Quality Education Fund Application with Grant Sought Not Exceeding \$150,000 Part B: Project Proposal

Project Title	Project Number
Promoting Assessment for Learning in Science and Mathematics through identifying students' learning difficulties from automated analysis of multiple-choice test.	2014/0503 (Revised)

Basic Information

Name of School / Organisation / Individual Tak Sun Secondary School 德信中學

Beneficiaries

- (a) Sector: ☑ Secondary
- (b) Students: Pilot scheme class:
 - F1 Maths (30 students) + F2 Science (30 students) + F4 Chem (30 students) + F6 Chem (25 students) = Total around <u>115</u> students
- (c) Teachers: 2 project leaders (1 Sci teacher & 1 Maths teacher) + 10 Sci and Maths teachers

<u>Proposal</u>

(I) Project Needs

- (a) Please state the aims of the project in clear and concise terms and elaborate how the proposed project could impact on school development.
 - to promote Assessment for Learning in Science and Mathematics in school
 - to identify students' possible learning difficulties effectively
 - to enable teachers to use information about students' performance to inform their teaching
 - to enhance the professional exchange among colleagues in STEM education
- (b) (i) What are the areas of the needs and priorities of the school?
 - Enhance learning and teaching to facilitate students' knowledge on subjects / learning areas / generic skills development
 - Enhance school management / leadership and teachers' professional development / wellness
 - (ii) Please give background information to justify the demonstrated needs as mentioned in
 (b)(i). (Please tick the appropriate box(es).)
 - School development plan (2013-16) (part of the plan)

Major concern	Intended outcomes	Strategies
To develop learning	Students with different	To implement the concept of
and teaching strategies	learning abilities show	core/extended assessment and
to cater for learner	improvement	feedback mechanism in the
diversities	academically	curriculum.

☑ Survey findings:

Teaching and Learning survey is conducted twice per year in school, here has four questions highlighted in the 1^{st} term survey (1 = lowest; 5 = highest):

Question	Subject	Score	Sample Size	St. Dev
2. 'The teacher	Technology Stream	4.50	582	0.77
listens to our	Mathematics Stream	4.24	869	1.04
questions with	Whole school	4.19	9320	1.04
patience.'	Science Stream	4.18	818	1.08
	Social Science and Humanities Stream	4.11	2402	1.08
→ Science stream is lacking behind from tech., Maths. streams as well as the whole school for this question				

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3. 'The teacher	Technology Stream	4.47	582	0.81
tries his best to	Mathematics Stream	4.28	869	1.01
answer our	Science Stream	4.22	818	1.03
questions.'	Whole school	4.20	9320	1.04
	Social Science and Humanities	4.12	2402	1.09
	Stream			
6. 'The teacher	Technology Stream	4.36	582	0.84
often helps me	Mathematics Stream	4.21	869	1.04
solve my	Science Stream	4.15	818	1.08
learning	Whole school	4.10	9320	1.09
problems in the	Social Science and Humanities	4.03	2402	1.13
class.'	Stream			
8. 'The teacher	Technology Stream	4.35	582	0.90
can point out	Mathematics Stream	4.27	869	1.04
my mistakes in	Science Stream	4.15	818	1.08
the	Whole school	4.10	9320	1.12
assignments	Social Science and Humanities	4.01	2402	1.17
clearly.'	Stream			
➔ Science stream is lacking behind from tech. and Maths. streams for O3, 6 and 8.				

Implication	Reflection (How can we identify students' learning difficulty now?)	Follow-up and QEF helps
Compared with	Mathematics and Science: in-class	We believe that shorten the
Maths and Tech.	observation / regular homework /	time for each teaching-
streams, it seems	revision quiz / examination, etc.	learning-assessment cycle,
that Sci is not	In addition, Mathematics department	using more assessment data
offering enough	provides extra support to our students,	for identifying students'
support to	like 'consultation period' every day	learning difficulties/needs
students in order	after school for those students in need	can be beneficial to students'
to help them	to ask question / work on their	learning. Please refer to the
overcome the	homework together with teacher, etc.	Part(c) below for explaining
learning	This may lead to the deviation in	the new ideas about
difficulties.	student survey (Q2, 3, 6 and 8).	Assessment for Learning and
		how OEF can help us.

(c) Please elaborate the innovative ideas or new practices to enhance, adapt, complement and/or supplement the existing practices that will facilitate the development of the school to address the needs specific to its own context.

Target: to identify students' learning difficulties more effectively

Existing practices: rely on homework / uniform test / examination / in-class observation limitation: take at least 1-2 week to finish collection, marking, return and feedback to students, etc.

New ideas: 'using mobile devices +

- 'using mobile devices + form analysis' \rightarrow collect students' answer \rightarrow instant analysis and feedback
- \rightarrow teacher will identify their learning needs earlier and refine his teaching afterwards

lesson video: http://tinyurl.com/oyb47wv

how to prepare: http://tinyurl.com/ouz59rt

Instant feedback to teacher:

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After students submitting their answers, teacher will <u>immediately (even in class)</u> look at which question(s) students are grasping the ideas well or performing poorly. Here are some examples:

Example 1: most students are able to apply filtration correctly in context, i.e. removing insoluble substance from a liquid

Example 2: students understand well the effect of exposed surface on the rate of evaporation

Example 3: only about half of students got the correct answers, compared with example 1:

Reflection in teaching:

Choice A: Do we have enough experience to tell students copper sulphate is a soluble salt? Choice D: Language barrier 'sawdust' = 鋸屑

Hence, teacher provides more learning experience to students after the assessment, (1) more examples of soluble salts; (2) limitation of filtration (cannot separate solid + solid mixture); (3) language: 'sawdust' meaning.

Lesson MC test paper: <u>http://tinyurl.com/o7guaad</u>

Students' performance: http://tinvurl.com/nk94gdp (Instant analysis by

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School context analysis:

Strength:

- School has a stable and fast wifi network.

- In a boys' school, boys will be more attentive in case teacher can point out their possible learning barriers rather than teacher-centered approach followed by assessments.

Weakness:

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- In junior form, around ¼ of class students do not own a smartphone or just an ordinary phone, they need to borrow from others which is not an ideal case due to the privacy issue.
- In senior form, we have elective lesson with combining students from five different classes, it is almost impossible to take back their own mobile devices from the safe in different classes. (All students' mobiles should be locked in the safe placed in each classroom.)

analysis will send email to the respondents telling them the score and the mistakes. However, responses to different email domains with different speed. Some students need to wait for a long time (i.e. 10-15 mins) in order to receive the email or even no email is received.

<u>Future</u> opportunities:

In case the QEF application is successful with school geared up with certain number of mobile devices, besides doing the titled project, we can explore the possibilities of introducing concept of 'flipped classroom'. In the system, teacher can put some desired learning materials into the feedback. Once a student has submitted his answer and received email from system, he can refer to what the teacher has directed him to see/learn. (i.e. can be a video explanation, pre-lesson videos...)

Here is an example:

Finding: It seems that our students do not understand the source of water in the Ganges river. Teacher can insert some information for student in the 'explanation' part:

Due to the 'weakness' and 'future opportunity' analysis above, we do hope that QEF can help bridge those gaps in order to make this practice of 'Assessment for Learning' become more effective, sustainable and transferable.

Effective: everyone in the class has a tablet with a mail account designated → for receiving a prompt response from the system Sustainable: explore the feasibility of introducing 'flipped classroom' with idea of 'Assessment as Learning' in future

Our professional development – echoes with STEM education in Policy Address:

In order to promote collaboration between teachers in our school for enhancing Science, Technology, Engineering and Mathematics (STEM) education, we should arrange professional exchange among colleagues. During the exchange, we teachers from different streams should be able to tell each other what learning difficulties are encountered by our students when they are trying to strengthen the integrative learning and application skills. This project helps a lot for it, as it aims at using IT tools to effectively find out the students' strength and weakness within a short time.

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Transferrable: explore the possibility of transferring this pedagogy to another subject department (i.e. Mathematics, Social Science, etc.)

→ Eventually draw teachers' attention / awareness for identifying students' learning needs.

For Science subject, various assessment tasks (fill in the blanks, short questions, true/false and paragraph writing, etc) will be done by the system, here is an example:

	14° I	Funde des socialitases	
Queston Tibe	What are isotopes?		
Help Text	· · · · · · · · · · · · · · · · · · ·		
Question Type	i Paragraph text +		
Thest logger answer			
Advanced patron		Circles Control	
· Donef J	ିଆ Required question		
Add kens 👻			
Short que	estion prepared by teacher	(student's screen)	

(II) <u>Project Feasibility</u>

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- (a) Please describe the design of the project, including:
 - (i) <u>Approach/Design/Activity</u>

The project adopts 'Assessment for Learning' for identifying the students' learning needs. With help of IT devices and online platform, teacher can identify students' misconception or learning difficulties <u>faster</u> and <u>easier</u> than most traditional assessment methods (i.e. homework, quiz and exam etc.).

Try-out period and topics: (4 weeks per topic)

Month	Maths	Sci	
Oct	F1 Algebra	F2 Gas	
Nov	F1 Triangle	F2 Force	
Remarks: Each topic above will have at least 4 sets of test (once for week). For Science, test will involve short questions, fill in the blanks etc. other than just MC)			

Term 2 arrangement:

Science:

At least 1 teacher from each Phy/Chem/Bio subject has adopted the practice in his class. Proposed topics: acid and alkali, electricity, sensation Maths:

At least 1 teacher from Junior and Senior Maths class has adopted the practice in his class.

They will be able to design an assessment by themselves using the designed methods in project to identify the students' needs. They will show evidence how this practice has helped student to learn better.

(ii) Key Implementation Details

Project period: Oct/2015 to Aug/2016

Month / Year	Content / Activity / Event	Target Beneficiary/ Participants
Oct / 2015	Purchase tablet PCs and cart.	Maths and Sci teacher
Oct / 2015	Pilot scheme will be conducted in 2 project leaders' classes. Lessons will be video-taped.	Maths and Science students in project leaders' classes.
Nov / 2015	Staff development day Project progress will be demonstrated to all teachers in school. Invite for lesson observation.	Teachers in school, target drawing their attention of importance of 'Assessment of Learning'.

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Nov-Dec / 2015	Workshops will be conducted	Sci and Maths teachers
	for the interested teachers about:	(around 10)
	How to design a good	(Staff trainer will be invited
	assessment (MC test) for	for explaining more about a
	identifying students'	good assessment design.)
	difficulties?	
	How to create the MC system by	
	platform and do the,	
	analysis?	
2nd term / 2016	Invite more Sci and Maths	Sci and Maths teachers
	teachers to adopt the practice.	(around 10)
	Even transfer to other subject	
	stream or introduce ideas of	
	flipped classroom in it.	
Aug / 2016	Evaluation of the project.	-

- (b) Please explain the extent of teachers' and/or principal's involvement and their roles in the project.
 - Number of teachers involved and degree of input (time, types, etc.):
 12 teachers will be involved (including 2 project leaders)
 Workshops/lesson observation/post-lesson observation discussion

(ii) Roles of teachers in the project: (Please tick the appropriate box(es).)

- - ✓ Developer
 ✓ Service recipient
- (c) Please provide the budget of the project and justify the major items involved. Grant Sought: HK\$107.200

Dudget Item	Expenditure Deta	Instifications	
Duaget Hem	Item	Amount (\$)	Justifications
i) Service	Staff trainer \$700 x 1.5 hrs x 2 times Staff trainer qualification: Experience in designing assessment tasks for science teachers and able to carry out analysis for the assessment	2,100	For equipping teachers with the knoabout a good design of assessment.
ii) Equipment	Tablet PCs \$3,700 x 23 pcs	85,100	For implementing e-learning in class
	1 Tablet Charge Cart	15,000	To store, secure and charge up the tablets.
iii) General Expenses	Audit fee	5,000	
	Total Grant Sought (\$):	107.200	1

(d) Asset Usage Plan

Category	Item /	No. of	Total	Proposed Plan for
	Description	Units	Cost (\$)	Deployment
Computer	Tablet pc	23	85,100	Tablets and Cart will be
hardware	Tablet Charge Cart	1	15,000	managed by the Project Leader with support from the IT officers in school.

(III) Expected Project Outcomes

- (i) Please describe how to evaluate the effectiveness of the project;
 - ☑ Observation: students' performance in class and assessments
 - ☑ Focused group interviews: project leaders will interview students in pilot classes and teachers joined
 - ☑ Pre-and post-activity surveys: student survey results (Question no. 2,3,6,8)
 - ☑ Performance change of students in assessment: performance in summative assessments (e.g. uniform test and examinations)

(ii) Please state the project deliverables or outcomes.

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- ☑ Learning and teaching materials
 - Resource package (school-based MC problem sets x 10+ sets for Maths & Sci.)
 - \square DVD (lesson videos and interview)

(IV) <u>Report Submission Schedule</u>

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My school commit(s) to submit proper reports in strict accordance with the following schedule:

Project Management		Financial Man	lagement
Type of Report and Report due day		Type of Report and	Report due day
covering period		covering period	
Final Report	30/11/2016	Final Financial Report	30/11/2016
1/10/2015 - 31/8/2016		1/10/2015 - 31/8/2016	