

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

<b>Project Title</b> Learning science and technology from a modern first principle approach	<b>Project Number</b> 2013/0404(Revised)
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**Basic Information****Name of School / Organisation / Individual**

City University of Hong Kong - Department of Civil and Architectural Engineering

**Beneficiaries**

- (a) Sector: ☒ Secondary
- (b) Students: 20 and F5-F6
- (c) Teachers: 3 teachers
- (d) Parents: 5 by invitation
- (e) Others:
  - It is envisioned that our proposed app can benefit many high school science students with a strong self-learning initiative.
  - The developed app will be open up for access to all local secondary schools and is believed to be beneficial to all local secondary students.

**Proposal****(I) Project Needs**

- (a) Please state the aims of the project in clear and concise terms.

To help top tier high school students in science and technology by our developed app that acts as an advanced electronic dictionary of words in professional scientific and technological fields with the feature of knowledge linked-up function, which allows the system to direct users to some online resources supported linked-up from some prestigious universities around the world. The developed app will be open up for access to all local secondary schools and is believed to be beneficial to all local secondary students.

- (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).
- ☒ Relevant experiences: Based on the direct interaction with the university freshmen, PI has noticed that there is a need to help high school students in grabbing abstract ideas in science and technology.
- (c) Please elaborate the innovative ideas or new practices to enhance, adapt, complement and/or supplement the existing practices of the school.

Smartphones are popular among teenagers nowadays and almost every student has one on hand. For teenagers, especially high school students, the best and easiest way to introduce them a new thing is by something they have the access almost everywhere, which is smartphone apps. Thus, this proposal aims to develop a smartphone app which plays the role similar to professional dictionary. However, the tasks are not just settled here. A further advancement will be conducted by equipping the app with the function to link a particular word with online open resources, such as the course materials from the prestigious universities worldwide.

**(II) Project Feasibility**

(a) Please describe the design of the project, including:

(i) Approach/Design/Activity

When teachers start answering student's question by "let us google it" rather than "let us look it up in the dictionary", we realize that internet has become the major resources for information hunting. It has not only turned into a tool which bridges and leads us toward knowledge we wish to acquire but transformed people's habits of information-searching from book-based to internet-based. In the internet-driven era, even though books are turned into less popular tools for information searching and its roles as information index has been replaced by internet gradually, the concept of dictionary still play a major role in education regarding on index function with the neatly information arrangement and easy-to-use feature for information-hunters.

Information hunting in scientific and technological fields of studies is vital for high school students. Getting familiar with scientific terms or jargon is always the first task for them, especially for those who are going to become freshmen in university in which these terms may appear in university entrance exam. However, we discover that they usually have to spend a great amount of time flipping through pages of dictionary or browsing through online resources to look for a particular meaning of word. To assist students on searching for relevant information and save time, we aim to make use of the praised features of compiling and index of dictionaries and the prevalent trend of internet browsing to dedicate ourselves to implement an idea which will connect traditional dictionaries with modern technology.

The objective of this project is to create an app that acts as an advanced electronic dictionary of words in professional scientific and technological fields with the feature of knowledge linked-up function, which allows the system to direct users to some online resources linked-up from some prestigious universities with better and deeper explanations than a normal dictionary, leading to an enhanced learning approach for high school students.

### **Approach**

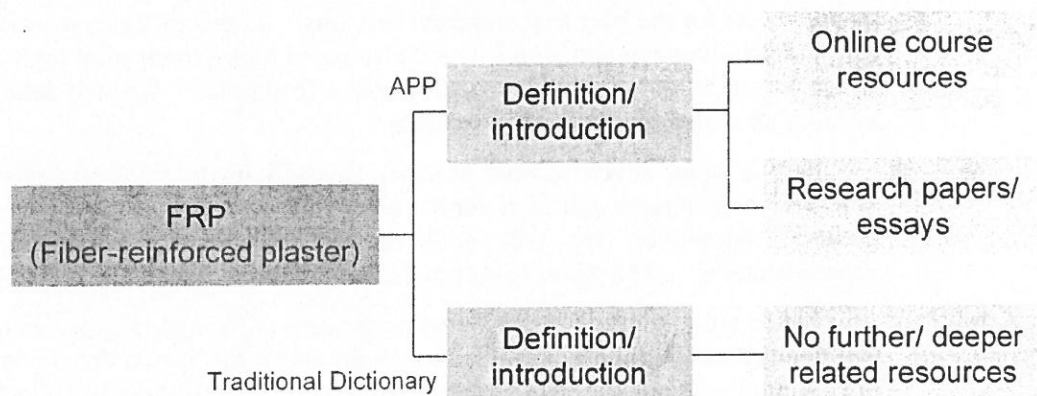
This app will adopt the computer-based approach to help high school students grab the abstract ideas from scientific and technological fields using first year university materials from top universities from all over the world. Internally, the project will be led by the principal investigator (PI)'s group formed with relevant personnel, including graduate students who are good at science and technology and experts in developing apps in PI's group. Externally, PI keeps a good relationship with the current students in his high school alma mater, in which these students are the target group for our apps application (top tier students).

It is planned that 15-20 students will be included in this study. Meanwhile, PI will recruit professional apps developer to optimize the efficiency of development (including the work related to the advertisement and publicity issue) and make sure that every timely-goal set and be achieved. Four processes are scheduled to be conducted, including apps development, app advertisement/promotion, app optimization and entire project feedback review in a step-by-step manner by related crew. The timeframe of this proposed project is one year.

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For instance, as shown in Fig. 1, when you search FRP (Fiber-reinforced plastic), what shows up will not be only the definitions like “a sort of composite material made of a polymer matrix reinforced with fibers which is commonly used in construction industry to reinforce the structure”. Instead, along with the definition and rough introduction of FRP, the app can further guide users to materials from the well-known and prestigious universities of FRP and useful research papers related to the topic. This function allows users to understand the plain definition of the word searched and further connect the word with professional, updated and advanced interpretations from top universities over the world to reinforce users’ learning experience and outcomes. It is envisioned that this function can significant help our high school students to grab the abstract ideas from science and technology on their own and the self-learning habit can further be promoted. Some target online open course resources from prestigious universities worldwide are listed:

The reference materials from the above links are mainly focus on first year materials. The degree of difficulties needs to be verified by the actual feedback from the target users (i.e. top tier high school students). The PI’s group will execute constructive feedback gained from pilot users to actual interface and will conduct trial and error sessions to make the app mature, user-friendly and useful enough before official publish.



**Fig.1** Flowchart showing the difference between our proposed app and the traditional dictionary

The pedagogy and specific applications of the app in learning and teaching of Physics/Science and Technology are elaborated and listed below:

1. The developed app can help teacher to get the most updated information about Physics/Science and Technology from the university college level, which is more comprehensive and detailed in general and can help students grab the abstract ideas more easily. Teachers can demonstrate the use of this app in the class directly. In addition, teachers can use this app to update their teaching material as the advancement of science and technology is much faster nowadays when compared to decades ago.
2. The scope of this app is wider and deeper compared to syllabus adopted in many secondary schools. This can fulfill student's desire towards knowledge and help them learn beyond the preset boundaries by the textbook. This app eventually can help student develop a self-learning habit, which is especially important in their upcoming tertiary education.

The scope of this project and the capacity of the app are elaborated below:

1. As indicated at the top of this page, the source of this app from prestigious universities worldwide. Their online material is open to public and this app can help to get the access effectively and easily without doing their own search online. No license of online dictionary will be involved. In other words, it is a self-created dictionary with definition and in-depth elaboration of scientific terms provided by online free web resources.
2. The scope of this project includes (a) the provision of an innovative app that helps teachers prepare their physics/science and technology class, (b) the app provision that initiate student's self-learning habit, (c) the training to teachers, students and parents how to use the developed app for facilitating their learning process, and (d) the refinement of the app with the comments from the users during the apps development stage.
3. The capacity of the app will cover the entire domain of Physics/Science and Technology in secondary school, while the knowledge-depth is founded on the university entrance level, which is believed to be very helpful to all secondary school students. The developed app will be applicable in any operation systems or devices.

### Activities

In the proposed project, activities organized can be divided into four categories: apps development, apps advertisement, apps optimization and feedback study/review.

Apps development includes the preparation of hiring relevant apps developers and coordinators for the later trial and error sessions. In this process, we will finish setting up the app to a trial version and then invite the selected high school pilot high students and teachers to use our apps and to provide us constructive feedbacks. We will debug the trial version for coming up with a mature and full version.

In the apps advertisement process, we will invite pilot students from tier one high schools, their parents and high school teachers to have training sessions conducting by PI's group. Moreover, we will hold tutorials which are conducted by trained CityU representatives. The participants (students, parents and teachers) can help promote this app.

The quality control and optimization process of the app is expected to be a long-term task that requires a continuous effort to keep maintaining the app as the major online dictionary for high school students (or even freshmen) and other interested parties. Updated versions may be generated if needed.

The final task is to study the feedback/review received from app's users when the app is officially in the market. A comprehensive report which includes the study of the user's behavior and preference will be provided as one of the deliverables



## (ii) Key Implementation Details

Project period: 3/2015 to 2/2016

Month / Year	Content / Activity / Event	Target Beneficiary/Participants
3 – 6/2015	Project initial preparation set-up and app development	PI's group
7 – 8/2015	App trial and error testing period	More than 20 students and 3 teachers
9 – 10/2015	Training workshop for top tier high school students	More than 30 students and 3 teachers
11 – 12/2015	Seminars for apps promotion	All local secondary students, parents and teachers
1/2016	Sharing session with participants	All local secondary students, parents and teachers
2/2016	App quality control and optimization Preparation of the final report illustrating feedback and findings from this project	PI's group

(b) Please explain the extent of teachers' and/or principal's involvement and their roles in the project.

(i) Number of teachers' involved and degree of input:

3 high school science teachers, part-time when needed

(ii) Roles of teachers in the project: ☒ Co-ordinator ☒ Service recipient

(c) Please provide the budget of the project and justify the major items involved.

**Grant Sought: HK\$120,700**

Budget item	Expenditure Detail		Justification
	Item	Amount (\$)	
Staff	Research assistant (\$13,200/month)	79,200	A teaching assistant (TA) with expertise in computer, science and technology with a bachelor degree will be hired for 6 months. The role of TA is to implement the tasks being mentioned in this proposal and follow the job order given by the project leader. The TA duties or job descriptions include developing the app and conducting/coordinating the training workshops to all the potential users including teachers, students and parents. The apps development includes the programming part, especially the linking between the specific scientific terms with the online web resources.
	Student helpers (\$52/hour)	10,400	
Equipment	Notebook computer (1)	6,500	The notebook computer is needed for apps development. The tablet PC is needed for testing the apps in the associated platform.
	Tablet PC (1)	4,000	
General expenses	Stationery	5,000	Some consumables will be purchased.
	Data storage	5,000	
	Promotion	5,000	
	Transportation to the event venue	600	
	Audit Fee	5,000	
<b>Total Grant Sought (\$):</b>		<b>120,700</b>	

**Assets Usage Plan**

Category	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment
Computer hardware	Notebook computer	1	\$6,500	For learning & teaching in the university.
	Tablet PC	1	\$4,000	

**(III) Expected Project Outcomes**

(i) Please describe how to evaluate the effectiveness of the project;

- ☒ Observation: To observe whether the students, parents and teachers participate actively in the organized events including seminar, sharing session and training workshop.
- ☒ Pre- and post-activity surveys: Questionnaire will be given to students, parents and teachers regarding the effectiveness of the app on helping them learn science and technology.

and (ii) Please state the project deliverables or outcomes.

- ☒ Others (please specify) Our developed app and a final report

**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 Day	Type of Report and Covering Period	Report Due Day
Final Report 1/3/2015 - 29/2/2016	31/5/2016	Final Financial Report 1/3/2015 - 29/2/2016	31/5/2016