RGC Ref. No.:
UGC/FDS17/H03/15
(please insert ref. above)

RESEARCH GRANTS COUNCIL
COMPETITIVE RESEARCH FUNDING SCHEMES FOR
THE LOCAL SELF-FINANCING DEGREE SECTOR

FACULTY DEVELOPMENT SCHEME (FDS)

Completion Report
(for completed projects only)

Submission Deadlines:
1. *Auditor's report with unspent balance, if any: within **six** months of the approved project completion date.*
2. *Completion report: within **12** months of the approved project completion date.*

Part A: The Project and Investigator(s)

1. Project Title

The effectiveness of learning field triage skills in a web 3D game-based virtual world

2. Investigator(s) and Academic Department(s) / Unit(s) Involved

Research Team	Name / Post	Unit / Department / Institution
Principal Investigator	Prof. CHOW Meyrick Chum-ming, Acting Dean and Professor	School of Nursing, Tung Wah College
Co-Investigator	Dr HEROLD David Kurt, Assistant Professor	Department of Applied Social Sciences, The Hong Kong Polytechnic University
Co-Investigator	Dr LAU Newman Man-lung, Associate Professor	School of Design, The Hong Kong Polytechnic University
Co-Investigator	Dr NG Vincent To-yee, Associate Professor	Department of Computing, The Hong Kong Polytechnic University
Co-Investigator	Dr NG Wah-shan, Consultant & Deputy Chief of Service	Accident and Emergency Department, Tseung Kwan O Hospital, Hospital Authority
Co-Investigator	Dr WIRMAN, Hanna Elina, Research Assistant Professor	School of Design, The Hong Kong Polytechnic University
Co-Investigator	Dr HUNG Maria Shuk-yu, Associate Professor	School of Nursing, Tung Wah College
Co-Investigator	Mr MA Pony Mun-chung, Senior Information Technology Manager	Information Technology Services Office, Tung Wah College

3. Project Duration

	Original	**Revised**	**Date of RGC / Institution Approval** *(must be quoted)*
Project Start Date	1 January 2016	N/A	N/A
Project Completion Date	31 December 2018	31 March 2019	3 January 2019
Duration *(in month)*	36	39	N/A
Deadline for Submission of Completion Report	31 March 2020	N/A	

Part B: The Final Report

5. Project Objectives

5.1 Objectives as per original application

1. To develop a 3D game-based virtual world for nursing students to learn field triage skills; and
2. To compare the effects of the 3D game-based virtual world with conventional face-to-face tabletop exercises on the acquisition and retention of field triage skills in mass casualty incidents.

5.2 Revised objectives

Date of approval from the RGC: N/A

Reasons for the change:

5.3 Realisation of the objectives
(Maximum 1 page; please state how and to what extent the project objectives have been achieved; give reasons for under-achievements and outline attempts to overcome problems, if any)

The first objective was to develop a 3D game-based virtual world for nursing students to learn field triage skills. As planned, we developed the scenario of the tragic Sai Kung bus crash mass casualty incident in the 3D virtual world. The serious game revolves around the training of nursing students as triage officers in the bus crash situation. After arriving at the scene, the student will be advised that he/ she is the first-responder at the scene, and be told that the scene is safe to enter. The student will be required to make a quick assessment of the situation, and then proceed with the triage task. Two groups of students were invited to do user testing of the game and we collected their feedbacks and fine-tuned the game.

The second objective was to compare the effects of the 3D game-based virtual world with conventional face-to-face tabletop exercises on the acquisition and retention of field triage skills in mass casualty incidents. We recruited 282 nursing students and randomly assigned them into the experimental group (web 3D triage game; N=141) or control group (tabletop exercise; N=141), and as planned successfully compared the effect of 3D game-based learning and conventional tabletop exercise on students' learning.

5.4 Summary of objectives addressed to date

Objectives *(as per 5.1/5.2 above)*	**Addressed** *(please tick)*	**Percentage Achieved** *(please estimate)*
1. To develop a 3D game-based virtual world for nursing students to learn field triage skills	✓	100
2. To compare the effects of the 3D game-based virtual world with conventional face-to-face tabletop exercises on the acquisition and retention of field triage skills in mass casualty incidents	✓	100

6. Research Outcome

6.1 Major findings and research outcome
(Maximum 1 page; please make reference to Part C where necessary)

Having recruited 282 nursing students, we randomly assigned them to the experimental group (web 3D triage game; N=141) or control group (tabletop exercise; N=141). At the end of the web 3D and tabletop triage exercises, we collected baseline information of the participants and their response to the eight-item Perceived Learning Effectiveness Scale (PLES). One month after the triage exercises, the participants of both the experimental group and the control group were invited to an on-campus nursing laboratory for a simulation-based assessment played by 13 actors. 275 nursing students completed the simulation-based assessment. Regarding the triage score of the simulation-based assessment of 13 casualties, the results showed significant differences (p=0.02) between the experimental group (10.79±1.26; N=135) and control group (10.26±1.55; N=140). However, no differences were found in triage time and PLES score between the two groups. Besides, the effect size calculated based on the mean and standard deviation of tagging accuracy (primary outcome) of the experimental and control groups is 0.38. This indicates that a sample size of 113 for each group is required (power=0.8, alpha=0.05).

6.2 Potential for further development of the research and the proposed course of action
(Maximum half a page)

This study focused only on nursing students' use of the 3D game-based virtual world in the acquisition and retention of field triage skills in mass casualty incidents. Other healthcare disciplines, including physicians and paramedics, should also be studied so that results may be generalized to different populations. Besides, in terms of data collection, only a single tertiary education institution was involved. Inevitably, it poses problems of generalizability. Multicentre randomized controlled trial of the effect of the 3D game-based virtual world on learning and retention of field triage skills in mass casualty incidents is warranted.

7. Layman's Summary

(Describe <u>in layman's language</u> the nature, significance and value of the research project, in no more than 200 words)

Healthcare workers who participate in rescue and disaster management are usually those who work in Accident and Emergency Departments. Many nursing students may not be involved in field triage during their clinical placement. Findings of previous studies have shown that many nurses are not well prepared to participate in disaster management and tend to have higher levels of anxiety in field triage. Conversely, this 3D field triage game can provide a safe environment in which students are fully immersed to practice their skills and enhance their knowledge without endangering patients' lives. In addition, one of the distinct features of this 3D game is that it provides feedback immediately during and at the end of a session, without the presence of a teacher. Hence, students may find it interactive and constructive. Furthermore, students can freely access this game and repeat it unconditionally to meet their needs. Findings of this study suggest that it is more effective than conventional face-to-face tabletop exercises in facilitating students to acquire and retain field triage skills in mass casualty incidents.

Part C: Research Output

8. Peer-Reviewed Journal Publication(s) Arising Directly From This Research Project
(Please attach a copy of the publication and/or the letter of acceptance if not yet submitted in the previous progress report(s). All listed publications must acknowledge RGC's funding support by quoting the specific grant reference.)

The Latest Status of Publications				**Author(s)** *(denote the corresponding author with an asterisk*)*	**Title and Journal / Book** *(with the volume, pages and other necessary publishing details specified)*	**Submitted to RGC** *(indicate the year ending of the relevant progress report)*	**Attached to this Report** *(Yes or No)*	**Acknowledged the Support of RGC** *(Yes or No)*	**Accessible from the Institutional Repository** *(Yes or No)*
Year of Publication	**Year of Acceptance** *(For paper accepted but not yet published)*	**Under Review**	**Under Preparation** *(optional)*						
		✓		Chow, MCM*, Hung, MSY, Chu, WK, Lam, SKK	Exploring nursing students' intention to use a 3D game to learn field triage skills/ Nurse Education Today	No	No	Yes	No
			✓	Chow, MCM*, Hung MSY, Lau NMH, Herold DK, Ng WS, Wirman HE	Effectiveness of learning field triage skills in a web 3D game-based virtual world: A randomized controlled trial/ International Journal of Nursing Studies	No	No	Yes	No

9. Recognized International Conference(s) In Which Paper(s) Related To This Research Project Was / Were Delivered
(Please attach a copy of each conference abstract)

Month / Year / Place	**Title**	**Conference Name**	**Submitted to RGC** *(indicate the year ending of the relevant progress report)*	**Attached to this Report** *(Yes or No)*	**Acknowledged the Support of RGC** *(Yes or No)*	**Accessible from the Institutional Repository** *(Yes or No)*
September, 2017. Newcastle, Australia.	Learning field triage in a 3D game-based virtual environment	The 3rd Australian Nursing and Midwifery Conference	Yes (2017)	Yes	Yes	Yes
December, 2017. Hong Kong, China.	3D simulation game for triage training	The 9th AMEA (Asian Medical Education Association) cum Frontiers in Medical and Health Sciences Education 2017	Yes (2017)	Yes	No (the Co-Investigator forgot to do that)	Yes
January, 2018. Seoul, Korea.	Perceived learning effectiveness and sense of presence in a 3D game-based virtual environment.	The 21st East Asian Forum of Nursing Scholars & 11th International Nursing Conference	Yes (2017)	Yes	Yes	Yes
June, 2018. Nottingham, UK.	Effects of a web 3D game-based virtual world on the acquisition and retention of field triage skills: A randomized controlled trial.	HPSN (Human Patient Simulation Network) UK Conference	No	Yes	Yes	Yes
January, 2019. Singapore.	Evaluation of a web 3D game-based virtual world in mass casualty incident: A randomized controlled trial.	The 22nd East Asian Forum of Nursing Scholars	No	Yes	Yes	Yes

10. Whether Research Experience And New Knowledge Has Been Transferred / Has Contributed To Teaching And Learning
(Please elaborate)

Undergraduate final year nursing students benefited to conduct an evaluation study on the 3D game-based virtual world in their Capstone Project by collecting data, doing statistical analyses, and discussing on factors affecting the intention of nursing students' intention to use the 3D game. They not only learned how to conduct and practice field triage by using the 3D game, but also gained research experience by doing a research study on the same area. Besides, the

3D game-based virtual world has been using by over 300 nursing students per year to learn field triage skills in the course NUR4005 Trauma and Disaster Nursing from Semester 2, 2016-2017 academic year onward.

11. Student(s) Trained

(Please attach a copy of the title page of the thesis)

Name	Degree Registered for	Date of Registration	Date of Thesis Submission / Graduation
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017
	Bachelor of Health Science (Major in Nursing) Senior Year Entry	September 2014	August 2017

12. Other Impact

(e.g. award of patents or prizes, collaboration with other research institutions, technology transfer, teaching enhancement, etc.)

The 3D game-based virtual world has been using by over 300 nursing students per year to enhance the teaching of field triage skills in the course NUR4005 Trauma and Disaster Nursing from Semester 2, 2016-2017 academic year onward.

13. Statistics on Research Outputs

	Peer-reviewed Journal Publications	Conference Papers	Scholarly Books, Monographs and Chapters	Patents Awarded	Other Research Outputs (please specify)	
					Type	No.
No. of outputs arising directly from this research project	2 (1 under review; 1 under preparation)	5	--	--	--	--

14. Public Access Of Completion Report

(Please specify the information, if any, that cannot be provided for public access and give the reasons.)

Information that Cannot Be Provided for Public Access	Reasons
N/A	