Goal Question Metric as an Interdisciplinary Tool for Assessing Mobile Learning Application

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Abstract—**Assessing the mobile learning application among interdisciplinary researchers is a non-trivial task. Mandarin Learning App is a Mandarin 3D game tailor-made for students who choose PBC1033 Mandarin Language Level 1 as an elective course. It is an interdisciplinary project which it involves researchers from software engineering, computational science/mathematics and the Faculty of Language studies. In the project, the software engineer focuses on producing a quality application mostly through usability studies; the language teacher focuses on students' study performance upon using the Mandarin Learning App and the mathematician focuses on finding the statistical data dependency of collected data through the various statistical packages. Hence, we are facing issues like how to reach a consensus in working on assessing the Mandarin 3D games? How to enable the discussion among the researchers; how to consolidate the results so that we can understand? We introduce Goal Question Metric to tackle these issues. In this paper, we demonstrate how Goal Question Metric is used to form a holistic view of assessing requirements on mobile applications and guide the discussion and reach consensus in analyzing the results of the evaluation. The contribution of this paper is to introduce Goal Question Metric as an interdisciplinary tool while assessing the mobile learning application. With Goal Question Metric, we demonstrate how it can structure the assessment from a different viewpoint in a comprehensive and systematic manner; 1) better structure of the experiments, 2) able to reach consensus among researchers from different disciplines, 3) able to analyze the dependencies among various experiments and 4) able to find hidden results.**

Keywords—*Goal question metric; mobile application; evaluation; communication; interdisciplinary*

I. INTRODUCTION

Language is very important for everyone to have connection and interaction with others either in verbal or nonverbal communication. UNIMAS has offered introductory Mandarin Language courses for students who wish to explore and learn Mandarin. Among them, the PBC0033 Mandarin Language Level 1 is offered as an elective course to students who do not have any basic knowledge of Mandarin. In this course, students start to learn and recognize the Chinese character; to pronounce the character together with pinyin and to write the character with the correct stroke. Based on our informal observation, students are interested to adopt mobile applications to learn Mandarin. Hence, we developed an in-house mobile application known as "Mandarin App", under an interdisciplinary project between researchers from software engineering, language teacher and mathematician.

In the project, the software engineer focuses on producing a quality application by evaluating the system mostly through usability studies. On the other hand, the language teacher focuses on students' study performance upon using the Mandarin Learning App and the mathematician focuses on finding the statistical dependency of collected data through the various statistical packages. Hence, we are facing issues like how to reach a consensus in working on assessing the Mandarin 3D games? How to enable the discussion among the researchers? How to understand the assessing mechanism in which some are too technical (e.g., statistical analysis) and how to consolidate the results so that we can understand? Hence, we are in the dilemma to reach a consensus when conducting the evaluation of the project.

We introduce Goal Question Metric (GQM) to tackle these issues. In this paper, we demonstrate how Goal Question Metric is used to form a holistic view of assessing requirements on mobile applications and guide the discussion and reach consensus in analyzing the results of the evaluation. The contribution of this paper is to introduce GQM as an interdisciplinary tool while assessing the mobile learning application. With GQM, we demonstrate how it can structure the assessment from a different viewpoint in a comprehensive and systematic manner. Section II presents the related works in using GQM to assess a system. Section III presents how GQM is used to assess a mobile application. Section IV presents the results derived from GQM measurement guidelines. The paper is concluded in Section V.

II. RELATED WORK

GQM is used to perform usability evaluation of real-time water quality monitoring mobile applications [1] and general mobile applications [2], [3], [4], [5], [6], [7], [8], [9]. It describes the data that we need to collect and how to interpret the data [10]. The GQM consists of goal, questions, and metrics. Several metrics are identified in user experiment measurements on mobile applications [11]. They are understandability, learnability, efficiency, effectiveness, operability, attractiveness, usability compliance, happiness, engagement, adoption, retention, task success, usability, satisfaction in use, safety, social presence, cross-platform interaction, algorithm diversity, user control, usage effort, outcome-related experience, review, connection, content, internet service, service availability, ease to use, utility, long term use, productivity, generalizability, pragmatic quality, hedonic quality, stimulation, emotion, psychology metric.