mPsych: An MLearning App for Psychometrician Board Exam Reviewees

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Abstract

Learners nowadays are described as technology-savvy. Being "digital natives" accustomed to technology, students use mobile devices for learning engagement. As a supplement to classroom experience, their use of educational applications (apps) allows them to access information anytime and anywhere, thus making apps convenient instruments for both the serious and the on-the-go learners.

Educational apps are especially helpful for Philippine board exam reviewees. Typically employed, reviewees need to juggle work and study. Anchored on both the Self Determination Theory of Motivation (Deci & Ryan, 2000) and the Extended Technology Acceptance Model or TAM2 (Venkatesh & Davis, 2000), we present the ongoing project of mPsych (Mobile Psychology), an educational app to support reviewees of the Philippine psychometrician board exams. mPsych is the first locally-made app that targets these reviewees.

App Description: mPsych is a web-based or browser-based application that can be accessed and is adaptive to mobile devices. It uses gamification and contains glossaries and tests for each of the four Philippine psychometrician board exam subjects (Abnormal Psychology, Theories of Personality, Psychological Assessment and Industrial/Organizational Psychology). In Offline Mode, reviewees are presented with a set of randomized test items and choices and receive prompts for scheduled tests. Online Mode lets registered reviewees login, manage their settings and select subjects/exams based on their priority. In addition, online mode allows them to compete with one another. It includes a Reports Section (Leaderboard) highlighting top exam performers. Its mLearning Portal lets them take exams, review glossary terms, check or track scores, and manage Account Settings.

App Content Development Method: Content (item database) development followed the Theoretical Substantive Stage of the Tripartite Model of Test Construction, where items were derived from textbooks and provided by professors and instructors teaching the four required Psychology courses. App will further undergo reliability (Internal Structural) and validity (External Criterion) stages.

Keywords: *Blended learning Approach, Online Learning, Face-to-face Instructional Approach, Writing quality, Writing performance*

1. Introduction

"Formal learning" and "education" often conjure images of classroom settings characterized by teacher-student interactions. In traditional school systems, the teacher is often the main repository and primary source of knowledge and information. Due to the steady influx of digital technology, (specifically mobile technology) in the academic sector, this mental picture has been evolving. Mobile technology has become a significant force in the educational field, as learning and education are no longer processes bound by classroom walls, limited by fixed schedules nor constrained by face-to-face interactions. An exemplary model of this pedagogical transformation is the flipped classroom, which particularly appeals to modern-day digital learners due to the availability of online resources on every topic. In a flipped classroom approach, the historical style to learning is inverted (flipped) by doing homework in school under the guidance of teachers while lectures are listened to (e.g., podcasts) or watched (e.g., instructional videos) at home.

This paper's main objective is to present the development of a mobile learning app, specifically, the ongoing project mobile Psych (mPsych), for the reviewees of the Philippine psychometrician board/licensure exams.

Advantages of Educational Apps

How we manage, and experience learning is shaped by the upsurge in technology use. "Mobile learning" or M-Learning, a term first recognized in 2005 (Crompton, 2013) is "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies." (o'Malley et al., 2003). A more technocentric definition is offered by Traxler (2005), which describes M-Learning as "any educational provision where the sole or dominant technologies are handheld or palmtop devices."

Today's learners are best described as "digital natives" (Prensky, 2001). Growing up after the sweeping adoption of digital technology has made them very familiar and adept with the use of computers, mobile devices and the Internet. One example of mobile technology's influence on learning is the acceptance and proliferation of educational apps.

In what ways have mLearning apps revolutionize the learning landscape?

Foremost, mLearning apps provide a convenient way to learn, chiefly since almost everyone own at least one mobile computing device, such as smartphones and tablets (Warschauer, 2011). Because of their novelty, these apps are neither time- nor space-bound, thus making learning a click away. In addition to contributing to a more conducive app experience, they can be personalized to suit the reviewees' preferences such as setting one's own pace, level of difficulty and review schedule.

mLearning app usage supports the enhancement of learning engagement. Learners can immediately be engrossed with the information these apps provide once they are downloaded (e.g., Domingo & Garganté, 2016; Falaki et al., 2010). Fredericks, Blumenfeld and Paris (2004) and Hirsh-Pasek et al. (2015) describe three forms of learning engagement: behavioural, emotional and cognitive. mLearning apps encourage a learner's behavioural engagement through exerting effort and being persistent in app usage. At the same time, apps can stir an emotional form of learning engagement. When apps provide feedback regarding the learner's performance, this elicit affective reactions, such as pride when completing a learning module. Lastly, cognitive engagement in the use of apps come in the form of opportunities for learning investment and

thinking flexibility.

mLearning apps have become important resources for present-day learners that support purposeful learning. The use of educational apps as auxiliary sources for information enables learners to become more dedicated in accomplishing their own learning goals. Purposeful learning is maximized when learners articulate and expand on prior learning. Such learning is possible as they extract relevant information from educational apps which they couple or associate with previous information and knowledge acquired in the regular classroom.

With the innovation that mLearning apps bring to learning, how effective is their use? In a recent study by Farrah and Abu-Dawood (2018), their data suggest that most students respond positively to using applications in the teaching and learning processes. In addition, students report that they understand and learn better through using the applications. In terms of learning flexibility and portability, students perceive convenience when using the applications and other technological tools (Al-Fahad, 2009; Clarke, Keing, Lam, & McNaught, 2008; Cavus & Uzunboylu, 2009). However, for the mLearning apps to be truly effective, the role of instructors particularly in designing proper mLeaning applications, selecting approaches, and administering methods, should not be overlooked (Khaddage, Knezek & Baker, 2012).

mPsych's Theoretical Bases: SDT and TAM3

mPsych development and delivery of content were anchored on the following theories: (1) Self Determination Theory of Motivation (SDT) (Deci & Ryan, 2000; Vansteenkiste, Lens & Deci, 2006) to demonstrate the benefits of utilizing mobile devices for learning purposes and (2) Extended Technology Acceptance Model (TAM3) (Venkatesh & Bala, 2008) to determine user acceptability of mPsych.

Self-Determination Theory of Motivation. Motivation is the underlying reason for behavior. It initiates, guides and maintains goal-oriented actions. Motivation may either be extrinsic (doing something because of external sources, rewards or benefits) or intrinsic (doing something due to internal drives). SDT is a motivation theory that emphasizes an individual's drive and need for fulfilment. Self-determination is manifested when people take control of their lives, enabling them to make choices without external influences. Thus, self-determination expounds on intrinsic motivation. To become self-determined, people experience three innate psychological needs – competence (to control outcome and experience mastery), relatedness (to connect with others) and autonomy (to be causal agents of one's own life and to act in harmony with one's integrated self) – thus enabling them to pursue activities that are intrinsically motivating.
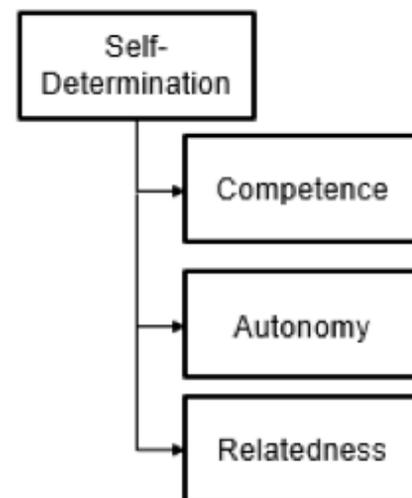

Fig 1. Self Determination Theory
(Deci and Ryan, 2000)

Extended Technology Acceptance Model. According to the Technology Acceptance Model (TAM), one's acceptance of a new technology or system is influenced by its Perceived Usefulness (PU) (the use of a certain system will improve behavior) and Perceived Ease of Use (PEU) (the degree to which the user expects the system utilization to be effortless). The extended TAM or TAM3 (Fig.3) provides reasons why users find a given system useful aside from PE and PEU (Venkatesh and Bala, 2008). This research model was tested in real-world settings of IT implementations. In TAM3, user experience is a moderating factor in PU and behavioral intentions.
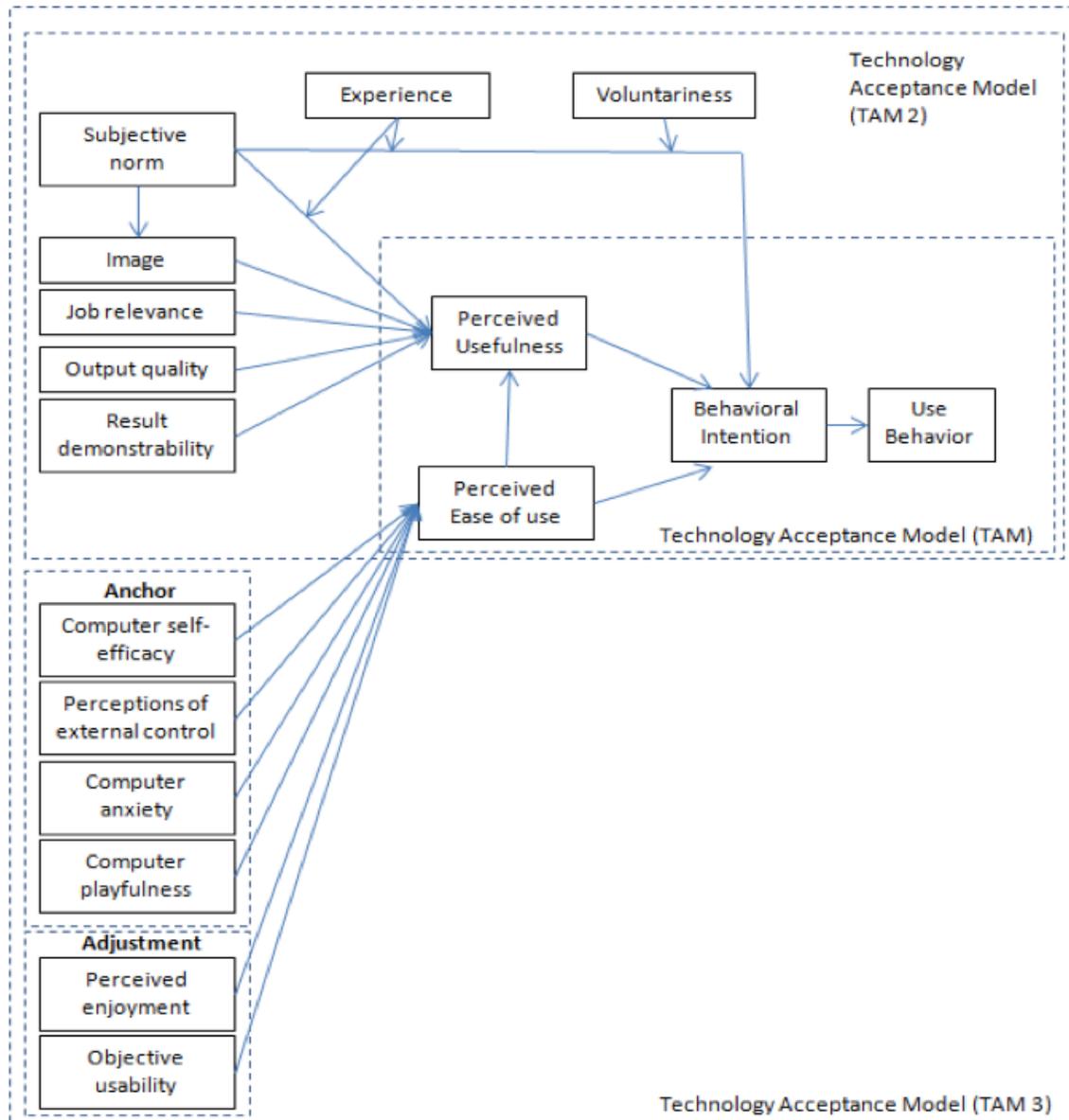

Fig 2. Extended TAM (Venkatesh and Bala, 2008) or TAM3 (Lai, 2017)

SDT, TAM3 and mPsych. Figure 3 presents the study's conceptual framework. Harboring intrinsic motivation results to deeper engagement in learning activities, better conceptual learning, and higher persistence at learning activities (Vansteenkiste, Lens & Deci, 2006). It is assumed that reviewees who are intrinsically-motivated and driven by self-determination will be the primary users of mPsych.

To encourage the acceptance and adoption of mPsych as a new learning strategy, the app's built-in functions are designed to provide ease of use for reviewees and aimed at enhancing their learning process by providing them with (1) immediate informational feedback (they will get prompts and explanations instantly for their correct and incorrect answers per item as well as view

their progress through individual tracking of scores) and a sense of achievement through optimal challenges. The app also presents them with (2) choice and volition (they will determine their own review and evaluation/test schedules, number of items to be answered in a particular span of time and courses to be reviewed, among others). Additionally, through (3) gamification, they stay connected with other reviewees (mPsych app reviewees/users can compare their scores against other mPsych app users).

Aside from being user-friendly, mPsych's acceptance and adoption will likely be influenced by its perceived usefulness among reviewees as a successful tool for learning.
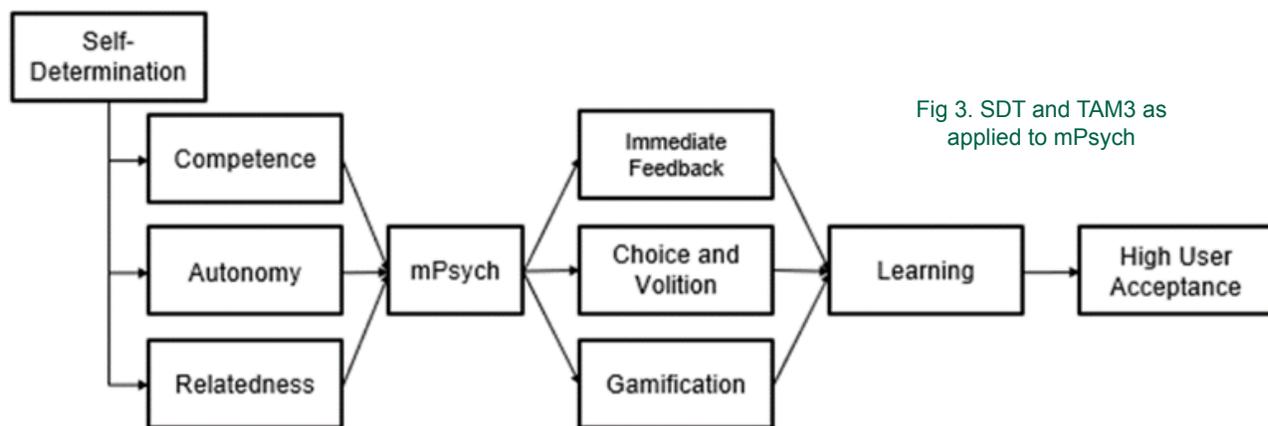

Fig 3. SDT and TAM3 as applied to mPsych

Use Case: Philippine Psychometrician Board Reviewees

The Board Licensure Examination for Psychometricians and Psychologists (BLEPP), which began in 2014, are administered by virtue of RA 10029 (Philippine Psychology Act of 2009) to regulate the practice of psychology. BLEPP is conducted by the Professional Regulatory Commission (PRC) through the Professional Regulatory Board of Psychology. Undergraduates who pass the licensure exams have

a leverage in job application, promotion eligibility and career advancement (http://psychometricpinas. blogspot.com). According to the PRC, as licensed psychometricians, they are certified to 1) administer and score lower level forms of objective and structured personality tests (non-projective tests); 2) interpret results of these tests and prepare a written report based on these tests; and 3) conduct preparatory intake interviews of clients for psychological intervention sessions (https://www.prc.gov.ph/psychology). In 2018,

out of the 8,453 examinees from 312 schools, 47.73% (n: 4,035) passed (https://www.rappler.com/bulletin-board/216367-prc-october-2018-psychometrician-board-exam).

Modes of Learning (Review): In 2014, before the first board exams were conducted, 444 graduates from 125 schools participated in an online survey for board exam reviewees (http://psychometricpinas.blogspot.com/2014/08/initial-result-of-survey-and-sign-up.html). Most of the respondents (82%) are fresh graduates (age range:18-26 years). As to their modes of learning, 20% enrolled in review centers while 2% availed of online tutorials. Self-review (66%) is the most common reported approach of preparing for the exams.

Enrolling in a review center gives the impression that reviewees have a higher chance of passing the board exams. One major benefit of review centers is that they provide ready and relevant study programs to their reviewees. Being exposed to mock exams, reviewees can familiarize themselves with the test content and format, as well as test anxiety adjustments. Lecturers not only discuss review materials and provide feedback but also dispense advice and suggestions and share their own personal experiences on test-taking techniques and exam preparations.

Recently, online tutorials are becoming a trend in education. They provide a cheaper alternative to review centers yet offer the same advantage of having prepared modules. They can also be personalized according to the reviewee's learning pace and style.

In self-review, as the term implies, reviewees study on their own, thus providing for them the flexibility they need to fit learning into their schedule. Often, they source learning materials from the Internet. Having work commitments, self-reviewees often do not have the time to take part in formal review sessions.

mPsych can fit in any of the aforesaid modes of learning, since it can augment the review process while being enrolled at a review center, participating in online tutorials and/or doing self-review. Also, mPsych may be used in conjunction with books and other learning resources.

mPsych: An mLearning App for Psychometrician Board Exam Reviewees

mPsych is designed to be a review supplement for the Philippine psychometrician board exam reviewees, regardless of their review mode. mPsych targets reviewees – fresh university graduates and young professionals - who are comfortable in using digital technology. The bulk of the reviewees tend to come from the 18-34 age group who are much more likely to be Internet and smartphone users (Pew Research Center, 2016). In addition, the Philippines, being the third largest and fastest growing smartphone market in South East Asia, has 88% of the total internet population accessed via mobile devices being dominated by individuals under the age of 34 (53% from age range 16-24: 35% from age range 25-35) (http://newsbytes.ph/2016/09/10/infographic-profile-of-smartphone-users-in-the-philippines/).

App Description. mPsych is a web-based or browser-based application that can be accessed via and is adaptive to mobile devices. It contains glossaries and tests for each of the four courses covered in the board exams for psychometricians - Abnormal Psychology, Theories of Personality, Psychological Assessment, and Industrial/Organizational Psychology. In addition, mPsych includes the course "General Psychology" to provide a common background to the four subjects. With gamification, users may be able to check their rankings based on their average test scores.

The Online Mode lets reviewees or app users take exams, review glossary terms, check or track scores individually, as well as schedule tests. They can login, manage their settings, and select subjects/exams based on priority. Gamification is incorporated in mPsych by letting registered users view their rankings and scores against all other mPsych users via the Leaderboard. Leaderboard also highlights top mPsych mock exam performers. In addition, reviewees can interact via the app's Chatbot for further inquiries regarding terms and names of prominent figures in psychology. The Offline Mode shares common features with the Online Mode, except for the Leaderboard and the Chatbot features.

App Features:
1. Online Mode: Reviewees can:
- Access mPsych via mobile browser
- Take exams with a set of randomized test items and choices
- Access Glossary (terms, concepts, names of prominent figures in psychology)
- Track individual progress via a Progress Report
- Receive prompts for scheduled tests
- Manage settings
- Access mPsych Chatbot for inquiries (terms, concepts, names prominent figures in psychology)
- View Leaderboard which displays a) current scores of all mPsych users and b) top mPsych mock exam performers

2. Offline Mode: Reviewees can:
- Access mPsych via mobile browser
- Take exams with a set of randomized test items and choices
- Access Glossary (terms, concepts, names of prominent figures in psychology)
- Track individual progress via a Progress Report
- Receive prompts for scheduled tests
- Manage settings

3. Maintenance Feature: This option enables the customization of test items and glossary content and/ or editing of the original set test items and glossary content by administrative users (from universities/ colleges) who wish to use mPsych as part of their review.

2. Method

The mPsych app development research design employs the Rapid Prototype Instructional Design (Tripp & Bichelmeyer, 1990). In this approach, the design-evaluation is a continuous cycle. Also known as the spiral cycle or layered approach, this design is described as iterative - that products are continually improved as they cycle continues. It is comprised of the following five stages (Fig 4):
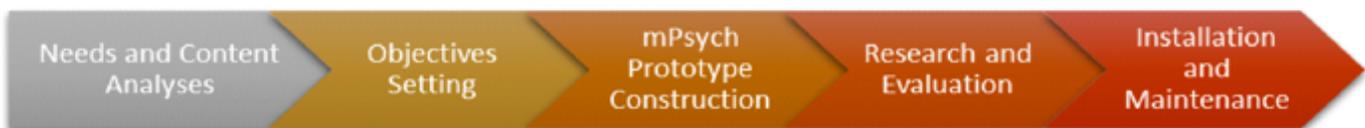

Fig 4. Stages of the Rapid Prototype Instructional Design (Tripp & Bichelmeyer, 1990)

Stage 1. Needs and content analyses: Requirements and content application are studied and explored

Stage 2. Objectives setting: mPsych will provide access to learning/review materials and tests to supplement the reviewee's mode of learning

Stage 3. Design: Prototype construction will take place through programming, debugging, and designing accurate user interface

Stage 4. Evaluation and Research: mPsych will undergo psychometric analysis via the Tripartite Model of Test Construction. User Acceptance Tests (UAT) will be conducted.

Stage 5. System installation and maintenance: mPsych will be made available for both iOS and Android mobile platform for commercial use.

3. Results and Discussion

A. Rapid Prototototype Instructional Design Stages

Stage 1. Needs and content analyses: Data from Ramos, Ferrer-Cheng and de Castro (2015) provided the initial analysis. The feasibility for the app development was based on the preferences of 811 Filipino college students and graduates (age range: 15-24 years; mean age: 17 years 11 months; female: 58.20%) regarding the use of mobile technology. Two main findings became the basis for needs and content analysis, which are a) Device Ownership and Internet Accessibility and b) Functions of the Applications Installed.

Regarding device ownership, most of the respondents' own or use multiple mobile devices, with 85.70% owning smartphones, implying that most of the target reviewees will be able to access mobile apps. For Internet accessibility, the prepaid phone line is preferred by majority of the respondents (73.9%), where credit is purchased in advanced before services can be used. Extremely cheap mobile cards (or SIM cards) are available in the Philippines that can go as low as P10.00 (0.18 USD or 0.16 Euros). Based on this information, mPsych will have an Offline Mode.

In terms of the functions of the apps installed in the devices, respondents rely on their mobile devices for accessing Learning References (e.g., Coursera, Wikipedia) (74.30%), which is also the main function of mPsych.

Stage 2. Objectives setting: As previously mentioned, the basis for mPsych's Content Delivery is the BLEPP. Like the board exams, test items of the app will be in multiple-choice format.

mPsych is a measure of maximal performance. Reviewees are encouraged to answer questions as well as they possibly can. As a test of maximal performance, mPsych checks for achievement or mastery of concepts and terms. It is criterion-based which requires 75% passing rate for each mPsych test. This passing rate is based on Section 18 of RA 10029 (Ratings in the Examination), which states that "a successful (Italics by authors) candidate must have obtained a weighted general average of at least seventy-five percent (75%) for all subjects, with no grade lower than sixty percent (60%) in any given subject.".

Stage 3. Design (mPsych System Architectural Design and User Interface): Regardless of the device in use (mobile or desktop), the web application is accessed via the mLearning portal (Fig. 5). An Administrator Portal (Admin Dashboard) is designated to allow maintenance of the mPsych modules, particularly the glossary and the test content or items. It will also keep track of the progress of reviewees in terms of scores garnered in the

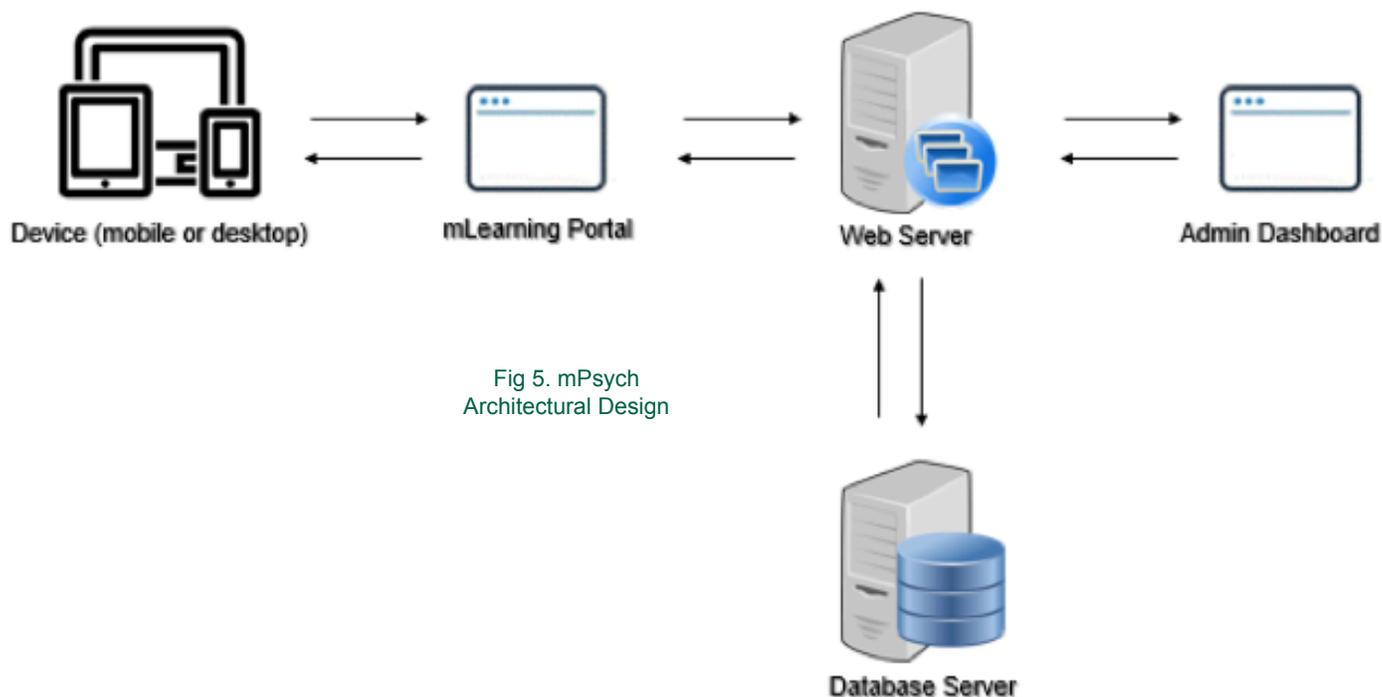tests. The Database Server will contain all data from the reviewees.

Fig 5. mPsych
Architectural Design

B. Features and Functionalities

1. Register: Opens an account by filling out pertinent details (e.g., email address, college attended) and Email Login (accepts user inputs for authentication and access)

2. Home, Menu, and Settings: Allows for personalization (e.g., time of tests, subjects to be reviewed) and Notification settings (e.g., test-taking reminders)

3. Glossary: Provides a database of terms filed under each of the mPsych tests

4. Tests: A set of randomized test items and choices which provides immediate feedback
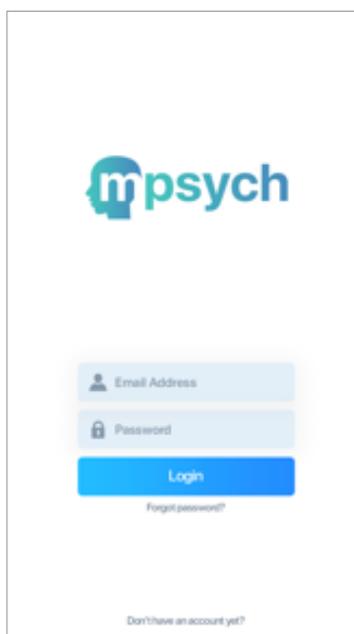

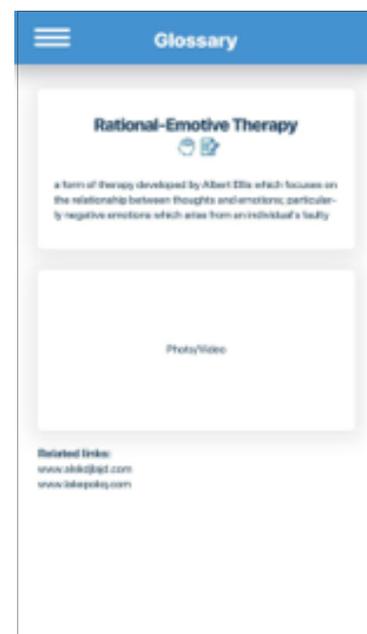Fig. 6 Registering for mPsych

Fig 7. Sample Glossary

5. Progress Report: Shows visual representations to track progress

Fig. 8. Progress Report

6. Chatbot: Online feature that acts like an interactive glossary

7. Maintenance Module: Full content customization

General Discussion

mPsych aims to effectively facilitate the review process of intrinsically-motivated app users. Thus, the need for competence, autonomy, and relatedness, which comprise self-determination, were taken into account in designing the features and functionalities of mPsych. Recognizing the importance of app validation and testing, TAM3 will be used as a guide in mPsych's UATs. Factors purported to influence PU and PEU will be considered in determining whether mPsych will ultimately be utilized by its target users, which are the psychometrician board reviewees.

Privacy. In compliance with the Data Privacy Act of 2012, the application server (mLearning server) is a public subnet while the Database Server is a private subnet. Furthermore, the application will require a username and password to be set before the reviewee can use the application. Reviewee will also have the option to have an application passcode.

Limitations. In general, there are restrictions when it comes to mobile phone (and app) learning. From a psychological/behavioural perspective, (learning) habits tend to be ingrained, and therefore, take time to change. Despite the availability of mLearning resources, learners still opt to buy books and enrol in traditional learning centers. Pedagogically, the mLearning environment lacks a firm framework, which tends to encourage laziness (Wang & Higgins, 2006). Since the learner can use the app anytime and anywhere, this leads to the absence of a learning atmosphere that is characteristic of the traditional face-to-face learning format. Also, the mLearning set-up can be less efficient, since students need more time to devote to learning, and it lacks interpersonal and direct interactions with teachers (Bouhnik & Marcus, 2006). A major technical issue which can dampen the motivation to take advantage of mLearning is the slow and unreliable Internet connectivity in the Philippines (average Internet speed: 2.8 Mbps), placing the country at rank 104 out of 160 countries (Agan Salac & Seon Kim, 2016). Given its speed, Internet cost in the country is relatively high. In 2016, it was estimated that the monthly cost for high-internet speed is approximately at 3,000 PHP (57 USD/50 Euros) (https://www.forbes.com/sites/ralphjennings/2016/02/23/meet-asias-internet-laggard-the-philippines/).

As for mPsych, this app is not intended to be a "stand-alone" review method for aspiring psychometricians. Rather, it is designed to supplement materials from review centers, online courses and self-review. Unlike review centers and online courses, mPsych does not have a fixed learning module. Instead, items are presented randomly to the reviewee. Lastly, as of this writing, no studies have yet been conducted to determine the effectiveness of mPsych.

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Future Research Directions. Research plans for mPsych include the: a) establishment of psychometric properties (reliability and validity). Tests in each of the four subjects will undergo the Tripartite Model of Test Construction (Millon, Millon, Davis, & Grossman, 2008), which includes the processes of theory-based item generation, establishing internal consistency and construct validation; and, b) evaluation of the effectiveness of mPsych as an adjunct to traditional review modes.

4. Acknowledgements

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