Part C Project Details

I. Needs and Applicant's Capability

1.1.1 Teaching and support for SID students

Owing to cognitive deficiencies and other sensory-motor handicaps, severely intellectually disabled (SID) students need more help and attention in overcoming their learning difficulties. Aiming at social adjustment, the school curriculum for SID students includes seven core areas:

(i) self-care training,
(ii) communication skill training,
(iii) music,
(iv) physical education,
(v) perceptual motor training,
(vi) social development training, and
(vii) visual arts

With well-planned individual learning programs, all students are learning on individual basis. By using tailor-made curriculum and effective instructional strategies, teachers help students to develop and maximize their potentials. For SID students, both education and therapy play important roles at the school which is supported by professionals including teachers, occupational therapists, physiotherapists, speech therapist, educational psychologist, social workers, and nurses who work as a team to carry out 'the whole school approach' spirit. All professionals help SID students to achieve greater independence and adjustment.

1.1.2 Communication and behavioral problems of the SID students

In general, SID students are in the early stage of communicative development. Some of them have different levels of severity of behavioral problems. For SID students, most of them have severe receptive and expressive language problems. Their behavioral problems, such as hand mouthing and repetitive behaviors significantly reduce their readiness to communicate with others as well as learning.

1.1.3 Establishment of generic skills in SID students

Generic skills are fundamental and crucial elements for students to learn how to learn in different situational contexts. For SID students, establishment of generic skills are especially essential to them, as they need a firm foundation to make their acquired skills transferable from school to hostel, home as well as social contexts. Amongst the nine generic skills, collaboration skills, communication skills, creativity and information technology skills are more emphasized in students with severe cognitive and sensory-motor deficiencies in order to facilitate their communication ability, learning and social adaptation. Teaching of such

skills requires modification to meet their learning capability. Moreover, in order to enhance the establishment of generic skills, an interactive and creative learning environment is vital to SID students. As such, they are more readily to respond emotionally and imaginatively through creative and expressive activities, in building up relationship with others, develop communication skills and learn in different environments and contexts.

1.1.4 Using Virtual Reality for SID Students

SID children face immense challenges in ego development, development of language and communication (both verbal and non verbal), thought processes, symbolic thinking due to severe intellectually disability, thwarting normal human development (Rubin, 2001). The use of virtual reality and interactive media can be an authentic tool to simulate appropriate affect (e.g. curiosity, motivation, attention) for learning and to integrate and bridge internal and external realities (Kort et al., 2001; Picard et al., a MIT manifesto, 2004; Ip et al., 2007; Kwok et al., 2010; Ip et al., 2010). This also encourages SID children, through interactive communication with the virtual scenarios and the therapist/teacher, to learn to interact and communicate, increase attention span and engage in self control. As SID children become more acquainted with the virtual reality scenarios and the therapist/teacher interacting with them, an increase in communication, stimulation, and human interaction can occur. These elements which exploit the affective and cognitive dimensions of learning (Picard et al, 2004), are all pre-learning and skills preparing SID children to learn and grow in the classroom environment.

Visual expression provides an appropriate medium to be experienced on many levels – (physical/kinesthetic, perceptual, sensory, and emotional, cognitive and symbolic). Virtual Reality characters, scenarios and games are a visual/auditory experience reaching these many levels. Lusebrink (1990) states that the kinesthetic level specifically relates to the release of energy through body action/movement. The sensory experience is stimulated by the interaction with virtual reality characters/objects as SID children interact with these objects in virtual space through kinesthetic movements, e.g. nodding of the head, making sound responses, swinging of the hands, arms and feet.

In addition, there is a remarkable ability to utilize a wide array of expressions, ranging from bold to delicate, by simply adjusting the tool." (Malchiodi, 2000). For SID students, the easy application of moving a large mouse/ball in a virtual environment allows them to have easy control promoting self-autonomy.

1.1.5 Teaching basing on Art Therapy in students with Special Educational Needs (SEN)

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 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. The process of therapy 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 nonverbal communication enable them to develop avenues for expression not possible through traditional methods" (The South Florida Art Psychotherapy Institute). Basing on the theories, techniques and skills in art

therapy, teacher can become both a facilitator and teacher using *Interactive Sensory Program for Affective Learning* (InSPAL) to execute an effective and efficient learning program for SID students.

1.1.6 Interactive Sensory Program for Affective Learning (InSPAL)

(i) Smart Ambience Environment

The Smart Ambience Environment developed by AIMtech Centre of City University of Hong Kong have been applied to psychotherapy of children (called Smart Ambience Therapy) and has also been extended to the establishment of a smart ambience learning classroom in a local primary school for the T&L of a range of subjects including Chinese and the Visual arts (Ip et al, 2007) as well as University General Education courses in Life Sciences (Ip et al., 2010). The Smart Ambience environment provides 3D stereo-display of virtual interactive scenarios, which enables students (users) to interact with the virtual objects or living beings (e.g. animal or human) therein. Through carefully designed interactions with the 3D virtual world and objects, different affect (emotional) state could be evoked within the users. The virtual scenarios and the associated interactivity have been designed to meet specific learning goals, such as enhance learning motivation, enhance curiosity towards a particularly subject matter, enhance students' experience of novel situations, or concretize abstract concepts in poetry or the visual arts. The CityU Smart Ambience Environment has won a *Gold Medal at the Geneva International Invention Symposium in 2007* and the Smart Ambience Therapy developed by AIMtech Centre is currently an *exhibit of the Hong Kong Science Museum.*

(ii) Interactive Sensory Program for Affective Learning (InSPAL)

Affective learning is a term that refers to the exploitation of the role of human affect (emotion) in learning (Picard et al., 2004). This includes the design of affectively evocative scenarios for learning, and understanding the relationship and the interplay between cognitive and affective dimension of learning. In this project, based on the Smart Ambience technologies developed by AIMtech Centre of City University of Hong Kong, an innovative Smart Ambience for Affective Learning Environment will be established

to provide an affectively stimulating learning environment for SID students to evoke their awareness of the world around them and to enhance their readiness to learn and to explore within a safe (virtual) and controlled space. The Interactive Smart Ambience for Affective Learning Environment will consist of cost-effective 3D stereo display facility and interactive devices, which would be operated either by the teachers or students, depending on the nature of the teaching and learning activities. A range of stimulating immersive and interactive scenarios will also be developed in consultation with the consulting psychotherapists and teachers to provide a range of learning activities to meet specific learning goals (discussed in other sections).

Students and teachers working within InSPAL would be able to view and feel immersed in and to interact with virtual 3D scenery which may contain objects that are floating or moving in the 3D space around them. With an interactive device, the virtual objects or person will respond to the movements or gestures of the students or teachers. This way, the students will experience that the virtual scenery is under their control or is responding to their movement in a safe, controlled and interactive learning environment. Different scenarios could be designed to evoke a feeling of calmness or curiosity among the observers.

The Interactive Sensory Program for Affective Learning (InSPAL) also provides a contingency-sensitive environment that students can obtain both opportunities to imitate and time to respond, allowing them to take the lead in interactions. By *combining and integrating*

art therapy and teaching techniques as well as using interactive media and virtual reality technology, we aim to promote SID students' self-awareness, decrease behavioral interferences with learning and social interaction, enhance their communications, thus promote their quality of life.

1.1.7 Significance of the project

Since this will be the FIRST special school in Hong Kong to establish an innovative Smart Ambience for Affective Learning Environment, to provide an affectively stimulating learning environment for SID students to stimulate their awareness of the world and to enhance their readiness to learn and to explore within a safe (virtual) space, we will pioneer a demonstration and innovative model for SID teaching professionals and settings both in Hong Kong and worldwide.

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 has successfully completed a number of major R&D projects for Government agencies such as ITF, QEF and EDB. Several of its developed systems 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 expert in the R&D of school-based and multimedia-based systems, with a strong successful track record.

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

In 2006, AIMtech Centre designed and installed a Smart Learning Environment for the Kwai Ming Wu Memorial School of the Precious Blood. The Centre has designed and constructed the 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.

More recently, 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 (Ip et al., 2010; Kwok et al., 2010).

In addition, the project team has worked with and the to complete a preliminary trial on three students to investigate the effectiveness of the use of 3D virtual reality (VR) system. In this study, it was found that most of the students could tolerate to wear the 3D eyeglasses accompanied by the Art Therapist in the Smart Ambience environment. They managed to focus at the screen intermittently and appeared to learn to look at the visual image. They showed less self-stimulating behaviors while engaging in the environment than in the school. They were calm and free throughout the session with the VR system.

II. Project Description

2.1 Collaboration with School

The AIMtech Centre will closely collaborate with the [redacted] in this project.

2.1.1 School Nature

The School provides educational, rehabilitation and residential services for severely mental handicapped student aged six to eighteen. Students are having substantial deficits in one or more areas of adaptive functioning such as communication, social adaptation, perceptual motor functioning, and distractibility of emotion as well as profound and multiple learning difficulties.

2.1.2 School Belief & Objectives

(i) All students have their own potential and all are educable.
(ii) To maximize the students' potential, to develop better self care ability, to promote their sense of being and to achieve personal growth through the holistic teaching approach and multi-modality learning.
(iii) To promote the public to accept the students as physically-fit, temperate, courteous and co-operative people.

2.2 Long Term Goal

To pioneer a new form of learning program with the support of virtual reality technology for SID students and underpinned by psychotherapeutic principals. The newly developed mode of learning program will be underpinned by existing psychotherapeutic principals implemented through an innovative exploitation of interactive media and virtual reality, in order to enhance the learning effectiveness of SID students.

2.3 Project Goals

(i) To strengthen the SID students' pre-learning abilities by exploiting the affective dimension of learning and promoting their generic skills.
(ii) To promote SID students' self-awareness and behaviors which affect learning.
(iii) To assess the effectiveness of the Interactive Sensory Program for Affective Learning (InSPAL) on SID student's learning.

2.4 Project Objectives

(i) To extend attention span and expand affect (emotional) responses of students with SID.
(ii) To develop their communication abilities.
(iii) To assist them to explore their environment.
(iv) To decrease their undesirable self-stimulatory behaviors.
(v) To set up an InSPAL room and a teaching & treatment protocol.

2.5 Activities to be organized & the details (Learning Program for SID students)

2.5.1 InSPAL Room Installation

The smart ambience classroom facilities which consist of 3D stereo display, computing equipment, and various interactive devices will be installed in the to support an interactive sensory programme for affective learning. The newly complete school building of the has allocated a specific space for this new learning facility. The InSPAL room set-up is detailed in Appendix II.

2.5.2 Smart Ambience Learning Scenarios design and development

Working in conjunction with consultant/trainer and educational expert, a series of interactive 3D learning scenarios will either be designed anew or modified from the existing learning scenarios. These scenarios will be designed to stimulate or discourage certain behaviours or affect that influence the learning effectiveness of SID students. Preliminary design of the InSPAL learning scenarios can be found in Appendix III.

2.5.3 Action research

A school-based action research on the program "Interactive Sensory Program for Affective Learning" (InSPAL) will be conducted to evaluate the effectiveness of the learning program and the instructional protocol developed. The aim of the study is to investigate the effectiveness of InSPAL in educating students with SID. Both objective and subjective measurements will be used including observation and data collection, and pre/post tests. Data about students' rate of responses, frequency of stimulation behaviors and attention span etc. would be collected.

Details of Assessments:

Subjective data collection:

a. Observation and data collection: Teachers and staff will observe before and after each time the students engage in InSPAL and will record what they observe via anecdotal.
b. Video taking and anecdotal: Teachers will liaise with the occupational therapists on the team to monitor improvements in balance and coordination via anecdotal and video taking. Teachers will carry out this assessment pre and post InSPAL training.

Objective data collection:

Teachers and staff will record progress made using the following instruments:

a. Task sheet: A task sheet will be carried out with students after students engage in the learning scenarios.
b. Tallying system: Teachers will monitor and record (tally) the amount of times students point to/ or raise their hand in order to meet their needs in the classroom setting. Teachers will carry out this assessment pre and post InSPAL training.
c. Rating scale: Teachers will assess the motivational factor before and after each time they engage in Learning Scenarios 7 and 8 of InSPAL. Teachers will rate on a scale of 1-10 (10 being the highest motivational marker).

2.5.4 Teacher and professional staff training programs

Teacher and professional staff (eg. therapists, social workers, nurses and wardens) training programs will be organized in order to enhance their knowledge and skills in the

implementation of the InSPAL. The Consultant/Trainer will conduct workshops for all teachers and staff members in the school enabling them to work more effectively with the students using the InSPAL approach. Participants would experience the innovative educational environment and acquire both theoretical knowledge and practical skills in executing InSPAL with the students.

Objective: To provide the necessary knowledge and skills needed to facilitate students to enhance their learning abilities as well as fully utilizing the resources and facility, which are provided in the InSPAL room.

Teacher Training Program: Seminar and workshop
Participants: Teachers and professional staff

Section 1: Training on rationale and methodology
Time allocation: 6 hours (2 afternoons 3 hours each)
Content:

- Introduction to the rationale of virtual reality and education
- Introduction to experiential learning
- Introduction to the role of teacher as facilitator
- Introduction to the InSPAL Program (learning objectives, learning scenarios, expected outcomes)
- Experiential workshop: Teachers and staff will try out 1 to 2 InSPAL learning scenarios

Section 2: Training on InSPAL implementation
Time allocation: 3 hours
Content:

- Instruction on how to implement the InSPAL learning scenarios
- Instruction on how to transfer the skills gained from the InSPAL learning scenarios into the classroom setting
- Experiential workshop: Teachers and staff will try out 3 to 4 more InSPAL learning scenarios

Section 3: Training on InSPAL assessment and skills integration
Time allocation: 3 hours
Content:

- Instruction on how to assess students progress in the InSPAL learning scenarios
- Experiential workshop: Teachers and staff will explore how to integrate the skills acquired in InSPAL into their current teaching practice

Section 4: Skills Training and Supervision on InSPAL
Time allocation: 15 hours
Content:

- Teachers and staff will observe the trainer working with students, carrying out the protocol for the InSPAL learning scenarios.
- Teachers and staff will work with students themselves carrying out the protocol for InSPAL learning scenarios. The trainer will observe and give feedback to the teachers/staff.
- Meetings will be held to explore the collaboration of the teaching team

2.5.5 Parent and carers development program

This project will offer a series of workshops and a training program for parents and carers to better equip them with identifying and developing the ability of the children students using the InSPAL approach. In this training parents and carers will gain new skills to have interactive dialogue with their child/ children in their care, adopt alternatives in building communication, and acquire methods to develop social skills. Parents and carers will have the opportunity to experience InSPAL first-hand in order to have a deeper understanding of how to integrate the InSPAL approach when interacting with the students. Parents and carers will also have the opportunity to interact directly with their child/children in their care in the training.

Objective: To provide basic knowledge about the benefits of experiential learning through InSPAL and how to enhance interaction and communication with their children as well as to develop their learning potential.

Parent and Carers Development Program: Seminar and workshop

Participants: Parents and Carers of SID students from

Section 1: Introduction to InSPAL

Time allocation: 6 hours (2 afternoons 3 hours each)

Content:

- Introduction to the InSPAL Program (learning objectives, learning scenarios, expected outcomes)
- Introduction to the role of parent as facilitator
- Introduction to how to communicate with your child in a virtual reality (immersive) environment
- Experiential workshop: Parents and carers will try out the InSPAL learning scenarios

Section 2: Individual Training

Time allocation: 1 hour for each parent/ or carer, for up to 10 hours

Format:

- Parents and Carers will have the opportunity to work with their child, along with the instructor, the InSPAL learning environment.
- Parents and carers will be guided to develop interactive dialogue with their child and develop a plan to integrate interactive dialogue with their children in the home setting.

2.5.6 Teacher Training manual

The Consultant/Trainer will publish a Teacher Training Manual. 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 3D virtual scenarios in the InSPAL room, evaluate learning outcomes and will include a psycho-educational (relating to the psychological aspects of education) protocol. This protocol includes step-by-step psycho-educational techniques aimed at building communication and pro-active interaction as well as instructional plans for teachers. The manual will be useful for teachers who will be working directly with students in the InSPAL room using the instructional protocol. It will also inform the teachers how to integrate the acquired skills and positive learning into other settings (ie) the classroom. It is envisaged that teachers and professionals will not only

experience the effectiveness of the InSPAL room for students' learning, but also develop better skills by adopting an innovative and creative approach to teaching.

2.5.7 Public seminars

Two public seminars will be conducted by team members to share their experiences in applying the InSPAL room with staff of other special schools, related professionals in this field and staff of the related professionals.

2.5.8 Resource Centre

Another outcome of this project will be a Resource Centre for the public and the interested professionals. This will be the only InSPAL Resource Centre in Hong Kong serving the community. Professionals are welcome to share their views and experience. Students and parents from other schools can try out the InSPAL facility at this centre.

III. Targets and expected number of beneficiaries

3.1 (Primary targets and direct beneficiaries)

- The whole school of 82 students with severely intellectually disability
- 91 Teachers, therapists and supporting staff
- 70 Family members of students
- Over 500 person-count

3.2 Resource Centre (Potential beneficiaries)

- Intellectual Disability Students of other special schools in Hong Kong
- Teachers and related professionals in special education and rehabilitation organizations
- Parents of other students with special educational needs

IV. Extent of teachers and principals' involvement in the project

The project is fully supported by the Principal, teachers, professionals and supporting staff . A multi-disciplinary and all-round approach will be adopted. They will work closely with the consultant/trainer who would be an Art Therapist and smart ambience learning system designers in the planning stage. At the implementing stage, trainers and facilitators would be able to conduct learning sessions in InSPAL room. Continuous evaluation and constant review would monitor the progress of the project. Whilst teachers act as facilitators in helping students to develop and strengthen their communication abilities, other professionals working for (Physiotherapists, Occupational Therapists, Speech Therapists, Nurses, Social Workers and House Parents) and supporting staff will be co-workers of the program. Upon the completion of the project, teachers and staff members will equip themselves with the necessary knowledge and skills in helping students to enhance their learning abilities as well as fully utilizing the resources and facility, which are provided in the InSPAL room.

V. Implementation Plan with Time Line

The duration of the program would be scheduled as follows:
From September 2011 to August 2014

5.1 Phase 1 (From September 2011 to August 2012)

- Set up InSPAL Room: The InSPAL room will be equipped with different modalities of interactive multimedia and 3D stereo display
- Smart ambience learning scenarios design and development of the protocol
- InSPAL Room in operation: testing and adjustment
- A mock trial with a couple of students will be carried out to test out the learning scenarios and protocol-carry out
- Action Research part 1. Training sessions with students. Individual students and groups of students will receive psycho-educational sessions. Observation and data will be collected throughout the sessions
- Training for teaching and professional staff working directly with students using InSPAL will be conducted in the InSPAL room. Supervision will be carried out
- Consultant/Trainer will conduct workshops for teachers and staff members
- Psycho-educational sessions by Trainer and teacher with students in the InSPAL room

5.2 Phase 2 (From Sept 2012 to Aug 2013)

- 3D interactive system and learning scenario design enhancement
- Fine-tune the protocol
- Action Research part 2. Training sessions with students. Individual students and additional groups of students will receive psycho-educational sessions. Observation and data will be collected throughout the sessions
- Preparation of Teacher's Training Manual

5.3 Phase 3 (From Sept 2013 to Aug 2014)

- Publication of Teachers' Training Manual: including objectives, assessment of learning styles, psychosocial and teaching activities, evaluation of outcomes and the protocol
- Action Research Evaluation of the effectiveness of InSPAL for learning with SID students Evaluation will include observation and data analysis and student case reports. Evaluation to be disseminated.
- Dissemination through public seminars and publications to professionals and public
- InSPAL Resource Centre in operation
- Parents and Carers Program to be conducted

Phase	Phase 1		Phase 2		Phase 3	
Time Block	Block A 9/11 – 2/11	Block B 3/11 – 8/12	Block C 9/12 – 2/13	Block D 3/13 – 8/13	Block E 9/13 – 2/14	Block F 3/14– 8/14
1. Installation of InSPAL Room	← →					
2. InSPAL learning scenarios design & modification	←			→		
3. InSPAL Room in operation		←				→
4. Psychoeducational sessions with SID students, and training sessions with teachers and SID students.		←		→		
5. Teachers' Protocol Trial with SID students			←	→		
6. Teachers' Training Manual write up				←	→	
7. Action Research		←			→	
8. Dissemination for professionals and the					←	→

community & conduct training programmes						
9. InSPAL Resource Centre for the community and conduct training programmes						

VI. Expected Deliverables and Outcomes

6.1 Deliverables

(i) A pioneering InSPAL Room and Resource Centre for all Hong Kong severely intellectually disabled (SID) students
(ii) Eight InSPAL interactive scenarios for students' learning
(iii) Teachers' Training Manual, including the psycho-educational protocol
(iv) Training sessions for teachers and related professionals
(v) Training sessions for parents and carers
(vi) Action Research Report on effectiveness of InSPAL for SID students
(vii) Dissemination seminars for related professionals and the community

6.2 Expected outcomes for Students

(i) To strengthen their pre-learning abilities such as to extend their attention span etc.
(ii) To promote their achievement in generic skills such as communication abilities etc.
(iii) To empower them to explore their environment
(iv) To decrease their undesirable self-stimulatory behaviors which affecting learning
(v) To develop positive and active life style
(vi) To enjoy and promote their quality of life by empowering their learning skills

6.2 Expected outcomes for Parents

(i) To provide a contingency-sensitive environment that their children can obtain both opportunities to imitate and time to respond, allowing parents to take the lead in interactions
(ii) To promote and enjoy better parent-child relationship through learning activities

6.3 Expected outcome for Teachers

(ii) To acquire a new and innovative teaching methodology for SID students
(iii) To enhance their communication and interaction with SID students with the support of innovative application of technology
(iv) To acquire the skills to help students to obtain their prerequisite in learning new skills
(v) To expand their scope in learning about and implementing experiential learning
(vi) To integrate the skill acquired in point (iii) into their current teaching practice
(vii) To explore the collaboration of the teaching team

6.5 Expected outcomes for School and Society

(i) To develop creative insights and a novel learning environment in teaching SID students
(ii) To acquire a new and effective teaching and learning environment and methodology driven by the innovative use of technologies

(iii) To establish an alternative learning technique/strategy for SID students with creative insights

VII. Budget

Category	Item	Duties/ Description	Expenses	Total Amount (HK$)[2]
1. Staff cost	1 Project Manager	Planning, monitoring and review the project: development of learning programs, coordinating the setting up of InSPAL room, coordinating and assisting with training sessions, assisting with action research and report writing, moderating staff and parents workshops; assisting with InSPAL system development	($20,520 + $1,000) x 36 months	$774,720
	1 Research Associate	Provide technical design, development, support of the InSPAL learning environment, development of gesture interaction with the learning scenarios, and assist in the publication of the training manual including translation.	$16,000 x 24 months +MPF	$403,200
			Sub-total (to the nearest hundred):	$1,178,000
2.InSPAL system: equipment and software	(i) 3D stereo projection system	Stereo projectors and audio system with electrically operated projection screen including installation and testing	$270,000	$270,000
	(ii) 2 Servers	Real-time servers with large memory and disk space and specialized hardware for real-time graphics and video processing	$40,000 x 2	$80,000
	(iii) 3 Computers for animation	Computers with specialized hardware for graphics and animation development	$7,000 x 3	$21,000
	(iv) 1 Computer for Graphic Rendering	Computer with specialized hardware for real-time graphic rendering	$7,000	$7,000
	(v) Interactive Devices	Sensors/devices for human interaction with virtual scenarios e.g. Gesture and motion sensors, eg. Kinect and wii sensor devices, stereo glasses		$12,000
	(vii) 1 Video camera (DVC)		$4,500	$4,500

Category	Item	Duties/ Description	Expenses	Total Amount (HK$)[2]
	(viii) 1 Digital camera		$2,500	$2,500
			Sub-total:	$397,000
3.Services	(i) Site preparation & Curtaining	Site preparation and curtaining to darken the InSPAL Room for stereo visualization	$10,000	$10,000
	(ii) Interactive scenario development	Contracted 3D graphics modeling and programming services for interactive scenario development (at $400 per hours for about 982 hours)	$400 x 982	$393,000
	(iii) Consultant and Trainer[1] (Art therapist)	Subject consultant in art therapy, educational psychology, and teaching : design of InSPAL learning scenarios, designer and trainer of the InSPAL programs, authoring teaching manual and protocol, design and conduct of Action Research with the staff of the collaborating school	$700 x 900 hours	$630,000
			Sub-total:	$1,033,000
4. Publication/ Printing	Teacher training manual	1000 copies	$50,000	$50,000
5. General Expenses	Parents workshops and seminars for professionals	Printing, banner, stationary and lecture room rental	$18,000	$18,000
6. Contingency	Miscellaneous	Inflation adjustments, Office equipment and consumables, e.g. stationary, computer consumables, removable-disks, cables, etc		$20,000
			Grant Total:	**$ 2,696,000**

[1]: *Justification of the consultant with strong background / qualifications in Art Therapy as well as in education for this project: Due to the unique nature of using visual elements to stimulate mind/affect in the InSPAL education program, a qualified art therapist, with a strong background in visual art/virtual reality, coupled with extensive teaching/training experience is most suitable to carry out the psycho-educational aspects of this project, write the protocol which has a strong visual element, and provide training.*

[2]: *Due to the fast changing functionality and capability of hardware and devices, the exact number and the costs of the items for each category will be known when the project progresses. The figures given in the table are current estimates.*

VIII. Asset Usage Plan

The Grantee should plan the deployment of assets that cost $1,000 or more per

item upon project completion.

Category (See note 3)	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment[Note 1] & Justification(s) [Note 2]
Audio and Video Equipment	3D stereo projection system	1	$270,000	At to sustain the outcome of the project & the operation of the InSPAL room
Computer Hardware	Server with large memory and disk space	1	$40,000	At to sustain the outcome of the project & the operation of the InSPAL room
	Server with large memory	1	$40,000	At CityU (AIMtech Centre) to provide technical support to InSPAL and further research and student training
	Computers with specialized hardware	3	$21,000	At CityU (AIMtech Centre) to provide technical support to InSPAL and further research and student training
	Interactive Devices		$5,000	
	Computers with specialized hardware	1	$7,000	At to sustain the outcome of the project & the operation of the InSPAL room
	Interactive devices		$5,000	
Others	Video camera (DVC)	1	$4,500	At CityU (AIMtech Centre), for production of records and materials for research and education purpose
	Digital camera	1	$2,500	

Note 1: for use by school / organization / in other projects (please provide details of the department / centre to which the asset will be deployed and the planned usage of the asset in activities upon project completion).
Note 2: areas related to educational use / sustain the project impact.

IX. 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 1/9/2011 - 29/2/2012	31/3/2012	Interim Financial Report 1/9/2011 - 29/2/2012	31/3/2012
Progress Report 1/3/2012 - 31/8/2012	30/9/2012	Interim Financial Report 1/3/2012 - 31/8/2012	30/9/2012
Progress Report 1/9/2012 - 28/2/2013	31/3/2013	Interim Financial Report 1/9/2012 - 28/2/2013	31/3/2013

Progress Report 1/3/2013 - 31/8/2013	30/9/2013	Interim Financial Report 1/3/2013 - 31/8/2013	30/9/2013
Progress Report 1/9/2013- 28/2/2014	31/3/2014	Interim Financial Report 1/9/2013 - 28/2/2014	31/3/2014
Final Report 1/9/2011 – 31/8/2014	30/11/2014	Final Financial Report 1/3/2014 – 31/8/2014	30/11/2014

X. 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 InSPAL Project will include the following:

(i) Pre- and post-study assessment: objective evaluation will be carried out by taking reference from 2 assessment tools, namely, the Behavior Problems Inventory (BPI) and Pre-verbal Communication Schedule (PVCS) in order to detect changes in behavioral/emotional problems that affect their learning as well as improvement in pre-verbal communication abilities which are crucial to all other learning areas and development.

(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. Changes in level of interaction with the 3D system and/or the facilitator, pre-learning abilities and learning performance will be documented.

(iii) Opinion survey: a questionnaire survey will be conducted to find out whether there are any changes in behaviors, responses to the 3D-system, 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.

XI. Sustainability of the Outcomes of the Project

The InSPAL room would be continuously utilized by the students of the School after the completion of the project. Both short and long-term sessions would be conducted for needy students. Teachers in different subjects and therapists would make use of the InSPAL room to provide individual or group training with the students. Students' performance would be monitored and evaluated by observations and questionnaires.

Beside the students in , the InSPAL room would be opened for utilization by children in the related educational sectors. Trained staff from the InSPAL Project would share their experience and knowledge among staff of the special education sector and parents of the clients in needs. It is aimed that the rationales and strategies of the InSPAL programme could bring benefits to more and more users in the future.

After the project, all maintenance and recurrent cost would be absorbed by the . Technical consultation of software maintenance would be provided by the AIM*tech* Centre, City University of Hong Kong at an estimated cost of $30,000 per year for the ensuing 3 years.

XII. Dissemination / Promotion

The project will conduct 2 public seminars for teachers and professionals in special

educational field, and parents of the children with children with special educational needs to introduce the rationales and strategies of InSPAL. Target participants will be the staff and parents of different grades of special schools and pre-school centers. 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. Interested parties will be invited to try out the InSPAL over the period. The project team will support the interested parties in using the InSPAL room when necessary.

Appendix

Appendix I

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Appendix II

InSPAL Room Set-up

The development and installation of an InSPAL room in at an estimated cost of $800,000 (equipment cost at $330,000, services cost of 3D graphics modeling at $16,480 and part-time staff cost at $453,600) includes the provision of hardware, software, installation materials, sensors and interactive devices.

- Design of a InSPAL Room at
- Interactivity and scenarios design of 8 smart ambience virtual scenarios specialized for SID students for assisting learning and acquisition of generic skills
- Development / modification of software for the 8 virtual scenarios
- Provision of computing hardware for the InSPAL room
- Provision and installation of 3D Stereo projection facility in InSPAL room
- Provision and installation of special 3D stereo display screen in InSPAL room
- Provision of 3D viewing and motion capture devices, e.g. 3-D viewing glasses and relevant sensor devices for the environment
- Site preparation and provision of installation materials
- On-site Installation and testing
- Staff training to operate the InSPAL facility

Appendix III

Preliminary Design of InSPAL Project Learning Scenarios

The Learning Program for SID students at Cronwall School will be designed to meet InSPAL learning objectives as noted in item 2.4 of our proposal. Based upon our project objectives, eight learning scenarios will be developed within the framework of four learning domains:

1) Safety awareness
2) Cause and effect
3) Balance
4) Sensational experience

We will in this document briefly describe the detail of these scenarios. It should be noted that these scenarios represent our current thinking and design and are subject to revision as the project progresses. A major goal of the InSPAL virtual scenarios is to facilitate SID students, through 3D visualization and multimedia, to learn about concepts and to acquire immersive experience and skills that may not be possible or safe to present to these students in physical reality.

Safety Awareness Learning Domain

Objective: Most SID students are not aware of the importance of safety, which impedes their overall functioning and ability to take some control of their environment and make healthy choices. Safety awareness is a key concept needed for SID students in order for them to be able to navigate safely at school and at home. Through training, students can learn to decipher between safe and unsafe items and what to touch and not touch. InSPAL interactive scenarios will be designed and developed to facilitate students to be aware of safety issues within the safe and controlled space of the InSPAL learning environment. The benefit of offering a virtual reality environment is that if students make a mistake and touch an unsafe (virtual) item, they will not 'get hurt'. The InSPAL learning environment enables students to learn the concept of safety in a 'safe environment'.

Learning Scenario #1: Safety at School

Objectives:

1.1 To distinguish between safe and unsafe items within the school environment.
1.2 To make decisions as to what is safe to touch and what is not safe to touch
1.3 To promote environmental awareness
1.4 To enhance the adaptation of appropriate behaviour with the environment

Scenario: In the "Safety at School" Scenario, students will be immersed in a relevant virtual space consisting of a variety of safe and unsafe items appearing and disappearing in 3D space. Multimedia effects will be deployed to transform safe or safety items in ways that facilitate students to understand the concept of safe/unsafe items. With the support of the teacher/facilitator and relevant visual and/or audio effects, students will learn to distinguish between safe/unsafe items and select only to touch or embrace safe items using simple hand or body gestures

Assessment: Teachers will carry out a simple task sheet that involves students touching only safe items laid out before them. Students will be scored according to their ability to decipherer safe/unsafe items in real time.

Learning Scenario #2: Safety at Home

Objectives:

2.1 To distinguish between safe and unsafe items within the home environment.

2.2 To make decisions as to what is safe to touch and what is not safe to touch

2.3 To promote environmental awareness

2.4 To enhance the adaptation of appropriate behaviour with the environment

Scenario: In the "Safety at Home" Scenario, students will be immersed in a relevant virtual space consisting of a variety of safe and unsafe items in their view. Such items will range from a teddy bear sitting on a sofa/ or pillows to a gas stove with lit fire/ or electricity coming out of the socket to a. bottle of pills (with a do not touch sign). With the support of the teacher/facilitator and relevant visual and/or audio effects, students will learn to distinguish between safe/unsafe items and select only to touch or embrace safe items using simple hand or body gestures

Assessment: A home chart will be distributed to parents to be used to monitor the students ability to decipher safe/unsafe items at home in real life conditions. Parents will carry out a simple task sheet that involves students touching only safe items laid out before them.

Cause and Effect Learning Domain

Objective: A key concept needed for learning is the concept of "Cause and Effect". A majority of SID students are passive and wait for their teachers and caregivers to carry out tasks and meet their needs. By strengthening this concept in students, they can begin to meet their own needs, learn that there is a consequence and increase their ability to take some control of themselves within their environment. The InSPAL learning environment, through relevant multimedia effects, enables students to be aware of the environment around them, as well as the effect of their action or inaction has on the environment around them. By experiencing and practicing this concept of cause and effect in 3D space, and once acquired, this skill can be transferred into the classroom setting and home environment.

Learning Scenario #3: Touch to Change

Objectives:

3.1 To experience seeing in 3D space the effect of touching something

3.2 To practice controlling their body and satisfying their needs

3.3 To experience of the concept of 'Change' Scenario: In "Touch to Change" learning scenario, students can experience interactions with objects in an immersive virtual environment. The student can move their body and point to or touch the virtual objects; depending on the nature of the object, the effect of interacting with the object may cause the object to react, burst, change or transform. After interacting with a number of objects, multimedia effects will result, giving positive feedback to the student for their success.

Assessment: Teachers will monitor and record (tally) the amount of times students point to/ or raise their hand in order to meet their needs in the classroom setting. Teachers will carry out this assessment pre and post InSPAL training.

Learning Scenario #4: Paint & Match
Objectives:
4.1 To experience seeing in 3D space the effect of touching something (cause and effect)
4.2 To practice controlling their body and satisfying their needs
4.3 To promote directional experience

Scenario: In the "Paint & Match" learning scenario, students will see a number of coloured circles or containers floating in 3D space and several object items, eg. a flower, a teddy bear, etc., that are of particular colours and forms. The students will use their body gesture to either paint or select the object and guide the object into the matching coloured circle or container. (For students with less mobility, they will use their fingers to point and touch the objects and matching coloured circles). After colouring or matching the appropriate objects, a brilliant multimedia effect will result, giving positive feedback to the student for their success. This learning scenario is of a higher level of cause and effect and may be suitable for students with a higher cognitive ability.

Assessment of Learning Scenarios 3 and 4: Teachers will monitor and record (tally) the amount of times students point to/ or raise their hand in order to meet their needs in the classroom setting. Teachers will carry out this assessment pre and post InSPAL training.

Balance and Coordination Learning Domain

Objective: A majority of SID students have weak balance and eye-body coordination, which impedes upon their ability to move about in space and control their body, affecting learning. The InSPAL learning environment can provide a unique approach to help students develop eye-body coordination as they need to be able to use visual tracking and some level of body coordination in order to reach their target in a safe and controlled virtual space. Once acquired, this skill can be transferred into the classroom setting and home environment.

Learning Scenario #5: Show us the Way
Objectives:
5.1 To experience the balancing concept in 3D space
5.2 To practice moving their body from left to right to control the direction of a magic moving platform.

Scenario: In the "Show us the Way" learning scenario, students will virtually move in 3D space, immersed into the scene as if he/she were sitting on the floating platform (eg. flying carpet) moving through the virtual environment. The students will use their body to show and lead the way, to move left or right in order to control the movement of the magic platform and reach their target. After controlling their body to balance or reach the target, a colorful inviting visual and sound will result, giving positive feedback to the student for their success.

Learning Scenario #6: Don't let them drop
Objectives:
6.1 To experience the concepts of balancing and tilting in 3D space
6.2 To practice tilting their body from left to right (or up and down for higher functioning students) to maintain the balance of the objects on a floating surface.

Scenario: In the "Don't let them drop" learning scenario; students will virtually move in 3D space much like in learning scenario 5 but in this case in order to keep a number of items (eg. food, ball) on a surface floating in 3D space so they do not slide off. Once the floating surface begins to tilt, the students will use their body in the opposite direction in order to keep the items on the surface and maintain balance. Multimedia effects will result, giving positive feedback to the student for their success in balancing.

Assessment of Learning Scenarios 5 and 6: Teachers will liaise with the occupational therapists on the team to monitor improvements in balance and coordination via anecdotal and video taking. Teachers will carry out this assessment pre and post InSPAL training.

Sensational Experience Learning Domain

Objective: SID students often show levels of desensitization within their learning environment which can thwart their learning. The InSPAL learning environment can provide immersive learning activities where they are engaged in exploring stimulating virtual environments, becoming more sensitized and more engaged through the use of their body and mind in 3D space. Once students are more sensitized they can be more stimulated to learn in the classroom setting.

Learning Scenario #7: Brace for Weather
Objectives:
7.1 To become immersed in climatic conditions within the virtual environment
7.2 To increase stimulation and motivation to learn
7.3 To promote the awareness of the change in nature

Scenario: In the "Brace for Weather" learning scenario, students will virtually immerse into the varying climatic conditions, eg. rainy, windy, temperature changes... to feel what it may be like to be in such weather. After being exposed to the different weather conditions they will be encouraged to select the weather(s) that they like and re-engage in the experience, increasing stimulation. This scenario may require additional devices and equipment to provide physical effects such as rain and heat.

Learning Scenario #8: Fly Together

Objectives:

8.1 To become immersed in the experience of flying in the sky, a stimulating virtual environment

8.2 To increase stimulation and motivation to learn

8.3 To generate their communication ability in abstract and creative thinking

Scenario: In the "Fly Together" learning scenario, students will virtually immerse into the sky environment to feel what it may be like flying like a bird. Students will be exposed to this unique environment stimulating their experiences beyond their daily life. This immersive experience can result in a stimulated response; such increased exposure can help the students to become more curious and more stimulated to learn more in the classroom setting. An alternative for this scenario is a "diving in the sea" scenario which will help students to experience what it may be like swimming like a fish.

Assessment of Learning Scenarios 7 and 8: Teachers will assess the motivational factor before and after each time they engage in Learning Scenarios 7 and 8 of InSPAL. Teachers will rate on a scale of 1-10 (10 being the highest motivational marker) how engaged the student is before and after engaging in the Weather or Fish Swimming learning activities.