

Quality Education Fund
The Dedicated Funding Programme for Publicly-funded Schools
Part B: Project Proposal

Project Title: STEM Aquaponics with Chinese Mitten Crabs	Project Number: 2017/1093 (Revised)
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Name of School: St. Paul's Secondary School

Direct Beneficiaries

(a) Sector: Kindergarten Primary Secondary Special School (Please put a tick in the appropriate box(es).)

(b) Beneficiaries: (1) Students: 400 F.3-6; (2) Teachers: 10 ; (3) Parents: Not Applicable ;
 (4) Others: Not Applicable

Project Period: 09/2019 to 08/2020

1. Project Needs

1.1	Project Aim(s)	<ul style="list-style-type: none"> - The project aims at integrating aquaponics with Chinese Mitten Crabs into STEM related subjects and Liberal Studies curriculum, to continuously improve interdisciplinary learning in the school learning environment and promote interest in STEM subjects. - Introduce flip classroom into the curriculum to further enhance our school-based curriculum, and to cater for learning diversity. - Develop entrepreneurship education within the school learning environment.
1.2	Innovative element(s)	<p>1. Aquaponics with Chinese Mitten Crabs Various schools in Hong Kong have been running aquaponics systems with a focus on fish. Our school will pioneer to incorporate aquaponics with Chinese Mitten Crabs (<i>Eriocheir sinensis</i>). This unique aquaponics system allows teachers to incorporate more complex biological ideas into the lesson than traditional classroom. For example, the crabs' unique reproduction cycle can be incorporated into the Biology reproduction chapters to discuss various reproductive strategies in different species.</p> <p>2. Enhancement of school based curriculum with flip classroom Flipped classroom is a teaching and learning strategy that allows the students to learn hard facts outside the classroom while class time is reserved to develop dynamic thinking culture. This allows students to learn at their own pace, at their own time through school developed videos, to cater for learning diversity. This, in return, reserves more lesson time for teachers to consolidating learning through questioning and feedback. Students are allowed more lesson time to focus on consolidating and discussion on STEM related principals, promoting high order thinking. Our school has been promoting mobile learning for a few years; mainly by teachers who bring mobile devices (e.g. [REDACTED]) into the classroom to aid instant feedback in a traditional setting. Flip classroom enhancement of school-based curriculum will allow a better blended learning experience, allow students to learn according to their own pace, and develop our school into a self-directed learning community. All modified curriculum in this project will be accompanied by school-based flip classroom video to help teachers to develop a better learning environment.</p> <p>3. Entrepreneurship education with entrepreneurial dare The core principle of entrepreneurship education is to ensure students are well equipped in facing the challenges of the world of work and entrepreneurship. (McLarty, 2010) This approach to education aims to strength students' creativity, vision, motivation, and perseverance. It also develops them to have "entrepreneurial dare" (Ng, 2017), by taking initiative and learning through experience. Introducing a STEM project with entrepreneurship education in mind creates an entrepreneurial</p>

		environment for students to learn by doing, and taking initiative, strive for the best, and having mastery over the project.
1.3	Alignment with school-based / students' needs	<p>One of the Major Concerns of our three-year School Development Plan (2018-21) is to sustain a learning community that inspires <i>self-efficacy</i>. It includes the developing a learning community that is focused on self-directed learning. The school is dedicated to create suitable school based resources to aid students to learn both in and out of the classroom on their own pace to cater for learning diversity. This also coincides with our schools' vision to develop a <i>dynamic thinking culture</i>, through increased lesson time teacher and student academic discussion and participation.</p> <p>The project also develops an entrepreneurial environment for students to have hands on experience on the project and requires application of interdisciplinary learning; from design of aquaponics project, to building, maintaining, promotion and selling products. These ties in with our schools' Major Concern for self-efficacy.</p> <p>STEM education is also part of the development focus on our school. This project will further enhance the continuous development of STEM in our school.</p> <p>Furthermore, our school's second Major Concern for our School Development Plan is to nurture students to have a <i>positive outlook in life</i>. Promoting entrepreneurship education through the aquaponics project develops a learning environment that encourages students to adapt to ambiguity and keep a positive mind in the face of adversity.</p> <p>Our school's development of STEM with entrepreneurial education and school-based curriculum with flip classroom elements is in alignment with the dedicated fund's purpose to promote school-based curriculum development.</p>

2. Project Feasibility

2.1	Key concept (s) / rationale(s) of the project	<p>Aquaponics with Chinese Mitten Crabs system and STEM:</p> <ul style="list-style-type: none"> - The project aims at integrate aquaponics with Chinese Mitten Crabs into STEM related subjects and Liberal Studies curriculum, to continuously improve interdisciplinary learning in the school learning environment and promote interest in STEM subjects. Using the aquaponics as core, it provides better and flexible cross-curricular and interdisciplinary linkage. Our school's STEM education involves the following elements: <ul style="list-style-type: none"> ■ S: Stimulate students' scientific knowledge and investigation skills. ■ T: Encourage students' technical and hands-on skills while using scientific apparatus and digital device through learning by doing. ■ E: Strengthen students' engineering skills by planning, implementing and evaluation. ■ M: Enhance students' mathematics ability through data analysis. - Through the project, a STEM learning environment is created; students can continuously collect data from the system outside the SBA experimental context. The benefits are twofold: (1) Increase students' interest in STEM subjects through hands on experience, and mastery over the project and product. (2) Provide opportunity for students to work on long term experiments which the current SBA experiments cannot provide, enhancing their data analysis skills and high order thinking. <p>Flip classroom:</p> <ul style="list-style-type: none"> - To align with Curriculum Development Council's ongoing renewal of the school curriculum, and creating space for learning. The school strives to introduce flip classroom into the school based curriculum to allow learning to learn, and to cater for learning diversity. The project aims at promoting STEM through curriculum integration and the use of flip classroom videos. The videos are used to move some of the rote, skills-based instruction out of the classroom. Students will act as self-directed learners and revisit concepts and knowledge that they are unfamiliar with at their own time through the videos, to construct their own knowledge using the video as a scaffold. - On the other hand, high ability students will have more time in lesson for high order thinking and knowledge construction. As lesson time increases, it also allows opportunity for peer learning to reduce diversity within the classroom. This in turn creates a learning community within the school.
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		<p>Entrepreneurship education with aquaponics system:</p> <ul style="list-style-type: none"> - Entrepreneurship education as defined by the Organisation for Economic Co-operation and Development (OECD) seeks to provide students with the knowledge, skills, abilities, mind-set, and motivation to encourage entrepreneurial success in a variety of settings. (Laeckeus, 2015) It involves 15 competencies: <i>self-awareness & self-efficacy, motivation & perseverance mobilising resources, financial & economic literacy mobilising others, taking the initiative planning & management coping with ambiguity uncertainty & risk, working with others, learning through experience, spotting opportunities, creativity, vision, valuing ideas, ethical & sustainable thinking</i> (Bacigalupo, 2017) These 15 competencies can be summarised with the idea of entrepreneurial dare (Ng, 2017): <ul style="list-style-type: none"> ■ Being entrepreneurial is about having a spirit of enterprise. An enterprising student is able to quickly analyse complex issues and identify problems and gaps, develop new ideas, seize opportunities and take action. ■ To dare is to be resilient and adaptable. Injecting confidence of being able to bounce back from mistakes and enables students to quickly innovate to seize the opportunities available or respond to the challenges ahead. - The aquaponics system with Chinese Mitten Crabs is innovative and with various uncertainties. Discussing these uncertainties, allowing and calculating risks, and to innovate different strategies for problems ahead are all creating an entrepreneurial environment for students to develop the fore mentioned skill set. These are important life skills for our 21st century learners and the future of Hong Kong.
2.2	Applicant's readiness or ability/ experience/ conditions/ facilities for project implementation	<p>Teacher Professional Development:</p> <ul style="list-style-type: none"> - The project coordinator participated in five weeks of overseas experience in Finland through the <i>i-Journey' Paid Non-local Study Leave Scheme for Secondary School Teachers</i>, to inquire the latest development in interdisciplinary learning, and entrepreneurship education. These experiences provide new perspective in continuous development of school based curriculum for students' self-efficacy. - Teachers in the Biology Department have joined <i>Professional Development Scheme</i> hosted by St. Paul's Convent School in 2015-2017. The scheme has professionally inspired our school to carry out small scale aquaponics project. Students and teachers are all experienced in the basics of aquaponics system. Furthermore, through the scheme, teachers got the opportunity to visit [REDACTED] le aquaponics system with Chinese Mitten Crabs. - Our school has established STEM and pedagogical connections through the Sister School Scheme [REDACTED] Through the connection, STEM related pedagogies and project technical support are shared. - [REDACTED] <p>IT and STEM Infrastructure:</p> <ul style="list-style-type: none"> - Our school classrooms, laboratories and functional rooms are all fully supported by high speed wireless networking through Support Scheme for e-Learning in Schools (Wi-Fi100). Our school owns around 100 tablet computers ([REDACTED]) for students to use during lesson time for various digital learning activities. As part of the Wi-Fi 100 scheme, "Bring your own device" (BYOD) programme has also been carried out for F.5-6 classes, to enhance a digital learning environment. Students are well adapted in using mobile devices and IT tools to assist their own learning and studies. - A laser cutter is in the progress of being acquired utilising the one-off grant STEM grant to further enrich our school based STEM curriculum. The cutter will be part of the installation for our school's ongoing development of a STEM room, and act as a new and innovative tool to construct the aquaponics system, allowing teachers to integrate various STEM elements into one. - Teachers are well prepared for digital teaching. The school has been providing

		<p>various sharing, lectures and workshops for staff to understand useful Apps and digital resources for their teaching. They are provided with ample support in designing digital elements into their lesson planning and curriculum. Furthermore, teachers frequently exchange ideas both within and between subject departments through collaborative meetings and peer lesson observation. Our school teachers also actively share their digital teaching experiences with teachers from other schools.</p> <ul style="list-style-type: none"> - Our school has also been providing [REDACTED] workshops and participating in related external competitions. Both teachers and students are well versed using the platform to carry out various tasks. <p>STEM Development: To coincide with [REDACTED] EDB's promotion of STEM, our school has carried out numerous STEM related activities and competitions. A diversify internal activities included biotechnology workshop series, drone training workshop, energy converter projects, Mobius band & origami workshop, Engineering workshops. These activities allow students to experience difference aspects of STEM. Furthermore, our school places heavy emphasis in the continuous development of STEM education. Our students actively participate in a large variety of external competitions with outstanding results, they include: [REDACTED]</p>
2.3	Principal's and teachers' involvement and their roles	<p>Project coordinator will organise and lead the project by:</p> <ul style="list-style-type: none"> - Produce flip classroom lesson material; - Maintenance of aquaponics system; - Promote environment for entrepreneurial dare; - Staff development through peer lesson observation and staff development day. <p>Teachers of Biology, Chemistry, Physics, Integrated Science, ICT, and Liberal Studies will support the project by:</p> <ul style="list-style-type: none"> - Integrating project elements into their curriculum; - Plan, implement, and evaluate the project's interdisciplinary teaching; - Promote self-directed learning environment to colleagues through peer lesson observation. <p>The project will be supervised by the principal and school's STEM education team which members include the vice principal and panel heads of the three sciences, IS, ICT and Mathematics.</p>

2.6 Implementation timeline

Implementation period (MM/YYYY)	Project activities
09/2018 – 08/2019	<p>Pre-preparation period</p> <ul style="list-style-type: none"> - Staff development programme on interdisciplinary education and entrepreneurship learning. - Staff meetings on discussion of curriculum modification
09/2019 – 11/2019	<p>Preparation period</p> <ul style="list-style-type: none"> - Pull-out programme for selected students on aquaponics system. - Design competition for aquaponics system. - Curriculum modification for related subjects, increase elements of aquaponics to related topics, and production of modified teaching and learning materials. - Employment of Substitute Teacher and Project Assistant

11/2019 - 06/2020	<p>Implementation period</p> <ul style="list-style-type: none"> - Construction of aquaponics system. - Implement and carry out designed teaching and learning materials into the classroom. - STEM related field trip. - Participate in external competition.
06/2020 – 08/2020	<p>Evaluate and extension period</p> <ul style="list-style-type: none"> - STEM and related department evaluation meeting on the effectiveness of the project and set direction for the sustainability of the project. - Questionnaire and evaluation sharing sessions for students to collect both quantitative and qualitative feedback. - Organise aquaponics bazaar to sell produce raised through the system within the school. - Hold STEM sharing workshops to present student work and experiences gained from the project. - Organise dissemination sessions for teachers in our school district - Writing of report. - End of employment for Substitute Teacher and Project Assistant.

2.7 Details of project activities

a. Student activity, if applicable

Activity name	Content	Number of sessions and duration	Teachers' involvement and/or hired personnel	Expected learning outcomes
Aquaponics Activity: Recruitment of student helpers	Teachers will promote the project to students during start of the school year; interested students will be selected as student volunteers to help to construction, maintenance, and aquaponics bazaar.	During lesson time	Project coordinator, Substitute Teacher, Project Assistant, STEM and Liberal Studies Teachers	Students will have a higher sense of belonging to the school while actively doing volunteering services.
Aquaponics Activity: Aquaponics design contest	The contest will be promoted throughout the whole school. Any students interested will be provided with two sessions of crash course on basics of aquaponics, to give them technical knowledge on the basics of the design of aquaponics. Students are then asked to submit their design.	2 sessions (30 mins each)	Project coordinator, Substitute Teacher, Project Assistant, STEM and Liberal Studies Teachers	Students will have mastery over the project, and it also promotes integration of art and creativity into STEM, to form STEAM.
Preparation activity: Modify curriculum & production of flip-classroom teaching and learning materials	Teachers will collaborate and discuss areas and topics that are related to aquaponics. These topics will be modified with flip classroom videos (60 videos) made with open source, school based, and non-copy righted materials; the videos will be approved by the related panel heads before implementation. Teaching duty of the project coordinator will be substituted and freed to produce and distribute teaching materials. STEM elements will be included into the materials produced and the project coordinator will collaborate with STEM education team to effective promotion of STEM in the lesson. Other teaching and learning materials, either complementing videos	/	<i>Video production:</i> Project coordinator, Substitute Teacher, Project Assistant <i>Flip classroom implementation:</i> STEM and Liberal Studies panel heads, STEM and Liberal Studies Teachers	Increase student interests in STEM while gaining subject knowledge. All modified and flipped classroom topics are related to aquaponics. It will reduce student learning diversity through self-directed learning. Allowing students to obtain learning to learn skills and promote self-efficacy.

	made, or stand-alone materials will be prepared to assist smooth running of modified curriculum.			
Learning Activity: Modified curriculum implementation	<p>Lesson time F.1-5 students of STEM related and Liberal studies will have flip-classroom elements, along with connection to aquaponics system with Chinese Mitten Crabs:</p> <p>Biology:</p> <ul style="list-style-type: none"> - Nutrient cycle (e.g. nitrogen cycle and carbon cycle) – F.5 - Biochemical concepts of photosynthesis and respiration – F.5 - Biodiversity and classification – F.5 - Nutrition – F.4 - Sexual Reproduction – F.4 <p>Chemistry</p> <ul style="list-style-type: none"> - Soluble ions – F.4 - Solubility – F.4 - pH – F.4 <p>Physics:</p> <ul style="list-style-type: none"> - Temperature - F.3 <p>Integrated Science:</p> <ul style="list-style-type: none"> - Respiration, photosynthesis and gas cycle – F.2 <p>Mathematics:</p> <ul style="list-style-type: none"> - Data handling and presentation – F.1 - Slope relationship – F.3 - Ratios (in siphoning system) – F.2 <p>Liberal Studies</p> <ul style="list-style-type: none"> - Quality of Life (Module 2: Hong Kong today) – F.4 - Sustainability (Module 3: Modern China) – F.5 <p>Computer Literacy:</p> <ul style="list-style-type: none"> - [REDACTED] sensor – F.3 - Data collection and analysis – F.3 - Programming – F.3 	15 (40 mins each)	STEM and Liberal Studies Teachers	
Aquaponics Activity: Construction & maintenance of aquaponics system	<p>The best design from the aquaponics design contest will be used as basis for the construction of the system. Recruited student volunteers will help with the construction of system. They will be also be responsible for planning and managing the system, and working with others, to ensure the system is biologically stable using wireless sensors and [REDACTED] units, equipment is fully operational.</p>	Whole year	Project coordinator Substitute Teacher Project Assistant	<p>Increase students mastery of project, students will also learn through experience. Students will also require applying their interdisciplinary subject knowledge in various aspects on construction and maintenance. Constant maintenance also promotes student sense of responsibility and entrepreneurial skills.</p>

Aquaponics Activity: Aquaponics bazaar	Student volunteers will be setup pop-up booths within the school by the end of the school year to sell products raised from the system. This allows students to practise and actualise their entrepreneurial skills and spirit. All proceeds will be donated to charity. Students will also use this opportunity to promote the aquaponics system, allowing other students to learn about the system, and to recruit potential student volunteers for the coming academic year.	2 sessions (30 mins each)	Project coordinator Substitute Teacher Project Assistant	Students can showcase their interdisciplinary subject knowledge related to the aquaponics system during promotion. It will also allow students to demonstrate their entrepreneurial dare and skills.
Sharing Session (information day)	This sharing session will be organised by student volunteers participating in construction and maintenance of aquaponics system. The sharing session will include students' sharing and booth displays which aim at summarising the project activities, consolidating students' learning experiences and showcasing their learning outcomes.	Half day event	Project coordinator Substitute Teacher Project Assistant	This event can showcase students' learning outcomes, recognise their achievements and encourage them to explore further.

b. Teacher training

Activity name	Content	Number of sessions and duration	Hired personnel	Expected learning outcomes
Staff development	Project coordinator will introduce Finnish education system and elaborate on the learning outcomes (interdisciplinary learning and entrepreneurship education) of i-Journey programme Hold staff sharing workshop, to report on and share experiences of the project. To deepen the interest of participating teacher in STEM education.	2 (each session 1 hr)	Project coordinator	Participating teachers will increase their knowledge of international development of interdisciplinary learning and entrepreneurship education, and therefore increase their capacity to create a better learning community for the 21 st century learner.

We will ensure the safety of the student/teacher participants and observe school activities guidelines, such as <https://www.edb.gov.hk/en/sch-admin/admin/about-activities/sch-activities-guidelines/>.

c. Equipment (including installation of new fixtures or facilities), if applicable

	Details of equipment to be procured	Contribution to fulfilment of the project aim(s) and if applicable, the expected utilization rate
1	Aquarium equipment and aquaponics construction material	Provide suitable materials for students to build a sustainable aquaponics system. The system is maintained throughout the year by student volunteers, project assistant, laboratory technicians, and related teachers.
2	Wireless Sensors	For constant monitoring the aquaponics system, used throughout the programme. For teaching and learning activities, experiment data collection for after school programmes.
3	Computer, microphone, tablet computer, Touch sensitive electronic pen	Provide infrastructure to organise, produce and record flip classroom videos Increase teaching effectiveness during flip classroom lessons

d. Features of the school-based curriculum to be developed, if applicable

Developing school based interdisciplinary (STEM) learning through the theme aquaponics, allowing students to develop real life application and understand the interconnectedness of various subject knowledge. Further increase students' mastery of the project by providing opportunity to design and construct aquaponics system, at the same time promoting learning by doing and life skills. Furthermore, afterschool pull out programme for F.3 to F.5 students allow them to consolidate and apply what they have learnt on practical problems, consolidating on what they have learnt, encourage creativity and provide collaboration and problem solving opportunity.

2.8 Budget

Total Grant Sought: HK\$717,200

Budget Categories	Breakdown for the budget items		Justifications
	Item	Amount (HK\$)	
Staff	Substitute Teacher for 12 months (From September 2019 – August 2020) (including MPF) (HK\$30,165 + 1500) * 12 months	379,980	<p>Applicant should hold a bachelor's degree or higher of STEM related subjects. The applicant is responsible for:</p> <ul style="list-style-type: none"> - Planning, implementing, execution of plan, and related administrative work - Assist in making teaching and learning materials - Flip classroom videos production and editing (including over the summer vacation) - Preparation of school-based teaching and learning materials curriculum modification (including over the summer vacation) - Biology and Liberal Studies lesson substitution for teacher (project coordinator) involved with production of teaching and learning materials - Plan, organise and lead local STEM related field trip - Assist and arrange school visits from other schools over the summer vacation
	Project Assistant for 12 months (From September 2019 – August 2020) (including MPF) (HK\$14,500 * 12 months * 1.05)	182,700	<p>Applicant should hold a bachelor's degree or higher with IT or media related subjects. The applicant is responsible for:</p> <ul style="list-style-type: none"> - Planning, implementing, execution of plan, and related administrative work - Maintenance of aquaponics system (including over the summer vacation) - Responsible for purchase of materials - Flip classroom videos production editing (including over the summer vacation) - Preparation of school based teaching and learning materials curriculum modification (including over the summer vacation) - Coordinating and technical assistance for making teaching and learning materials - Assist and arrange school visits from other schools over the summer vacation
Equipment	Aquarium chiller	6,200	Construction of the aquaponics system
	Aquarium pump	15,000	Construction of the aquaponics system
	LED Growth light (HK\$202 * 12)	2,424	Construction of the aquaponics system
	1 Water tank	457	Construction of the aquaponics system
	Intermediate bulk container (IBC) tank (HK\$1,000 * 2 tanks)	2,000	Construction of the aquaponics system

	Wireless Temperature Sensor (HK\$430 * 8)	3,440	For teaching and learning activities
	Wireless pH Sensor (HK\$719 * 8)	5,752	For teaching and learning activities
	Wireless CO ₂ Sensor (HK\$2,157 * 8)	17,256	For teaching and learning activities
	Wireless Light Sensor (HK\$500 * 8)	4,000	For teaching and learning activities
	Wireless Colorimeter And Turbidity Sensor (HK\$1209 * 8)	9,672	For teaching and learning activities
	Computer (HK\$9,988 * 5 users)	49,940	For developing teaching and learning materials by teachers
	Microphone (HK\$900 * 5 users)	4,500	For developing teaching and learning materials by teachers
	Tablet computer (HK\$2,600 * 5 users)	13,000	For developing teaching and learning materials by teachers & promote effective teaching through flip-classroom
	Touch sensitive electronic pen (HK\$788 * 5 users)	3,940	For developing teaching and learning materials by teachers & promote effective teaching through flip-classroom
General expenses	Video editing software (HK\$1,568 * 5 users)	7,840	For developing teaching and learning materials by teachers
	Consumable materials (e.g. feed, seeds, mitten crabs younglings, etc.)	2,099	
	Basic construction for aquaponics system (PVC tubes, vegetables stand, seedling nursery, etc.)	2,000	Construction of the aquaponics system
	Auditing cost	5,000	
Total Grant Sought (HK\$):		717,200	

We will ensure that all procurement of goods and services will made on an open, fair and competitive basis with measures taken to avoid conflict of interest in the procurement process.

3. Expected Project Outcomes

3.1	Deliverables / outcomes	<input checked="" type="checkbox"/> Learning and teaching materials <input type="checkbox"/> Resource package <input checked="" type="checkbox"/> e-deliverables*(<i>please specify</i>) <u>Flip classroom videos teaching pack</u> <input checked="" type="checkbox"/> Others (<i>please specify</i>) <u>Aquaponics system</u>
3.2	Positive impact on quality education/ the school's development	Through equipment acquisition and development of school based teaching and learning materials, the school systematically develops a learning community for self-efficacy through interdisciplinary education (STEM) and promote entrepreneurship dare.

3.3 Evaluation

- Questionnaire for both students and teachers: evaluate the project effectiveness and ability to raise interest in STEM and promote entrepreneurial dare in the learning environment
(Success criteria: 70% of teachers' and students' evaluation find the project effective in promoting STEM education)
- Feedback from teachers: related teachers are able to use the teaching and learning materials prepared
(Success criteria: 80% of teachers agree the prepared teaching and learning materials are useful)
- Aquaponics bazaar: the aquaponics system is evaluated by the productivity
(Success criteria: 70% of the product raised by the system is sold)

3.4 Sustainability of the project

- Aquaponics technical information and experience could be sustained by organising external dissemination session for STEM teachers in Hong Kong.
- Aquaponics system built will be on permanent display in STEM room to promote continuous development of school based STEM curriculum.
- Teaching and learning materials developed by the project could be used annually and allows for continuous improvement of our school based STEM curriculum.
- The current project does not involve any structural modification of rooms in use / change of room use. The school will seek further funding from the Dedicated Funding Programme for Publicly-funded Schools to continuously develop our STEM room as a second phase of our school development plan related to STEM education.
- The school will ensure careful usage of acquired equipment to ensure further development of the project.
- The school will be responsible for any future maintenance of equipment and classroom after the project has ended.

3.5 Dissemination

- Our school will further disseminate our project through the following means:
- Within the school: through school morning assembly, Campus TV, staff development workshops within the school,
 - Outside the school: participate in external science competitions; presentation of lab reports, oral presentations, reflections through open day / information day, dissemination sessions for teachers in Hong Kong
 - Promote our school's experience through continuously update to our school website.
- Our school confirms the copyright of the deliverables/materials developed through this project should be vested with the QEF and note that there will not be any reproduction, adaption, distribution or provision of the deliverables to the public for commercial purposes.

Report Submission Schedule

My school commits to submit proper reports in strict accordance with the following schedule:

Project Management		Financial Management	
Type of Report and covering period	Report due date	Type of Report and covering period	Report due date
Progress Report 01/09/2019 - 29/02/2020	31/03/2020	Interim Financial Report 01/09/2019 - 29/02/2020	31/03/2020
Final Report 01/09/2019 - 31/08/2020	30/11/2020	Final Financial Report 01/03/2020 - 31/08/2020	30/11/2020

Assets Usage Plan

Category (in alphabetical order)	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment
Computer hardware	Computer	5	HK\$49,940	Continuous use by STEM Education Team for further development of flip classroom learning pack
	Tablet computer	5	HK\$13,000	Continuous use by STEM Education Team for further development of flip classroom learning pack
Computer software	Video editing software	5	HK\$7,840	Continuous use by STEM Education Team for further development of flip classroom learning pack
Others	Aquarium Chiller	1	HK\$6,200	Continuous use by STEM Education Team for maintaining aquaponics system
	Aquarium pump	1	HK\$15,000	Continuous use by STEM Education

				Team for maintaining aquaponics system
	Intermediate bulk container (IBC) tank	1	HK\$2,000	Continuous use by STEM Education Team for maintaining aquaponics system
	Wireless Colorimeter And Turbidity Sensor	8	HK\$9,672	Continuous use by STEM Education Team for maintaining aquaponics system
	Wireless CO ₂ Sensor	8	HK\$17,256	Continuous use by STEM Education Team for maintaining aquaponics system

Reference:

- Bacigalupo, Margherita. "EntreComp: The Entrepreneurship Competence Framework. - EU Science Hub - European Commission." *Social Protection Statistics - Unemployment Benefits - Statistics Explained*, 14 July 2017, ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrecomp-entrepreneurship-competence-framework.
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- McLarty, Laura. "Evaluation of Enterprise Education in England." *Evaluation of Enterprise Education in England*, Department for Education United Kingdom, 2010, Organisation for Economic Co-operation and Development.
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