



Presenter: **Dr Mahmoud Bakkar**

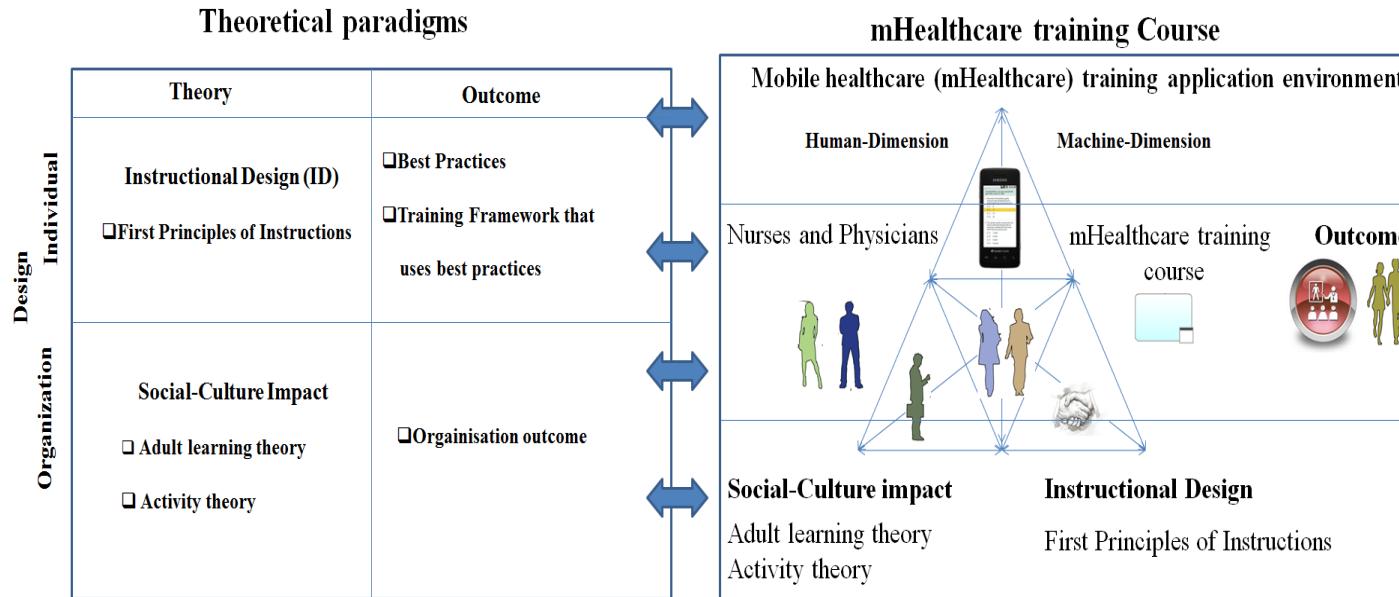
Lecturer at: Melbourne Institute of Technology
(MIT) and Holmes Institute

The 11th UK Rasch Day - 31 March 2017
University of Warwick- UK

Applying the Rasch model on measuring mobile healthcare (mHealthcare) training for healthcare employees in Jordan

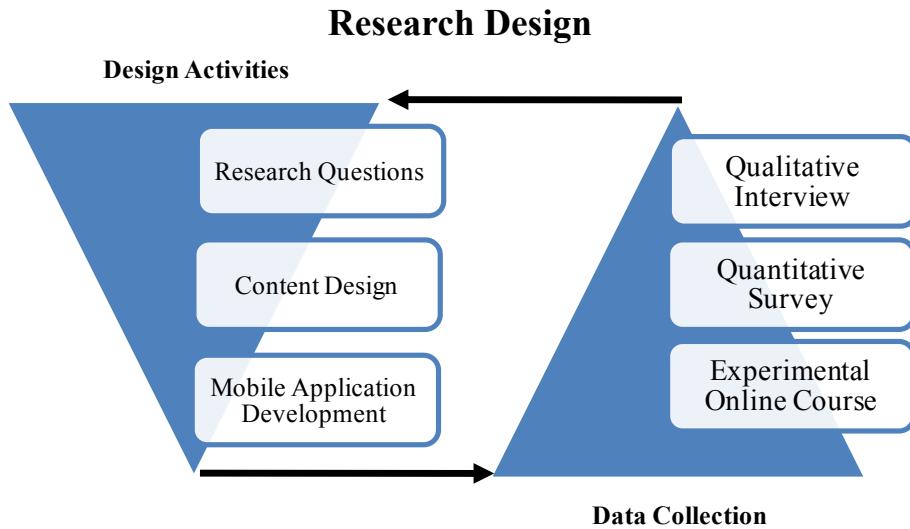
Research Questions

- 1. What is the best practice for designing mHealthcare training programmes in Jordan?**
- 2. What is the optimal design framework for establishing mHealthcare training programmes that apply such best practice in Jordan?**



Implementing the multidisciplinary fields of research for the mHealthcare training (software) application design

Design and Methodology



Participants

Healthcare professionals

Research Methodology

- Pilot Study**
 - Questionnaires
 - iPad training programme
 - Semi-structured interviews
- Instrument Validation Study**
 - Questionnaires - recalibrated
- Main Experiment**
 - Questionnaires
 - iPad training programme

mHealthcare training courseware task analysis

Knowledge development matrix

The knowledge development matrix was used to conduct instructional analysis and goal analysis for PFR-1 and PFR-2 and two separate skill development matrices for PFR-1 and PFR-2 were constructed

		Knowledge Development: Patient and Family Rights (PFR-1)					
		Declarative		Procedural		Metacognitive	
Patient and Family Rights (PFR-1)	Band-A	Band-B	Band-C	Band-D	Band-E	Band-F	
	Verbal information skill Concrete concept Knows basic terms Knows 'that'	Intellectual skill Basic rule Discriminates Understands concepts & principles	Intellectual skill Higher order rule Problem solving Applies concepts & principles to new situations	Cognitive strategy Identify subtasks Recognises unstated assumptions	Cognitive strategy Knowing the 'how' Recall simple prerequisite rules & concepts Integrates learning from different areas into a plan for solving a problem	Meta-cognitive knowledge Strategic or reflective knowledge about how to go about solving problems, cognitive tasks, to include contextual and conditional knowledge and knowledge of self	
PFR-1 Learning Tasks							
5	Privacy			DICH(9) PCM(29)	DICH(10)	PCM(30)	
4	Personal values and beliefs			DICH(7) PCM(27)	DICH(8) PCM(28)		
3	Protect patients' possessions from.		DICH(5) PCM(25)	DICH(6) PCM(26)			
2	Physical assault.		DICH(3) PCM(23)	DICH(4) PCM(24)			
1	Appropriate protection right.	DICH(1) PCM(21)	DICH(2) PCM(22)				

mHealthcare training courseware development

The screenshot shows a mobile application interface for "Patient and Family Rights (PFR) Mobile Training". At the top left is the "mHealthcare Training" logo. To the right is the tagline "User friendly innovative healthcare education". Below the logo are two buttons: "Patient and Family Rights" and "PFR Mobile Training". A horizontal navigation bar with colored dots is positioned below these buttons. The main content area features a large title "Patient and Family Rights (PFR)" in bold white font, followed by the subtitle "mHealthcare training course" in orange. To the right of the title, authorship information is listed: "Mahmoud N Bakkar, PhD scholar" and "Supervisors: Associate Prof Elspeth McKay Dr. Ferry Jie". Below this is a row of four icons with labels: "Objectives" (target icon), "Course" (book icon), "Tutorial" (gear and wrench icon), and "Feedback" (checkmark icon). At the bottom of the screen, a black footer bar contains the text "© 2014 Mahmoud Bakkar – RMIT University - School of Business IT and Logistics".

mHealthcare training courseware development

The screenshot shows a mobile application interface for "mHealthcare Training". At the top, there is a logo for "mHealthcare Training" with a stylized orange swoosh graphic. To the right of the logo, the text "User friendly innovative healthcare education" is displayed. Below the logo, there are two main buttons: "Patient and Family Rights" and "PFR Mobile Training". A horizontal navigation bar with colored dots follows. The main content area contains the text "Select the course below:" above two yellow rectangular buttons labeled "PFR 1" and "PFR 2". Below these buttons, the text "Patient and Family Rights" is repeated. On the right side of the screen, there is a photograph of a medical team consisting of a doctor, a nurse, and a patient. The doctor is in the foreground, smiling and holding a clipboard. The nurse and patient are seated behind him. At the bottom left, there is a circular navigation icon with arrows. At the bottom center, the copyright notice "© 2014 Mahmoud Bakkar – RMIT University - School of Business IT and Logistics" is visible.

mHealthcare training courseware development

User friendly innovative healthcare education

mHealthcare Training

Patient and Family Rights PFR Mobile Training

Patient and Family Right (PFR1) Tasks

- Appropriate Protection
- Physical Assault
- Patients' Possessions
- Values and Beliefs
- Patient Privacy
- Processes that support PFR



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User friendly innovative healthcare education

mHealthcare Training

Patient and Family Rights PFR Mobile Training

Patient and Family Right (PFR2) Tasks

- Appropriate Assessment
- Communication
- End of life care
- Discontinuing treatment
- Confidentiality
- Identify, protect, PFR
- Participation in the care



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Participant demographics

Qualitative study participants

Study phase	Male	Female	Doctors	Nurses	Total
Pilot study	12	18	14	16	30

Quantitative study participants

Research phases	Male	Female	Doctors	Nurses	Total
Pilot study	25	28	22	31	53
Test instrument validation study	10	10	9	11	20
Main experiment	19	21	18	22	40

Data analysis-Qualitative study

Semi-structured interviews

- Total of 30-participants from the two hospitals agreed to be interviewed.
- The interviews analysed using NVivo, each participants was given a research-code and the interviews' transcript written out using the documents' resource option in NVivo. Each 'document' was given the same participant research-code as a title.
- Two main NVivo nodes were created based on the interviews' semi-structured questions which were about:
 1. best healthcare practice; and
 2. factors that may assist improving the useability of the training application.

Data analysis-Quantitative study

Questionnaires

1. The pre- and post-test data was analysed using the 'Quest Interactive Test Analysis System' (Wu and Adams, 2007).The resulting Rasch analysis results will afford comprehensive statistical test-item and participant performance estimates, tables, maps and fit statistics.

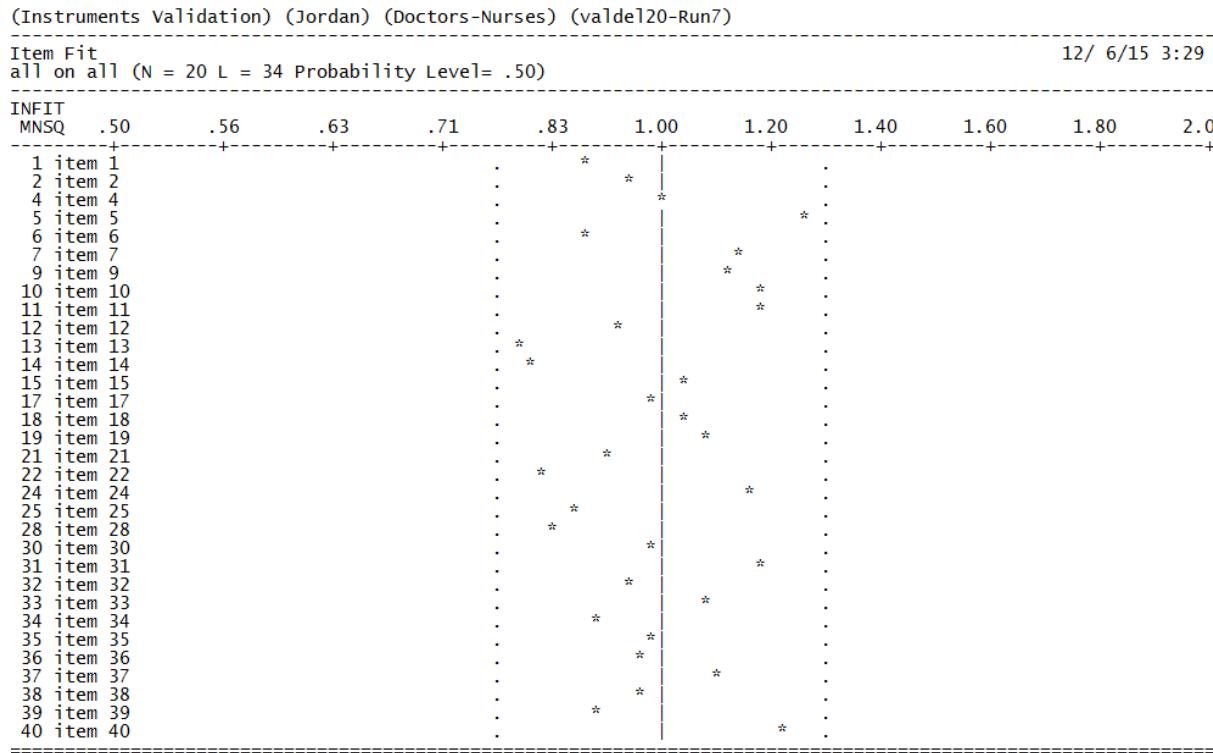
Pilot Study

- The first step in data collection was a pilot study conducted by the researcher in January-February 2015 in Jordan.
- The results from the data analysis of the data collected in the pilot study showed that some test-items were not fitting the Rasch model and that there were small knowledge-level changes in participants' post-test outcomes.
- The participants' feedback also revealed there were some test-items that were difficult to understand, saying that rewording in more simple language.
- It was also necessary to add more questions to involve a broader range of knowledge testing.
- Some test-items were changed from a long partial credit scoring design to a straight forward multiple choice format.
- Hence, it was necessary to conduct a further test instrument validation study to calibrate the new test-items.

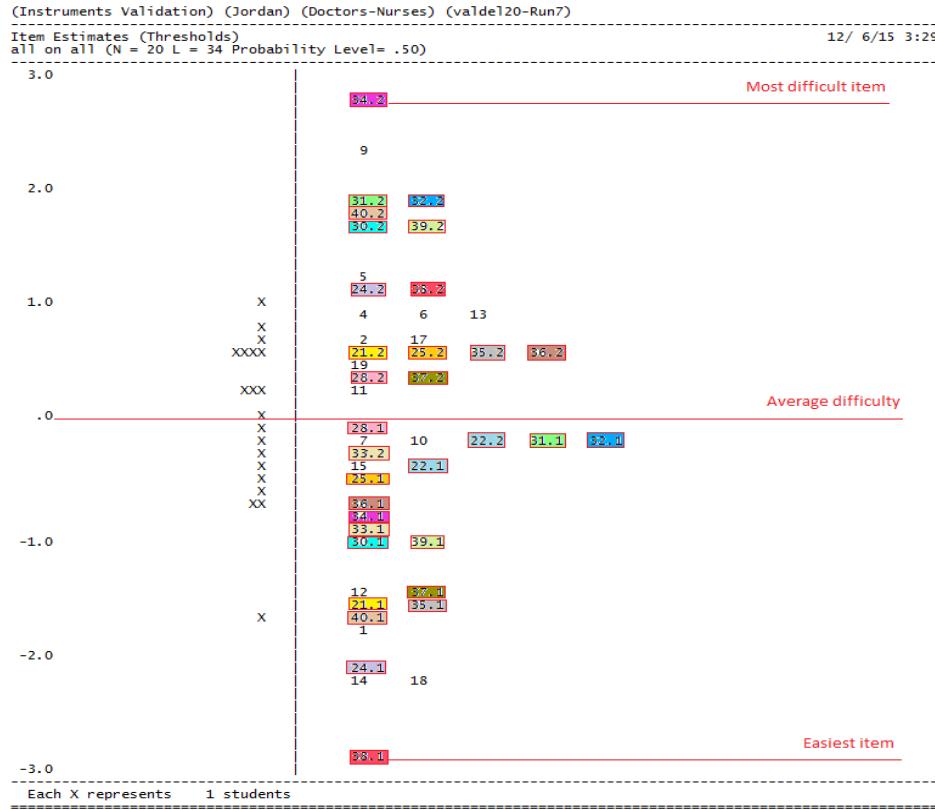
Instrument Validation Study

- ❑ The second step in data collection was a test instrument validation study conducted in May-June 2015 by the research assistants in Jordan.
- ❑ It enabled the recalibration of the assessment instrumentation. To this end, a newly designed questionnaire, which consisted of 40-test-items were administrated in two Jordanian hospitals; there were 20 participants who agreed to participate in this study.
- ❑ The validated test-items which fit the Rasch model were sorted according to the difficulty value, and then grouped into three groups of test-items: high-level items used in the post-test; middle-level items used as common items between the pre- and the post-test; and the low-level items, were used in the pre-test construct. All the validated items were used in the next research stage, the main experiment.

Test instrument validation fit map using the quest analysis



Test instrument validation variable map using the quest analysis



Main Experiment

The main experiment was conducted in two Jordanian hospitals (King Abdullah University Hospital and Marka Islamic Speciality Hospital), in July-September 2015.

Data collection in the main experiment involved three steps:

- evaluation of the participants' prior domain knowledge using the validated pre-test questionnaire;
- a training session with the mHealthcare training course. Participants were required to use the mHealthcare training application on an iPad device given to them by the research assistants in their own offices; and
- after completing the training course, the post-test questionnaire was administered.

Findings and Discussion

The first research question:

What is the best practice for designing mHealthcare training programmes in Jordan?

The findings and Discussion was approached from four perspectives:

- Performance – how can the effectiveness of a mHealthcare training application (mHTA) be measured?
- Instructional design (ID)
- the usability heuristic model
- HCI paradigms

Findings and Discussion

The second research question :

What is the optimal design-framework for establishing mHealthcare training programmes that apply such best practice in Jordan?

The author proposes that best practice for mHealthcare training application design considered by the following ID framework:

- Get started phase
- Training phase
- Evaluation phase

References

Bakkar, M. (2016), *An Investigation of Mobile Healthcare (mHealthcare) Training Design for Healthcare Employees in Jordan*, Doctor of Philosophy (PhD), Business Information Technology and Logistics, RMIT University.