THE CHINESE UNIVERSITY OF HONG KONG

Courseware Development Grant (2016-17)

<u>Final Report</u>

Report due 31 May 2018
Please return by email to Judy Lo judyl@itsc.cuhk.edu.hk

<u>PART I</u>

Project title: Computer Assisted Assessment Software for Math Proofs

Principal supervisor: Cheung, Leung Fu

Co-supervisor(s):

Department / Unit: Mathematics

Project duration: February 2017 – May 2018

Date report submitted: 6 July 2018

1. Project objectives

Is the project on track to meet its objectives? Yes

Have the objectives been changed as a result of the experience of working on your CDG project? No

2. Process, outcomes or deliverables

Please specify the number of different types of deliverables produced, and the course(s) (with course codes and titles) that have used the deliverables in Part IV, and provide more detailed descriptions here.
Has the nature of the deliverables been changed? No
Have you adjusted your timeline? No
Overall, was the project completed satisfactorily? Yes

3. Evaluation Plan

Have you altered your evaluation plans? Yes. The class has been changed to MATH2550 (Quantitative Methods for Earth and Environmental Sciences) and the evaluation has been conducted by myself.
What monitoring data did you collect? Students' proof writings
Does your evaluation indicate that you have achieved your objectives? Partially

4. Dissemination, diffusion and impact

Please provide examples of dissemination: website, presentations in workshops or conferences, or publications.
Please provide examples of diffusion: how the project results/process/outcomes/deliverables have been used in your unit and other parts of CUHK or other institutions? I have experimented the software (= deliverable) in my class in the 2ⁿᵈ semester of the academic year 2017/18.
Please provide examples of impact: how the project results can be adapted to other disciplines. I am trying to extend the functionality of the software to be used in Chemistry, Physics and even Humanities classes.

PART II
Financial data

Funds available:

Funds awarded from CDG	$	20,000
Funds secured from other sources	$	
(please specify_____)		
	Total: $	20,000

Expenditure:

Item	Budget as per application	Expenditure	Balance
Student Helpers	$20,000.00	$18,665.40	$334.60
Total:			

PART III

Lessons learnt from the project

Please describe your way forward.
Please describe any of the following item(s) accordingly:

- *Key success factors, if any* The software algorithm has so far been able to grade "semi-automatically" students' proof writings, provided that they are close to a standard format. The accuracy is quite reasonable.

Difficulties encountered and remedial actions taken, if any No

- *The role of other units in providing support, if any* No
- *Suggestions to CUHK, if any* Would it be possible to consider deploying intelligent computer assisted assessment systems e.g. WeBWork or STACK? Such systems can promote formative self-learning as testified to by various research works done in the United States and in UK. In Hong Kong, one major user of WeBWork is the HKUST. They are using this software for all freshmen taking mathematics, with a user population of more than 3,500.
  - *Example: what should be done differently?*
    A hybrid semi-auto-grader for E-learning would be considered.

PART IV

Information for public access

Summary information and brief write-ups of individual projects will be uploaded to a publicly accessible CUHK CDG website. Please extract from Part I the relevant information to facilitate the compilation of the publicly accessible website and reports.

1. Keywords

Please provide five keywords (in the order of relevance to your project) to describe your project.

(Most relevant)   Keyword 1: semi-auto

Keyword 2: grading

Keyword 3: written proofs

Keyword 4: Perl based

(Least relevant)   Keyword 5:

2. Summary statistics

Please provide information, if any, in the following tables, and provide the details in Part I.

Table 1: Publicly accessible online resources (if any)
(a) **Project website:** http://123.255.64.88:8080/webwork2/course001
If a publicly accessible project website has been constructed, please provide the

URL
(b) **Webpage(s):** N.A.
If information of your project is summarized in a webpage (say a page in the department's or faculty's website), please provide the URL(s) in here
(c) **Others (please specify):** N.A.

Table 2: Resource accessible to a target group of students (if any)			
If resources (e.g. software) have been developed for a target group of students (e.g. in a course, in a department) to gain access through specific platforms (e.g. CU Learning Management System (Blackboard), facebook), please specify.			
Course Code/ Target Students	**Term & Year of offering**	**Approximate No. of students**	**Platform**
Earth Sciences Programme, MATH2550	Students from all years of study	22	internet

Table 3: Presentation (if any)	
Please classify each of the (oral/poster) presentations into one and only one of the following categories	**Number**
(a) In workshop/retreat within your unit (e.g. department, faculty)	
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	*Please insert no*
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	T29
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	*Please insert no*
(e) In international conference	
(f) Others (please specify)	In two seminars organized by the Education Bureau of HKSAR

Table 4: Publication (if any) 5	
Please classify each piece of publications into one and only one of the following categories	**Number**
(a) Project CD/DVD	
(b) Project leaflet	
(c) Project booklet	
(d) A section/chapter in a booklet/book distributed to a limited group of audience	
(e) Conference proceeding	
(f) A chapter in a book accessible internationally	
(g) A paper in refereed journal	
(h) Others (please specify)	