary finding is that the VR-based training is applicable to this special group of children.(28-29)

1.1.10 Training based upon on Art Therapy techniques for students with ASD

Art Therapy is based upon the healing properties of art in therapy. Art Therapy is a unique form of therapy, working with emotional, psychosocial and developmental needs, through engaging in the creative process. Through this creative process, personal material is explored within the safe holding of the therapeutic relationship.

In art therapy, the SEN students/clients makes use of a wide variety of art materials to produce images in the presence of a qualified therapist, thus stimulating communication in a unique way, reaching beyond words. This process enables clients to work through issues and move towards recovery and personal change, taking better control of their lives.

“Art Therapist’s unique skills and knowledge in the areas of non-verbal communication enable them to develop avenues for expression not possible through traditional methods” (The South Florida Art Psychotherapy Institute).

People with autism are faced with the difficulties of being chronically overstimulated. Coupled with this is the fact that they often do not have efficient communication skills to express what they are thinking and feeling. This is especially true when it comes to times of stress. People with autism display varying levels of stress/ anxiety when they come in contact with new situations and face difficulties in establishing connections, with others and also within themselves. Art therapy provides an outlet for those people living with autism to express in visual form what they are thinking and feeling. It is a direct access into their inner world and a visual tool for communication via image. The image can further aid the autistic person to verbalize what this image means to him/her. This process of visual expression and verbal communication about the image can result in deeper connections with others (outer connections) as well as developing windows into self-understanding (inner connections).(30)

Training / educational scenarios based upon the concepts of Art therapy provides authentic opportunities for ASD people to make improvements in sensory integration through the creative process and use of different art materials. Through the process of creating something tangible, cognitive processing is stimulated, along with problem solving functions. This process allows for greater concentration and organization, as the client/participant needs to focus and organize what is contained in their inner world into tangible form.(31)

At the same time, teachers could be trained to develop skills to become both a facilitator and teacher using VR to execute an effective and efficient social training program designed by our project team specifically for students with ASD.

1.1.11 Significance of the project

This is a pioneering project in Hong Kong that aims to create an innovative social adaptive and emotional training program that harnesses the benefits of virtual / augmented reality to address a serious challenge currently encountered by most primary schools with students with ASD under the auspices of inclusive education.

The outcome of this work will facilitate teachers in helping ASD children to integrate well in mainstream classroom and society, improving their behavior and reducing the teachers' stress in handling ASD students in inclusive classroom. Moreover, it will serve as an outstanding example of inter-disciplinary collaboration to provide a tangible solution for challenges faced by normal schools in the context of inclusive education.

The project team is unique in that it is a cross-disciplinary and inter-institutional collaboration of computer scientists from CityU AIMtech centre, developmental and behavioral paediatrician from CUHK medical school, and developmental/educational psychologist from HKIEd and an independent consultant on psychotherapy.

1.2 Readiness of the applicant organization for undertaking the project

The Centre for Innovative Applications of Internet and Multimedia Technologies (AIMtech Centre) of City University of Hong Kong headed by Professor Horace Ip has successfully completed a number of major R&D projects for Government agencies such as the Innovative Technology Fund (ITF), Quality Education Fund (QEF) and the Education Bureau (EDB). The Centre has won local and international awards including the IT Excellent Award, the Hong Kong Award for Industries, the Asia-Pacific Information and Communication Technology Award (APICTA) and the prestigious Austrian's Prix Ars Electronica. Members of AIMtech Centre are experienced and experts in the R&D of school-based technology-mediated teaching and learning systems, with a strong successful track record.

Dr Dorothy Chan, Specialist in Developmental and Behavioural Paediatrics, is an expert in clinical management of this group of children and their parents. She understands well of the deficits and training strategies for them.

Dr Simpson Wong, a Developmental Psychologist, has substantial experience in developing psycho-educational assessment and conducting research for validating evidence-based interventions.

1.2.1 Applicant organization's other favourable factors/ facilities for implementing the project

In 2006, CityU AIMtech Centre designed and installed the first Smart Learning Environment for the Kwai Ming Wu Memorial School of the Precious Blood. The Centre has designed and constructed a Smart Ambience Classroom in the School as well as designing a number of smart ambience interactive learning scenarios for a range of subjects including Chinese, General Science and Arts.

In 2008, the Centre has also designed and constructed a new learning facility called Smart Ambience for Affective Learning (SAMAL) at City University of Hong Kong. The specialized learning facility and the associated learning virtual reality interactive scenarios have been designed for University foundation year General Education courses in Information Management and Life Science.(32-34)

A recent QEF project entitled "Interactive Sensory Program for Affective Learning (InSPAL) ---- Using SMART Ambience Environment to establish basic generic skills

for SEN students” (QEF#EDB/QEF/2010/0072) under the leadership of Prof Horace Ip has demonstrated the benefits of applying virtual reality-based intervention and training programme for severe intellectual disabled (SID) students for acquiring and practicing generic skills in a safe and controlled environment.(35) Using a similar technique, we aim to empower students with Autism Spectrum Disorder by training their social adaptive dysfunction and emotional control.

In addition, in August 2013, this project team has completed a preliminary trial on motor assessment of forty students with ASD to investigate the effectiveness of the use of 3D virtual reality (VR) system. In this study, it was found that most of the students with ASD at aged of 4 to 6 years old could tolerate to wear the 3D eyeglasses accompanied by the coach in the Smart Ambience environment. They managed to focus at the screen intermittently and appeared to learn to look at the visual image. They were calm and free throughout the session with the VR system.

II. Project Description

2.1 Collaboration with School and academics professional

This project will be an exemplary inter-disciplinary and inter-institutional collaboration, composing of Dr Dorothy FY Chan of Department of Paediatrics, The Chinese University of Hong Kong (CUHK), who is expertized in clinical management of children with ASD, and Dr Simpson WL Wong, who is a developmental psychologist at the Department of Psychological Studies, the Hong Kong Institutes of Education (HKIEd), and Prof Horace H S Ip from AIMtech Centre, City University of Hong Kong (CityU) who has substantial experience and knowhow in virtual / augmented reality technology and technology-assisted learning.

2.1.1 School Nature

Direct Subsidy Scheme school and government subsidized schools in inclusive education.

2.2 Goals and objectives

2.2.1 To improve the emotional control of students with Autism Spectrum Disorder (ASD) by facilitating these learners to acquire skills for:

- the recognition and appropriate response to facial emotional expression;
- developing self-awareness of and expressing emotions and
- 3rd party perspective thinking (theory of mind)

2.2.2 To develop their generic skill on complying with basic social rules in common social situation e.g. classroom rules.

2.2.3 To promote the generalization of their adopted social skill to new social situations.

2.2.4 To develop a psycho-educational protocol on training social adaptive and emotional control for children with ASD.

The work will be conducted by an inter-disciplinary (and inter-institutional) team of educational and developmental psychologists, behavioral pediatrician and computer scientists; and will harness the unique benefits of virtual reality (VR) and related augmented technologies to provide relevant authentic training scenarios for ASD students to acquire and practice the needed skills.

2.3 Targets groups

- 2.3.1 Children who suffered from Autism Spectrum Disorder under the Special Education Needs category (SEN) and, are studying in mainstream Primary grade 1 to grade 6.
- 2.3.2 Primary school teachers who are managing children with ASD in the mainstream school (inclusive education program) in Hong Kong.
- 2.3.3 Non-governmental organizations (NGOs)

2.4 The VR-Based social and emotional training program for children with ASD – The vPAD)

2.4.1 The vPAD program

The vPAD program consists of 6 *training modules* covering at most 40 weekly sessions depending on the needs of the students and discussion with participating schools, and each session will last for 1 hour. Each session will contain a group of 4 students. The design of the vPAD programme centres around three learning themes relating to social adaptation and emotional training:

A. Reasoning:

- Discrimination between good and bad
- Understanding of social norms and conventions

B. Meta-cognition of self-initiated behaviours:

- Planning socially desirable behaviours
- Managing the whole action plan

C. Emotional regulation:

- Being aware of the physiology of emotion
- Interpret and express the emotion
- Control the emotion

The vPAD training modules and learning objectives are shown below with the indicative number of sessions that may vary depending on the needs of the students:

Training modules	Goals and objectives
Getting to School Module (3 sessions)	1/ To navigate and cope with variations in road situation <ul style="list-style-type: none"> - To navigate safely from point A to point B. - To decipher between safe and unsafe <i>objects</i> on the road - To decipher between safe and unsafe conditions on the road. - To cope with minor variations in road situations along the route - To recognize and express feelings whilst engaging in the navigational experience.
Classroom Module (12 sessions)	1/ Recognition of emotion (Classroom) <ul style="list-style-type: none"> - Consolidate the emotional face of classmates - To recognize the facial expression of “dislike”, “impatient”, “sad”, “unwilling” and “stressed/anxious” - To recognize the positive facial expression of “satisfactory” “like”, “patient” “happy” “willing” “calm”

	<ul style="list-style-type: none"> - To recognize and express one's own emotions 2/ Follow school norms - Understand and practice the appropriate classroom behaviour
Library Module (12 sessions)	<ul style="list-style-type: none"> 1/ Recognition of emotion (Library) - To recognize the emotional face of others - To differentiate the tone of polite and impolite verbal expression - To recognize and express one's emotions - By <i>facial expression</i> and <i>verbal</i> 2/ Follow norms in the library - To understand and practice the library routines - To understand and practice the expected social behaviour
Snack Bar Module (12 sessions)	<ul style="list-style-type: none"> 1/ Recognition of emotion (Snack Bar) - Consolidate the emotional face of others - To recognize the facial expression of others' excitement in Snack Bar - To differentiate the tone of polite and impolite verbal expression 2/ Express their emotion - To express politely whilst ordering a snack 3/ Follow social norms - Understand the social norms and expectation in taking turns, sharing and cooperation - Understand and practice the expected social behaviour while queuing up
Consolidation Session (1 session)	<ul style="list-style-type: none"> 1/ Generalization of social adaptive behaviour - New scenarios and unexpected accidents. 2/ Assessing emotional control and generalization of social skill
Calming/Feeling session	<p>The scenario is to be used after the session activity as a means to end the session in a calm manner / or as a means to calm down if displaying emotions during the session activities.</p> <ul style="list-style-type: none"> 1/ To sooth the emotion with peaceful and comfortable feeling in a in a peaceful environment. 2/ To provide an outlet to express feelings in a contained way.

In each session, the participants will be guided by an experiences instructor/consultant in coaching to different social situation and scenarios with immediate feedback. A journal log book would be passed to teacher/parent to track the student's improvement progress, which is needed to return to the Resources Centre after finishing all sessions.

We may use two measures to compensate the potential measurement and training problems due to a wide age range of the participants. First, we may employ age-appropriate and norm-referenced assessment tools when we test children in the pretest and posttest. The test scores would then reflect the performances of the children as expected for their ages. Second, we may adopt a stepwise approach in the training modules thereby the number of sessions shown in table above are indicative and we will adjust the number of training sessions for the children according to their needs and discussion with the participating schools. The two preventive measures have been widely and successfully employed in previous studies of a similar kind.

Further details of the vPAD training modules can be found in Appendix IV.

2.5 Validation & Assessment of the training program

One hundred primary school P1 to P6 students with ASD will be recruited from at least 10 representative primary schools in Hong Kong. Student participants will be invited to participate in the training program to be conducted in an ASD learning resource centre at City University of Hong Kong.

The effectiveness of the proposed social and emotional training program will be evaluated by a mixed method research study using both objective and subjective measurements. More details are provided in the next section.

A. *Objective data collection*

A randomized controlled trial (RCT) experiment with the inclusion of a waitlist control group will be conducted. This experimental design ensures every participant has a chance to receive the training. After we obtain the parental consent, we will randomly pick half of the students (group A) to join the 6-module training. The remaining half (group B) will join the training upon the completion of the group A training.

Before the participants attend the training, we will conduct a pre-test to examine the social and emotion recognition skills with a battery of standardized tests. All the tests described below have high internal consistency and test-retest reliability. Moreover, these tests have a Chinese version and have been tested in various Chinese samples.

a) Adaptive functioning in real-life situations

The Adaptive Behavior Assessment System, Second Edition (ABAS-II; Harrison & Oakland, 2003). The ABAS-II is a norm-based behavioral rating scale to assess adaptive skills from birth to age 89. Five subsets are provided by different age groups and different raters (parents or caretakers). It is widely used to evaluate the independent and social functioning among people with ASD. The rating scale, with 4 point Likert scale, measures 10 adaptive behavior skills, namely *Communication, Community Use, Functional Academics, Health and Safety, Home or School Living, Leisure, Self-Care, Self-Direction, Social, and Motor Skills.*

b) Social and emotion recognition skills

The skills of reading facial expressions and eyes for the understanding of emotion are assessed by the Face and Eye tests (child version; 36-37) developed by a team of researchers from the Autism Research Centre, University of Cambridge. The two tests have been widely used for assessing children with autism spectrum condition. In these tests, children are instructed to read pictures and indicate the emotion that the face/a pair of eyes show.

To test children's social sensitivity, we will use the Faux Pas Test (child version; 38). In this test, children will be presented with social situations and then asked to detect the faux pas.

c) Theory of mind (ToM)/ Perspective taking

The first- and second-order ToM ability is assessed by the modified *Theory of Mind* subtest of the NEPSY-II.(39)

We will get information about the children's verbal mental age (VMA) so as to ensure that any known ToM deficit is not attributed to poor verbal abilities. We either collect information from parents if they know their children's VMA or test the children with the the Hong Kong Cantonese Oral Language Assessment Scale.(40)

Post-training assessment

Upon the completion of the 6-module training programme, all the children will be assessed with the same tests listed above. We will process the data using SPSS.(41) The statistical analyses will test if the training is effective or not and the size of the training effect for each domain (e.g., adaptive functioning, social and emotional recognition skills, theory of mind).

B. Subjective data collection:

We will enquire the trainer, observers and users' opinion of the VR training by adopting a case study method. For the evaluation of the children's compliance to the VR training, we will make multi-dimensional observations.

Assessment during each module

- a) Tally system: Teachers will monitor and record the amount of times of students response in verbal or facial expression of emotion or request for relaxation, number of temper outburst and the needs of immediate intervention on emotion.
- b) Video-recording: children's behavioral responses will be recorded and scored using a self-administered rubric
- c) Scoring sheets: Number of correct answers in the modules tests on emotional recognition and social rules compliances
- d) A brand new social situation will be run at the last module for assessing the emotional control and generalization of social skill.
- e) Observation: Teacher and observer will observe before and after each time the students engage in VR and will record what they observe via anecdotal on social and conversation skill.

For the evaluation of the degree of adherence to the training, we will conduct a semi-structured interview. We adopt a questionnaire that includes evaluation statements that require the participants to rate on a 7-point Likert scale and relevant open-ended questions that allow the participants to express their views towards the VR training. The data will be reported case by case.

2.6 The Student Training Protocol with vPAD

The Consultant/Trainer will publish a Student Training Protocol. It will contain information on how to observe and assess students' learning styles, how to define teaching objectives, how to plan psycho-social and teaching activities that make use of the vPAD virtual scenarios, evaluate learning outcomes and will include a psycho-educational protocol. This protocol includes step-by-step psycho-educational techniques aimed at building communication and pro-active interaction as well as instructional plans. It will also inform how to integrate the acquired skills and positive learning into other settings like in the classroom. It is envisaged that teachers and professionals will not only experience the effectiveness of the VR-based training sessions for students, but also develop better skills by adopting an innovative and creative approach to teaching.

2.7 Public Advocate

2.7.1 Dissemination and introductory training seminars to teachers and public

Two open seminars will be conducted by team members to share their experiences in applying the VR room and have an introduction on how to implement the program with the ASD students, with staff of other mainstream primary schools, related professionals in this field and staff of the related professionals.

2.7.2 Announcement of launching the virtual reality social and emotional training package

Press conference and launching conference will be conducted to announce the full package.

2.7.3 vPAD Resource Centre and website – The Hong Kong ASD learning resource centre

Another outcome of this project will be a Resource Centre and an online website for ASD students interested professionals and public. This will be the VR Resource Centre in Hong Kong serving the community. Professionals are welcome to share their views and experience, and the public can learn more about the vPAD background and application. Interested professionals and students from other schools can obtain adequate information and try out the VR facility at this centre.

III Target numbers

3.1 Students with ASD in Inclusive schools

We aim to select and train **100 P1 to P6 students with ASD** from at least 10 Primary Schools

3.2 Teacher Training

We aim to train **20 teacher champions** to take forward and to sustain the vPAD programme for students with ASD.

3.2 vPAD Resource centre with the following potential beneficiaries

- **2,600 Students with ASD** of mainstream primary schools and their family members
- **Over 500 teachers and related professionals** in special education and rehabilitation organizations Students with ASD of other mainstream primary schools in Hong Kong

IV. Extent of teachers and principals involvement in the project

vPAD Teacher Champion Program: The goal of this leadership training program is to identify and train a small number of keen participants in our vPAD Program (ie) teachers at our partner school/ or professional staff at our partner NGO. Trainees in the vPAD Teacher Champion Program will be trained to carry out the vPAD training Protocol, be given essential training capabilities in order to take this program forward post our project. Such duties will entail working with ASD children/youth, being a resource for teachers working with ASD children/youth, and being a part of a team to sustain the program in schools after the project ends.

V. Implementation Plan with Time Line

The duration of the program would be scheduled as follows:
From January 2015 to June 2017

5.1 Phase 1 (From January 2015 to December 2015)

- Set up vPAD Room: The vPAD room will be equipped with different modalities of interactive multimedia and 3D stereo display
- Social and emotional training modules design and development of the protocol
- vPAD Room in operation: testing and adjustment
- A mock trial with a couple of students will be carried out to test out the training scenarios and protocol-carry out
- Psycho-educational sessions with students. Individual students and groups of students will receive psycho-educational sessions. Observation and data will be collected throughout the sessions

5.2 Phase 2 (From January 2016 to December 2016)

- Interactive system and learning scenario design enhancement
- Fine-tune the protocol
- Psycho-educational sessions with students. Individual students and additional groups of students will receive psycho-educational sessions. Observation and data will be collected throughout the sessions
- vPAD Teacher Champion Program training sessions by trainer and teacher with students

5.3 Phase 3 (From January 2016 to June 2017)

- Publication of Training Protocol: including objectives, assessment of learning styles, psychosocial and teaching activities, evaluation of outcomes and the protocol
- Evaluation of the effectiveness of VR for social adaptive and emotion for students with Autism Spectrum Disorder (ASD). Evaluation will include observation and data analysis and student case reports. Evaluation to be disseminated.
- Dissemination through public and introductory training seminars to professionals, teachers and public
- vPAD Resource Centre in operation

Phase	Phase 1		Phase 2		Phase 3
Time Block	Block A 1/15 – 6/15	Block B 7/15 – 12/15	Block C 1/16 – 6/16	Block D 7/16 – 12/16	Block E 1/17 – 6/17
1. Installation of vPAD Room	<----->				
2. Training modules design & modification	<-----	-----	-----	----->	
3. vPAD Room in operation		<-----	-----	-----	----->
4. Psycho-educational sessions for students with ASD.		<-----	-----	----->	

5. vPAD Teacher Champion Program training sessions			<-----	----->	
6. Evaluation includes observation and data analysis and student case reports					<----->
7. Dissemination for professionals and the community & conduct training programmes					<----->
8. vPAD Resource Centre					<----->

VI. Expected Deliverables and Outcomes

6.1 Deliverables

- (i) A social adaptive and emotional training program for inclusive primary school students with Autism Spectrum Disorder (ASD)
- (ii) Six vPAD training modules for student with ASD
- (iii) Student Training protocol with vPAD and Introductory training seminar for teachers
- (iv) Evaluation report on effectiveness of vPAD for social adaptive and emotional control training in students with ASD
- (v) vPAD Teacher Champion Training Programme and related publication for professionals
- (vi) A vPAD Resource Centre and website for students with ASD and the Public

6.2 Expected contributions to School and Society

- (vii) To promote creative insights and a unique training program in helping students with Autism Spectrum Disorder (ASD)
- (viii) To provide new techniques for handling emotional outburst of the students with ASD
- (ix) To provide new pedagogical tools to facilitate the long term learning in students with ASD
- (x) To promote the inclusiveness of student with ASD
- (xi) To reduce the stress and tension experience of the teachers in handling the inclusive classes

VII. Budget

Category	Item	Duties/ Description	Expenses	Total Amount (HK\$)
1. Staff cost (Staff)	1 Project Manager	Planning and monitoring the project progress: development of learning program, coordinating the setting up of vPAD room, supervising students training, conducting and overall review of psychoeducational sessions and publication, and operating of vPAD resource centre.	\$26,000 x 30 months + 5%MPF	\$819,000
	1 System Programmer (Part-time or Full time)	Provide technical development and IT setup for vPAD VR learning environment.	\$9,500 x 30 months + 5% MPF	\$299,250
	1 Research associate	Provide operational and research support on training data collection and analysis, learning outcome assessments, feedback survey, dissemination, experience sharing and Leadership training Program.	1 x \$17,000 x 24 months +5% MPF	\$428,400
Staff cost Sub-total: \$1,546,650				
2. Set up vPAD Room and virtual training modules design (Equipment)	(i) 3D projection and viewing system	<ul style="list-style-type: none"> Provision, modification and/or installation of computing and 3D stereo projection system 3D viewing and motion sensing/capture devices Site preparation and materials 	\$284,000	\$284,000
	(ii) 2 Servers	<ul style="list-style-type: none"> Real-time servers with large memory and disk space Specialized hardware for real-time graphics and video processing 	\$30,000 x 2	\$60,000
	(iii) 2 Computers	<ul style="list-style-type: none"> Computers with specialized hardware for graphics rendering and animation development 	\$7,000 x 2	\$14,000
	(iv) Interactive scenario development	<ul style="list-style-type: none"> Software and scenarios design & implementation of 6 virtual reality training modules Staff training to operate the vPAD facility 	\$300,000	\$300,000
Equipment cost Sub-total: \$658,000				

Category	Item	Duties/ Description	Expenses	Total Amount (HK\$)
3. Training (Services)	Consultant & Trainer	Subject consultant in educational psychology, art therapy, and teaching, trainer of the vPAD program, developer of training manual and protocol	\$700 x 200 hours	\$140,000
Services cost Sub-total: \$140,000				
4. Dissemination and Publication (General Expenses)	Website, Training manual and dissemination materials	Website development, 1,000 copies of training manual and dissemination materials	\$65,050	\$65,050
	2 seminars for public and professionals	Printing, banner, stationary and venue rental	\$18,000	\$18,000
5. Audit (General Expenses)	Auditing Service	Auditing Service	\$15,000	\$15,000
6. Other cost (General Expenses)	Miscellaneous	Psychological assessments/tests, Office equipment and consumables, e.g. video camera, stationary and mail, computer consumables, storage devices, transportation cost	\$10,000	\$10,000
General Expenses cost Sub-total: \$108,050				
7. Contingency	Contingency		\$10,000	\$10,000
Contingency cost Sub-total: \$10,000				
Total Grant Sought:			\$ 2,462,700	

VIII. Asset Usage Plan

The Grantee should plan the deployment of assets that cost \$1,000 or more per item upon project completion.

Category	Item/Description	No. of Units	Total Cost	Proposed Plan for Deployment
3D projection and viewing system	3D stereo projection system	1	\$260,000	At CityU (Resources Centre) to sustain the outcome of the project and the operation of the vPAD resources centre
	3D viewing and motion sensing /capture devices	2	\$24,000	
Computer Hardware	Server with large memory and disk space	1	\$30,000	At CityU (AIMtech Centre) to provide technical support to vPAD and further research and student training

	Server with large memory	1	\$30,000	At CityU (Resources Centre) to sustain the outcome of the project & the operation of the vPAD room
	Computers with specialized hardware	1	\$7,000	At CityU (AIMtech Centre) to provide technical support to vPAD and further research and student training
	Computers with specialized hardware	1	\$7,000	At CityU (Resources Centre) to sustain the outcome of the project & the operation of the vPAD room
Others	Video Camera	1	\$4,500	At CityU (Aimtech Centre) for production of records and materials for research and education purpose

IX. Evaluation Parameters and Method of the Outcomes

Our evaluation process includes both measurement procedures (e.g., tests) and non-measurement procedures (e.g., informational observation) for describing changes in students' performances as well as value judgments concerning the desirability of changes. The evaluation of the vPAD training programme will include the following:

- (i) Pre- and post-study assessment: A battery of objective and subjective assessments will be conducted (please refer to project assessment in Section 2.5).
- (ii) Continuous evaluation: qualitative record of student's response and interaction will be made after discussion among facilitators and observers at the end of each session.
- (iii) Opinion survey: a questionnaire survey will be conducted to find out whether there are any changes in behaviors, responses to the VR-based training programme, communication and interaction, social development and learning effectiveness of the students both inside the room and in class from adults' (teachers, para-educators, parents and users of the Resource Centre) perspectives.

X. Sustainability of the Outcomes of the Project

The vPAD Teacher Champion Program will produce teacher leaders to champion the deployment of the vPAD programme for students with Autism Spectrum Disorder (ASD). They will also help train other interested teachers, and hence sustain the applications and outcomes of the project. The vPAD Resources Centre and website will provide an on-going virtual and physical centre for interested public and professionals to practice and experience VR-based training programme for students with ASD.

XI. Dissemination / Promotion

The project will conduct the introductory and public seminars for teachers and professionals in special educational field (Schools with inclusive education), and parents of the children with children with special educational needs to introduce the rationales and strategies of virtual reality based training. Target participants will be the teachers of primary schools with inclusive education. Experience will be shared

and teaching manual including the facilitation skills for children with individual needs will be distributed. The project team will arrange 2 workshops to interested parties so as to disseminate the knowledge more extensively.

XII. Report Submission Schedule

The grantee commits to submit proper reports in strict accordance with the following schedule:

Project Management		Financial Management	
Type of Report and covering period	Report due day	Type of Report and covering period	Report due day
Progress Report 01/01/2015 - 30/06/2015	31/07/2015	Interim Financial Report 01/01/2015 - 30/06/2015	31/07/2015
Progress Report 01/07/2015 - 31/12/2015	31/01/2016	Interim Financial Report 01/07/2015 - 31/12/2015	31/01/2016
Progress Report 01/01/2016 - 30/06/2016	31/07/2016	Interim Financial Report 01/01/2016 - 30/06/2016	31/07/2016
Progress Report 01/07/2016 - 31/12/2016	31/01/2017	Interim Financial Report 01/07/2016 - 31/12/2016	31/01/2017
Final Report 01/01/2015 - 30/06/2017	30/09/2017	Final Financial Report 01/01/2017 - 30/06/2017	30/09/2017



Date	Description	Amount	Balance
1/1/20	Opening Balance	100.00	100.00
1/15/20	Deposit	50.00	150.00
1/20/20	Withdrawal	25.00	125.00
1/25/20	Deposit	75.00	200.00
2/1/20	Withdrawal	30.00	170.00
2/15/20	Deposit	40.00	210.00
2/20/20	Withdrawal	15.00	195.00
2/25/20	Deposit	5.00	200.00