Quality Education Fund

The Dedicated Funding Programme for Publicly-funded Schools

Part B: Project Proposal

Project Title:	**Project Number:**
STEM Ahead: An Innovative Curriculum Development	2018/0060 (Revised)

Name of School: CMA Choi Cheung Kok Secondary School__

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

(b) Beneficiaries: (1) Students: _300_; (2) Teachers: _30_; (3) Parents: _50 (Participate in Sharing sessions/events)_;
(4) Others: _Primary students 700 (Participate in workshops and competitions)

Project Period: Sept 2019 to Mar. 2021

This template only serves as a reference. Items that are NOT applicable can be deleted as appropriate. A Guide to Applicants about the Dedicated Funding Programme for Publicly-funded Schools is available on the QEF website.

1. Project Needs

1.1	Project Aim(s)	1. Developing School-based STEM curriculum for junior secondary students 2. Enhancing teachers capacity in organizing STEM related activities 3. Providing students (including networks' schools) with opportunity to learn by hands-on tasks 4. Developing students' sense of responsibility by serving local primary schools
1.2	Innovative element(s)	1. Teaching coding through **Internet of Things** (IoT) device 2. Understanding **Artificial Intelligence** (A.I.) workflow with modern AI device. 3. Organizing STEM related events for local primary schools.
1.3	Alignment with school-based / students' needs	Many students in **CMA Choi Cheung Kok Secondary School** are tasks learners; more hands-on tasks given could raise their learning motivation and attain higher achievement. **CMA Choi Cheung Kok Secondary School** was a prevocational school, therefore it has a strong technology background. The school taught Electronics and Automatic control from 80s to 90s. The school has also started 3D modeling and Computer aided Design course since the launch of the new DSE syllabus. With such advanced technology background. The set up of **STEM Centre** and **Artificial Intelligence Laboratory** could help to further develop students' capacity in technology aspect. The STEM related events organization help to develop students' sense of responsibility (School 2018-2021 major concern) and problem solving skills through actual learning needs.

2. Project Feasibility

2.1	Key concept (s) / rationale(s) of the project	Rationale of learning **IoT** (Internet of Things) The Internet of Things, the connection of devices (other than standard products such as computers and smartphones) to the Internet, is in the process of transforming numerous areas of our everyday lives. And while it might not seem like an obvious application of **IoT**, education is on that list.

		One of the unavoidable parts of the web is the information science and examination. For every information arrangement that is being made and created, there must be the best information to be made. If Students are planning to be a data scientist in near future, this is the right scope to opt for since it will give students the right map of things associated with the web. Certainly, **IoT** has got a lot more scope for the students in terms of making career and even explore more opportunities if starting up with own business. It is one of the perfect walls that build the gap between the physical location, geography, language and even the status at an economic level. Often we wonder whether blending education with technology can work. But with IoT, it is certainly possible. Rationale for learning **Artificial Intelligence:** **Artificial Intelligence** (AI) is an area of study in Computer Science that focuses on creating computer systems that perform tasks that require human intelligence. This can include visual perception, decision-making, translation, and even speech recognition.
2.2	Applicant's readiness or ability/ experience/ conditions/ facilities for project implementation	Teachers: The Design and Technology teacher in **CMA Choi Cheung Kok Secondary School** has been teaching technology subjects for over 10 years, coaching robotic team for more than 5 years. He has also taken part in the technology related communities: 1. Committee of (2017-present) 2. Event partners School Facilities: - Choi Cheung Kok Secondary School STEM Centre was established in 2017. With the advanced technology machines (e.g laser cutter, 3D printer). Students have widened their exposures of recent technology. Students are ready to deepen their learning with high-end technology in different aspect. Awards: **CMA Choi Cheung Kok Secondary School** Robotic team awards received: 2017-18 **HKCIT modular robot competition** Second runner up (all) Second runner up (Senior form) Second runner up (Building speed) **Hong Kong Tech Challenge** Second runner up Sportsmanship award **Robocom 2018 (Beijing)** Bronze prize (Secondary School) **VR Robot Challenge** Merit **Robotic soccer Challenge** Team of best defense Co-operate with local primary schools: **CMA Choi Cheung Kok Secondary School** has also provided STEM training for local primary schools. 2017-18 **Solar model car Challenge and workshop (over 26 teams)** Teachers and students from12 different primary schools were taught to Design and made solar powered model cars. **Primary IQ Robot Challenge and 4 workshops (over 16 teams)** Over 16 teams from 10 different schools were taught to build and programme robots to join the competition.

2.3	Principal's and teachers' involvement and their roles	Principal: Programme Supervisor and Financial Control. Vice Principal: Overall coordinator, cross subject collaborator. Teachers from Science KLA: Core members of programme development giving suggestion to the teaching plan. Teachers from Technology KLA: Programme coordinator, curriculum developer, and facilitators. Teachers from Mathematic KLA: Core members of programme development, Lesson plan preparation. Delivery Math related contact to students, perform evaluation on lesson plan implemented.
	Parents' involvement / participation (if applicable)	Participate in STEM day / Open day workshop Audience of Technology exhibition. The Project can benefit the 50 parents by delivery latest IoT and AI technology to Parents through exhibition and STEM Open day. To increase their exposure and understanding on technology in application.
2.5	Roles of collaborator(s) (if applicable)	Event organizer: Event holder Service supplier: Consultant Primary School teachers: Enhancing teacher capacity in leading STEM project. Enriching their hand on skill in micro-controller operation and 3D printing skill. Primary school students: They can be benefit from Team building through inter-school teams co-operation; Micro-controller operation; Understand the important of variable operation in programming

2.6 Implementation timeline

Implementation period *(MM/YYYY)*	Project activities
Sept -Dec 2019	Preparation of the programme, forming of Teachers-In-charge groups
Dec-Feb, 2020	Purchase of related hardware/services, Renovation of resource rooms
Feb, 2020 -July, 2020	Teachers Workshop, forming of STEM network school, development of curriculum
Sept 2020 –Feb 2020	Implementation of curriculum, Result showing, STEM exhibition for parents, Report hand in. STEM competitions for local primary schools
Feb 2020 – Mar 2021 Mar 2021	Sharing project result to network school, Fine tune of learning material for hand in to QEF secretary Final report Hand in

2.7 Details of project activities *(Item (a)-(f) not applicable to this application can be deleted.)*

a. Student activity, if applicable

Activity name	Content *(Including the topics, implementation strategies/modes, target beneficiaries, selection criteria, etc.)*	Number of sessions and duration	Teachers' involvement and/or hired personnel *(Including the roles, qualifications and experiences required of the speaker(s)/ instructor(s), etc.)*	Expected learning outcomes

Forming Local school network for STEM	Topic: Forming local Primary School network Implementation strategies: 1. Train student helpers to teach primary students STEM related topic. 2. At least 3 workshops to be provided for primary students in programing micro-controller 3. Hold at least 2 robot competitions to raise technology awareness of Network schools 4. Has approached 3 schools to join the programme, target a total of 5 schools 5. Tailor-made projects with partner schools Target Beneficiaries: S1-S3 students Parents Teachers Local primary schools	6 hours workshop about microcontroller 2 STEM related Inter-school competitions	Hire coding specialists for students and teachers' training (Programmer with C language working experience) Hire event holders to provide event support (Organization with sound robot event running experience) Teachers from Technology KLA as programme coordinators and instructors	Enhance elite students hands-on skill Sharpen students' generic skills by providing social service Participate school can continuous to apply micro-controller programming skill for lesson or STEM project.
Learning Automatic control and IoT through micro controller	Topic: Learning **Internet of Things** IoT coding through micro controller (Improving campus life): 1. Understand the application of IoT device through device using. 2. Control output devices through micro-controller. 3. Receive data through input device 4. Variables handling with simple math operation. 5. Smart device making with micro-controller to solve daily life problems. 6. Connect micro-controller to the internet. 7. Design and make simple IoT device. Target Beneficiaries: S1&S2 students Parent Teachers	12 lessons (80 minutes per lesson)	Teachers from Technology KLA as programme coordinators and instructors. Teachers from Science KLA: Core members of programme development giving suggestion to the teaching plan. Teachers from Mathematic KLA: Core members of programme development, Lesson plan preparation. Delivery Math related contact to students, perform evaluation on lesson plan implemented.	Control input and output devices with micro-controller. Construct and programme smart devices to solve daily life problems. Construct and programme IoT device to solve daily life problems.

Learning AI through the study of AI device	Topic: Learning **Artificial Intelligence** AI through the study of AI device (Improving campus life) 1. Understand daily applications of AI technology by using AI devices. 2. Use AI Apps to perform science studies. 3. Use AI devices to from Math model. 4. Use achievable data to perform deep learning through API. 5. Apply AI skills in machine design project. Target Beneficiaries: S3 students Parent Teachers	12 lessons (80 minutes per lessons)	Hire AI development company for technical support. Teachers from Science, Math and Technology KLA as programme coordinators and instructors. Teachers from Science KLA: Core members of programme development giving suggestion to the teaching plan. Teachers from Mathematic KLA: Core members of programme development, Lesson plan preparation. Delivery Math related contact to students, perform evaluation on lesson plan implemented.	Control AI devices by simple blocky progamme.

b. Teacher training, if applicable

Activity name	Content *(Including the topics, implementation strategies/modes, target beneficiaries, selection criteria, etc.)*	Number of sessions and duration	Hired personnel *(Including the roles, qualifications and experiences required of the speaker(s)/ instructor(s), etc.)*	Expected learning outcomes
IOT and Smart device Trainer training	*Topic:* **Internet of Things** (IoT) and Smart device: *Implementation strategies:* Workshop for smart device design *Target beneficiaries:* Teachers from Technology, Science and Math KLA S1-S2 Students	9 hours	Company with technology project running experience.	1. Understand the application of IoT device through device using. 2. Control output devices through micro-controller 3. Receive data through input device 4. Variables handling with simple math operation 5. Smart device making with micro-controller to solve daily life problems

				6. Connect micro-controller to the internet 7. Design and make simple IoT devices
AI Technology Trainer training	*Topic:* Learning AI through the study of AI device *Implementation strategies:* Workshop for AI technology *Target beneficiaries:* Teachers from Technology, Science and Math KLA S3 Students	9 hours	Company with technology project running experience.	1. Understand daily applications of AI technology by using AI devices 2. Use achievable data to perform deep learning through API 3. Understand AI running principles through Apps 4. Apply AI skills in machine design project

The details and key learning points of the learning activities.
Learning Automatic control and IoT through micro controller

Topic	Key learning point	Related Math, Science/ Tech learning element	Learning Activity	More about the implementation plan and activity details:	
				Learning Objective	Expected learning out come
Understand the application of IoT device through device using.	Understand the working principle of "internet of things" . How data can benefit long term development	Science: Application of data presentation in scientific investigation Math: Data handling: Construct and choose appropriate statistical charts to represent data	Demonstrate application of IoT example by different devices The introduction of the use of different IoT perform like "IFTTT" and "Things speak"	Understand the idea of "internet of things" . How data can benefit long term development	State the relation of The IoT technology and how it benefit people in daily life
Output devices	Control output devices through micro-controller.	Science: Electric circuit. Change of energy Technology: Block programming Electrical system Math: Number and algebra demonstration: Use directed numbers to represent values	Students are separated into groups The source code of different output devices like DC motor or LED light are given to students Student are asked to control the output device Students will present the process	Use micro-controller to control the on and off of various output device	Control different output device through computer programming

			Students will design a simple product with those out put device given.		
Input device	Receive data through different sensors (e.g light dependence resistance, Potentiometer, motion sensor.) Use of variable to read data from sensor	Science : using tools or instrument to record data for investigation Technology: Blocky programming System control, Input unit Math: The use of variable, Use linear inequalities in one unknown to solve problems	Students will connect the sensor to the micro-controller. Students will programme the micro controllers with computer Students will connect data from different sensor and record the values read. Students will make comment on the data they have connected.	Access micro-controller to receive data through different sensors (e.g. light dependence resistance, Potentiometer, Motion sensor.) Use of variable to process data	Read and store data from various input device
Math operation in Micro-controller	Variables Handling with simple math operation. Convert signal from different scale to meaningful indexes	Science: Unit of different energy source (e.g. Light, kinetic an d source) Technology: Blocky programming Electronic system System processing Math: Solve numerical problems involving variable numbers	Students will perform a mini project with related to table level Students will connect the microcontroller with LED display, gyro sensor and speaker. Students will set up variable and perform math operation with computer and input programme to microcontroller. Students will evaluation and modify the programme by try and error approach.	Understand Concept of smart device.	Apply different variable / math operation in Micro-controller programe
Smart device making with micro-controller to solve daily life problems.	Concept of smart device. System flow chart Circuit diagram	Science: Use of different scientific unit Electrical circuit Electrical voltage	Students will form group of two Students will randomly take two set of sensor	Understand Concept of smart device. Construct of system flow	Apply micro-controller programme in product design Explain project

	Logic looping	Technology: Blocky programme Open loop system; The use of flow chart; Looping; Logic Math: Use linear equations in one unknown to solve problems; Recognize identities and their uses	and output devices Students will design and mark a smart devices with the sensors and output devices given	chart Construct of Circuit diagram Apply of logic looping in project	idea with flow chart and circuit diagram
Connect micro-controller to the internet	Concept of internet address The use of WFI 8266 chipset The use of IoT inline platform	Science: The application of EM w Technology: Blocky programme The internet protocol; The concept of internet address Math: Solve numerical problem involving variable numb	Students will connect the microcontroller with WIFI 8266 chipset, a temperature sensors and a LED display. Students will connect the microcontroller with will the internet Students will set up IotT platform channel	Understand the concept of internet address in hardware Operate of WIFI 8266 chipset to connect micro-controller to internet Use of IoT online platform to connect data	Construct and programme micro-controller to read and write data to internet platform automatically
Design and make simple IoT device.	The concept of IoT The use of different address key to access Different IoT platform Data transfer between devices automatically	Science: Use of different scientific unit; Electrical circuit; Technology: Blocky programme Open loop system; The use of flow chart; Looping; Logic; The internet protocol. Math: Construct and choose appropriate statistical charts to represent data;	Students will connect the microcontroller with WIFI 8266 chipset, a temperature sensors and a LED display. Students will connect the microcontroller with will the internet Students will send temperature recorded to the IoT platform Students will general a temperature time chart .	Understand concept of IoT Use of different address key to access Different IoT platform Apply data between devices automatically	Create innovative product with IoT function.

		Interpret statistical diagrams and graphs; Analysis statistic and make useful conclusion.	Students will set up a alert system when there is extreme change of temperature by email/SMS or other appropriate way.		

Concrete involvement of school teachers in the planning of the above learning activities:

- Science teachers: They mainly apply the IoT model into science data connection for trends predicting.
- Math teachers: Suggest and implement statistic instrument in data connection and presentation.
- Technology teachers: Overall lessons planning, suggesting implementation of hardware and programme in lesson.

Learning AI through the study of AI device

Topic	Key learning point	Related Math, Science/ Tech learning element	Learning Activity	More about the implementation plan and activity details:	
				Learning objective	Expected learning outcome
Understand daily applications of AI technology	The daily application of AI and how it leaded to Mega change How neural networks use the data received to perform machine learning What are the similarity between human brain and AI neural network	Science: Human neutral system Technology: AI Application; Neutral System. Math: Interpret statistical diagrams and graphs	Introduce The working principle of neural system of AI. Demonstrate the AI speaker / camera to students. Compare and contracts the differences between AI neural system and human	Understand e daily application of AI and how it leaded to Mega change Understand how neural networks use the data received to perform machine learning	States and elaborated the relation between AI and mega change Elaborate the concept of machine learning
Understand AI running principles through Apps.	Experience the AI technology with different AI apps and product	Science: Light spectrum. Sound wave Technology: AI Application; Neutral System. Math: Interpret statistical diagrams and graphs	Students will observe the apps or hardware performance before Data bank input to the AI coding. Students will ask to compare the performance of different apps or hardware after mechine learning form data input. Students will make comment on how the learning rate and other parameter effect the performance of the Apps or hardware.	Understand the working principle of various AI computer programme / mobile apps	Understand the working principle of various AI computer programme / mobile apps

Use achievable data to perform deep learning through API.	The Tensor flow API application Modify the AI coding to perform specific project	Science: Light spectrum. Technology: AI Application; Neutral System. Math: Interpret statistical diagrams and graphs	Students will form study groups of two Students will self deform a, AI project with the use of camera or other sensors. The Students proposal will be evaluation by teachers for feasibility.	Use of tensor flow API application Modify the AI coding to perform specific project Apply tensor flow API in product design Modify AI coding to perform specific project	Apply AI API programme with refer to situation Create product with application of AI logic
Apply AI skills in machine design project.	The Tensor flow API application Modify the AI coding to perform specific project	Science: Light spectrum. Technology: AI Application; Neutral System. Math: Interpret statistical diagrams and graphs	Students will form study groups of two Students will self deform a, AI project with the use of camera or other sensors. The Students proposal will be evaluation by teachers for feasibility.	Apply tensor flow API in product design Modify AI coding to perform specific project	Create product with application of AI logic

Concrete involvement of school teachers in the planning of the above learning activities:

- Science teachers: They mainly apply the IoT model into science data connection for trends predicting.
- Math teachers: Suggest and implement statistic instrument in data connection and presentation.
- Technology teachers: Overall lessons planning, suggesting implementation of hardware and programme in lesson.

Forming Local STEM network (workshop)

Topic	Key learning point	Related Math, Science/ Tech learning element	Learning Activity	Remarks
Implement ation of 3D printing in Mathemati c learning Target Beneficiari es : Network school Students and Teachers	Use of 3D drawing software to from 3D model Implement 3D model in Mathematic learning Prepare 3D model with 3D printer	Technology: 3D drawing, Computer Aided design and Manufacturing Math: Volume, surface area	Design and draw mug with TinkerCAD software. Peers sharing of draw work and how it may apply to students learning. Use Slicing software to turn STL into G-code	

Automatic festival car making Target Beneficiaries : Network school Students and Teachers	Use of micro-controller to controller different output device (i.e. Motor, speaker, LED light) Use of different sensor to get data (i.e. Light sensor, color sensor, sound sensor, distance sensor ets) The concept of complete circuit Use of variable in programming	Technology: System, input, processing and output Science: circuit and current: Math: Calculation of Speed and distance, circumference	Use of micro-controller and output device (i.e. Motor, speaker, LED light) to make car for festival cerebration. Use of different sensors to make the festival car to go pass the assigned route Peers sharing of code and explain the math operation they have use in the coding.	
Task robot making Target Beneficiaries : Network school Students and Teachers	Use of micro-controller to controller different output device (i.e. Motor, speaker, LED light) Use of radio communication between device Concept of force Use of variable in programming Design evaluation base on data connected	Technology: System, input, processing and output. Wireless communication Science: Kind of forces Math: Calculation of Speed and distance, circumference	Use of micro-controller and output device (i.e. Motor, speaker, LED light) to make Sumo robot Connect and control the sumo robot with wireless controller Have scramming matches with peers by performing different tasks with robot Make improvement according the robot performance.	

Concrete involvement of school teachers in the planning of the above learning activities:

- Science teachers: They mainly apply the IoT model into science data connection for trends predicting.
- Math teachers: Suggest and implement statistic instrument in data connection and presentation.
- Technology teachers: Overall lessons planning, suggesting implementation of hardware and programme in lesson.

Forming Local STEM network (Competition)

Topic	Key learning point	Related Math, Science/ Tech learning element	Learning Activity	Remarks
. IQ Robot Challenge (CCK CUP) Target Beneficiaries : Network school Students and Teachers	Use of different mechanic structure Blocky programming Use of micro-controller Communication skill	Technology: Mechanical structure Blocky programme Science: force, motion,	Make, programme and control robot to completion assigned tasks with alliance teams Discuss and implement tactic with teams members form friend school Design implement autonomous programme for robot skill tasks	

		Math: Volume, surface area		
Automatic festival car making Challenge Target Beneficiaries : Network school Students and Teachers	Use of micro-controller to controller different output device (i.e. Motor, speaker, LED light) Use of different sensor to get data (i.e. Light sensor, color sensor, sound sensor, distance sensor etc.) The concept of complete circuit Use of variable in programming	Technology: System, input, processing and output Science: circuit and current: Math: Calculation of Speed and distance, circumference	Use of micro-controller and output device (i.e. Motor, speaker, LED light) to make car for festival cerebration. Use of different sensors to make the festival car to go pass the assigned route Peers sharing of code and explain the math operation they have use in the coding.	

Concrete involvement of school teachers in the planning of the above learning activities:
- Science teachers: They mainly apply the IoT model into science data connection for trends predicting.
- Math teachers: Suggest and implement statistic instrument in data connection and presentation.
- Technology teachers: Overall lessons planning, suggesting implementation of hardware and programme in lesson.

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	Micro-controller and related devices	For students to perform Internet of things project. The Micro-controllers can be reused for other projects.
3	20 pcs	For students to apply AI application and IoT apps. Those [illegible]s will be shared with other subjects for e-learning.
4	AI devices	For making AI projects and as an exhibition material for local primary school visits and parents' days showing.
5	Programming software	For curriculum development, lesson practice and project.

d. Construction works, (The required work involves no change of room nor core structure),if applicable

	Details of the construction works proposed (The required work involves no change of rooms nor core structure),	Contribution to fulfilment of the project aim(s) and if applicable, the expected utilization rate
1	Mounted furniture	For the storage of different parts and controllers in an orderly way and to allow quick assess of parts during lesson time and preparation time. Other subjects which have collaboration work can store their projects in those furniture.
2	Renovation of **STEM Centre** (Phase 2)	With the support of School IMC. The STEM Centre has been set up for students to study robotic and programming. However, the STEM Centre needed more equipment for rapidly increase demand of STEM projects , including the daily lesson, robotic competition and local primary school technical support. The traditional classroom cannot be use for the event above, as fixed equipment and practice field is needed . STEM learning in school could grow faster if students have a well equipped rooms for hand on project base.

		The concrete need for the renovation of STEM room is to facilities students STEM related lesson, providing students with maker equipment for making, supporting network school and competition preparation. It also serve as a STEM exhibition Centre for visitor and network school.

(Public sector primary and secondary schools, including DSS schools, and special schools should refer to Paragraph 8.6 and other relevant paragraphs in the School Administration Guide. Kindergartens under the New Kindergarten Education Scheme should observe Paragraph 1.2(1)(g) in the Kindergarten Administration Guide.)

Our school confirmed that the required work involves no change of rooms nor core structure. Thus, our school does not need to obtain approval from the respective Regional Education Office for the proposed work before the project commencement.

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

1. Tailor made curriculum to foster task learners' innovative exploration in STEM subjects
2. Enhance teachers' capacity in STEM related project coaching
3. Link students' projects to actual needs to increase their learning motivation and problem solving skills
4. Develop sense of responsibility of students through serving local primary schools

f. Other activities, if applicable (Please specify how they contribute to fulfilment of the project aim(s).)

1. Form Robotic team to sharpen elite students' Hands-on skills
2. Participate in local and international STEM related competitions to foster elite students' coding skills
3. Hold STEM exhibition to spread STEM knowledge to parents and other stockholders
4. Organize STEM related inter-school activities to promote STEM learning in Choi Cheung Kok Secondary School
5. Provide workshop to teachers form non-technology KLA to promote STEM in other subjects

2.8 Budget

Total Grant Sought: HK$ 397,000

Budget Categories*	**Breakdown for the budget items**		**Justifications** *(Please provide justification for each budget item, including the qualifications and experiences required of the hired personnel.)*
	Item	**Amount (HK$)**	
a. Staff	N/A	0	
b. Service ($92,000)	Event organize ($ 20,000)	Estimate Counter (10): 10 × $400 = $4,000 Materials and items related to / for two competitions: 2 × $3000 = $6,000 Preparation and 2 Event holding (100 man hours) 2 × 50 × $100 = $10,000	Hire experience organizers (Company with international robot match experience) Hold no less than two events to link local primary schools. Enhance STEM learning motivation for participated schools. Hold two events in one year. Provide primary school with 3 microcontroller workshops. Hold two robot competitions for Primary and junior secondary schools Invite makers organizations and schools to set up show booth for nearby community to visit each of the booth will be given no more $400 HKD for back up

	Teacher training and learning material development fees for AI ($ 32,000)	Online Material Development (35 hours): 35 × $400 = $14,000 Teachers training (15 hours): 15 × $400 = $6,000 On site support (30 hours): 30 × $400 = $12,000	Buy consultant package from technology company, to give support to develop AI programme to students. Provide subject knowledge training to teachers involved. 12 lessons activity plan with hardware support
	Consultant fee for Micro-controller and IOT ($ 40,000)	Online Material Development (60 hours): 40 × $400 = $16,000 Teachers training (20 hours): 20 × $400 = $8,000 On site support (40 hours): 40 × $400 = $16,000	Buy consultant package from technology company, to give support to develop IoT programme to students. Provide subject knowledge training to teachers involved. 12 lessons activity plan with hardware support Maker organization / Engineering background
c. Equipment ($143,000)			
	16 sets of Micro-controllers input and output devices	16 × $1,000 = $16,000	For Students to perform Internet of things projects. The Micro-controllers can be reused for other projects.
	20 pcs and accessories	20 × $3,500 = $70,000	For students to apply AI application and IoT application. The iPad will be shared to other subjects for e-learning. More justification for purchasing tablet PCs: The implementation of mobile device can free students and teachers from wire during learning activities. The integrated camera and microphone also allow students to study various AI related Apps easily.
	AI devices (5 sets with recognition camera, smart motor and processing unit)	5 × $11,000 = $55,000	For making AI projects and as an exhibition material for local primary school visits and parents' days showing. More justification for the choice of specific AI app/device and the IoT robot: The touchable and noticeable presentation of coding, could help students to learn the AI machine learning in a more practical way. The hand-on work could help students to understand abstract concept in a easier way.
	Software (2 sets)	2 × $1,000 = $2,000	For programming AI devices, can be reused.

d. Works ($147,000)	Renovation of STEM room (Second phase) ($100,000)	Floor treatment: $70,000 Wall treatment: $30,000	With the support of School IMC. The STEM centre has been set up for students to study robotic and programming. However, the STEM centre needed more equipment and rapidly demand of STEM project, including the daily lesson, robotic competition and local primary school technical support. Especially the floor treatment is greatly indeed, as the poor floor could leaded to students injuries with various machines in STEM centre. A place for students to perform hands-on tasks. Serve as an after school maker base. As a local resource for primary schools for STEM related competitions or projects. The concrete need for the renovation of STEM room is to facilities students STEM related lesson, providing students with maker equipment for making, supporting network school for STEM project and competition preparation and as a STEM exhibition Centre for visitor and network school.
	Mounted furniture ($47,000)	12fleet *12fleet storage stage f or robot practice field: $27,000 6 fleet *4 fleet (2pcs) storage: 2 × $10,000 = $20,000	For the storage of different parts and controllers in an orderly way and to allow quick assess of parts during lesson time and preparation time. Other subjects which have collaboration work can store their projects in those furniture.
e. General expenses ($5,000)	Audit fee	5,000	For project Auditing
f. Contingency ($10,000)	Contingency fee	10,000	Contingency provision for project more than 1year

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(i) Applicants should refer to the QEF Pricing Standards in completing the above table. All staff recruitment and procurement of goods and services should be carried out on an open, fair and competitive basis. Budget categories not applicable to this application can be deleted.

(ii) For applications involving school improvement works, a contingency provision of not more than 10% for carrying out works is considered acceptable.

(iii) For projects lasting for more than one year, a contingency provision of not more than 3% of the total budget exclusive of staff cost and works expenditure (including the related contingency provision), if any, is considered acceptable.

1. Our school will ensure that all procurement of goods and services is conducted on an open, fair and competitive basis with measures taken to avoid conflict of interests in the procurement process.

2. Our school understood that the expenditure items funded by the QEF is one-off. Our school needs to bear the recurrent expenditure incurred, including maintenance costs, daily operating costs, etc. and the possible consequences that may arise.

Assets Usage Plan

Category	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment
computer hardware	(20 pcs and accessories)	20	70,000	Will be used in the school campus after project completion
computer software	AI apps/ software (Software (2 sets))	2	2,000	Will be used in the school campus after project completion
Others	IoT Input and Output devices (16 sets of Micro-controllers input and output devices) AI Robot packages (AI devices (5 sets with recognition camera, smart motor and processing unit))	16 5	16,000 50,000	Will be used in the school campus after project completion

3. Expected Project Outcomes

3.1	Deliverables / outcomes	☑ Learning and teaching materials (Two set of learning and teaching material for junior Secondary classes included 1. Lesson note 2. Worksheet 3. Powerpoint. Topic: (a) Learning Automatic control and IoT through micro controller (b) Learning AI through the study of AI device) ☐Resource package ☑ e-deliverables* (Programme Source code package upload to website *as network's school reference)* ☐Others *(please specify)* _____ **For e-deliverables to be hosted on HKEdCity, please liaise with HKEdCity at 2624 1000.*
3.2	Positive impact on quality education/ the school's development	Teachers' capacity enhanced A STEM resource centre set up School-based STEM Curriculum revamped and developed Primary Schools supported

3.3 Evaluation

Please state the methodologies of evaluating project effectiveness and provide the success criteria.

(Examples: lesson observation, questionnaire survey, focus group interview, pre-test/post-test)

1. The frequency of the use of resource room
(Over 80% of Design and Technology lessons take place in resource room)
2. Questionnaires of IoT and AI course
   a. Over 80% of the interviewees believed improvement in the understanding of IoT in daily life
   b. Over 80% of the interviewees believed that they have improved their understanding in AI logic
3. Questionnaire from **STEM** event participants
   a. Over 80% of the participants agreed the event can help them to develop STEM related skill / knowledge
   b. Over 80% of the participant agreed that the event can increase students' motivation in STEM learning
4. Pre-test and Post-test of students participate in related lessons
   a. Over 80% of the students who have taken the course show improvement in the IoT programme logic.
   b. Over 80% of the students who have taken the course show improvement in the machine learning logic.
5. Questionnaire of STEM education:
   a. Over 80% of the students agreed that they have sharpen the processing skill in STEM
   b. Over 80% of the students agreed that they programme help to motivate their interest in taking STEM related subject in senior form.
6. Focus group interviews.
   a. Students' motivation in STEM subjects
   b. The understanding of STEM education

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For applications with grant sought <u>exceeding $200,000</u>, please complete Parts 3.4 and 3.5.

3.4 Sustainability of the project

1. Teachers who are involved in the teaching training could have **better foundation knowledge** for STEM project development. Those trained teachers could help to spread technology application in other subjects.

2. Teaching Kit of smart device/ robotic could allow **further development of competitions or STEM projects**.

3. The formation of local STEM schools network could allow sustainability activities between local schools, **we will share experience of curriculum development, equipment and hands on skill with network schools.**

4. Workshop for teachers from non-technology KLA in Choi Cheung Kok Secondary School to spread STEM in other subjects could promote the application of STEM knowledge in other subjects.

3.5 Dissemination

Please provide a dissemination plan for sharing the good value of the project with the school sector.
(Examples: dissemination seminar, learning circle)

1. Workshops to share learning materials
2. STEM events / competitions organized for primary schools
3. Experience sharing of setting up of AI lab

Report Submission Schedule

My school commit(s) 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 1/9/2019 – 29/2/2020	31/3/2020	Interim Financial Report 1/9/2019 – 29/2/2020	31/3/2020
Progress Report 1/3/2020 – 31/8/2020	30/9/2020	Interim Financial Report 1/3/2020 – 31/8/2020	30/9/2020
Progress Report 1/9/2020 – 28/2/2021	31/3/2021	Interim Financial Report 1/9/2020 – 28/2/2021	31/3/2021
Final Report 1/9/2019 – 31/3/2021	30/6/2021	Final Financial Report 1/3/2021 – 31/3/2021	30/6/2021

End of Proposal