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ARTICLE

New paradigms for psychiatry education: An evaluation of a blended teaching and smartphone application model

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New paradigms for psychiatry education: An evaluation of a blended teaching and smartphone application model

ABSTRACT

Over the last decade, there have been substantial improvements in Web-based Internet technologies, particularly with an increased development in smartphone technologies. Educators have tapped into the various advances in technology, by incorporating the use of the Internet as a medium for various modalities of teaching. In psychiatry, the application of up-to-date technology has so far been limited to the evaluation of online learning. The usefulness of newer smartphone technologies as another modality to augment and fulfill educational needs has yet to be explored widely (Weninger et al., 2009). Our main research objectives were to: (a) highlight the developmental process of a blended learning model that incorporated both traditional teaching methods alongside advances in Web-based and smartphone technologies; (b) determine whether students in our university would be receptive towards this blended educational model; (c) determine the students' perspectives towards this new blended educational model for psychiatry. Both the online portal and web-based application were launched in July 2012, and the usage data together with initial perspectives were obtained. The native application was then developed from August 2013 onwards. After their end-of-posting psychiatry clinical examination, students were recruited to complete a survey questionnaire, which incorporated their perspectives of the application. The online portal, web-based application and native smartphone application were well-received, with high utilization rates. 57.1% of students concurred that having a smartphone application in psychiatry was helpful in augmenting learning needs. Quantitative analysis was conducted using a focus group method and the results highlighted how integrating technology into formal learning can transform the learning experience of students in psychiatry in a positive manner. This study is an initial study that has demonstrated how a blended education model for Psychiatry, with the incorporation of the latest advances in both the Internet and smartphone technologies has enabled students' learning. It is hoped that there will be more clinicians who are willing to incorporate technology in their course delivery and conduct further studies to evaluate changes in satisfaction scores as well as objective improvement in clinical skills

INTRODUCTION

Over the last decade, there have been substantial improvements in Web-based Internet technologies as well as smartphone technologies. Educators have tapped on to the various advances in technology, by incorporating the use of the Internet as a medium for various modalities of teaching (Sadeghi et al, 2014). Previous research comparing conventional classroom teaching with a blended model of both e-learning and lecture methods, revealed results suggesting that the blended methodology was highly effective with regards to enhancing the student's learning efficacy (ibid.). It was also highlighted that the use of e-learning for certain modules in University education showed a link to economic advantages (ibid.). Apart from enabling the development of e-learning, there had been greater advances in smartphone technologies. Smartphone technology is a new generation of mobile technology equipped with immense computing capabilities. This technology allows individuals to access the Internet at all times (Hamid & Kavit, 2011). In addition, the built-in applications, as well as the applications available on the application store would allow further added capabilities to the smartphone (Payne et al., 2012).

Various studies conducted previously have looked at medical students and trainee-doctors' ownership and perspectives towards smartphone usage. In Payne's (2012) study conducted in the United Kingdom, a total of 257 medical students and 131 junior doctors were surveyed. The results demonstrated that there was a high ownership rate of smartphones in the surveyed cohort, with both students and trainee doctors displaying the tendency to use medical applications on average 20 to 30 minutes per day. It was noted that the most frequently used applications consisted of disease diagnosis, management and drug reference applications. Robinson et al. (2013) investigated the usage of a smartphone as an educational aid from clinical medical students' perspective. A total of 361 participants took part in the study, and it was found that the vast majority of students were receptive towards the concept of using smartphones as a future educational aid. It was the accumulation of these positive findings that had led to the widespread implementation and utilization of smartphones as an adjunctive educational tool in medicine and surgery (Hawkes et al., 2013; Hassani et al., 2013; Al-Hadithy & Ghosh, 2013; Al-Hadithy et al., 2012). Due to the rising popularity in smartphone applications being used in the medical world recently, it could no longer be considered a new discovery. Some disciplines such as Pediatrics (Hawkes et al., 2013) have started to use smartphone technologies to educate doctors on neonatal intubation techniques. Other disciplines such as Ophthalmology (Hassani et al., 2013) have identified technological related applications that are of educational value and clinical utility. This is the case as well for Plastic Surgery (Al-Hadithy & Ghosh, 2013) and Orthopedics (Al-Hadithy et al., 2012). The situation is however quite different in Psychiatry education.

Traditionally, psychiatry is taught largely using standardized instructional materials, alongside live bedside interviews with patients in order to demonstrate to medical students the way to elicit relevant clinical signs and symptoms. As psychiatry is a specialty that interfaces between art and science, there is a variety of important soft

skills such as communication skills that is still taught by means of modeling and live supervision. However, it is inevitable that the educational curriculum needs to tap on advances in technologies. A pilot study conducted back in 2006 by Hilty et al. (2006), looked at user perceptions of technology in psychiatry. Hilty et al. (2006) established that medical students together with the residents felt that technology skills were integral and they indicated a preference towards the use of personal digital assistants. It was believed then that these tools could provide them with immediate access to information that they were seeking (Hilty et al., 2006). More recently, a feasibility study demonstrated that a child psychiatry module could be similarly imparted via an online platform at the University of Ulm (Weninger et al., 2009). Other recent studies have demonstrated the educational benefits of online, blended learning materials in psychiatry for medical students and trainees (Chur-Hansen et al., 2012). The use of smartphone technologies in certain medical specialties was mentioned above. However, in the field of psychiatry, the application of advances in technologies is still limited. A search conducted on the existing published literature using the keywords "psychiatry, blended learning, smartphone, education" did not yield any published papers to date that has looked at a blended learning model incorporating traditional teaching methodologies alongside the Internet and smartphone technologies as adjunctive tools for teaching.

With this in mind, and taking into consideration the gap in knowledge with regards to the published literature, the authors applied a developmental process to build a blended educational model for local medical students enrolled in undergraduate psychiatry education. Our research objectives were as follows:

(a) to highlight the developmental process of a blended learning model that incorporated both traditional teaching methods along with advances in technologies;

(b) to determine whether local undergraduate students would be receptive towards this blended educational model; and

(c) to determine students' perspectives towards this new blended educational model for psychiatry.

METHODOLOGY

The Mastering Psychiatry E-Learning Online Portal and Smartphone Application (Web-based and Native Application)

The authors of this manuscript wrote a localized psychiatry textbook for undergraduates in 2012. The textbook comprised of topics that were essential concepts that local medical students in psychiatry need to grasp over the 6-week posting duration. The core topics included basic sciences, clinical psychiatry and psycho-pharmacology. For the online learning portal, apart from the provision of written content from the textbook, other features such as videos were uploaded online to allow students to learn and model how

psychiatrists elicit core clinical symptoms. In addition, there was also the integration of an interactive multiple-choice questionnaire survey that allowed students to consolidate and test their understanding of key concepts taught in each chapter on the online portal.

For the web-based and native smartphone application, the contents were largely similar to the online portal, except that the smartphone application has a 'search' functionality, thus enabling students to gain rapid access to key information instantly in their respective teaching clinics or by the bedside. In addition, the smartphone application has a live event management system built-in functionality as well. This feature allows students to schedule their tutorials with their tutors and be reminded of the date, timing and location of their scheduled tutorials via messaging services. The features of the application are as shown in Figure 1.

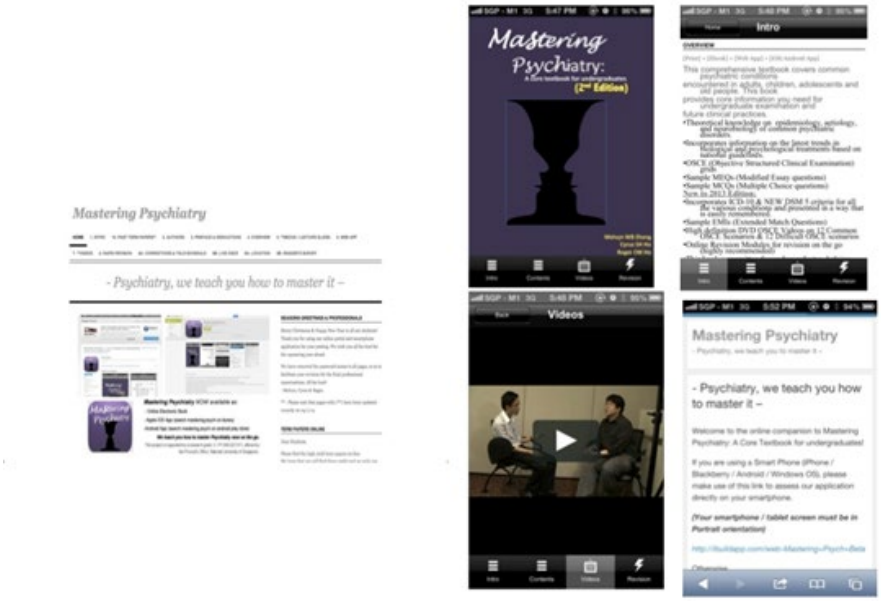

Figure 1: The Online E-learning portal and the Smartphone Application Interfaces

After the formulation process, the initial developmental process was undertaken by the main author, MWBZ. The online portal was built using a web portal designer that utilized a graphic user interface. An electronic copy of the textbook was hosted online to allow students to make use of the interactive features of the portal by scrolling through the pages of the textbook. Videos were uploaded and stored onto an online video storage service, then were made accessible via embedding functionality on the online e-learning portal. The questionnaire was programmed using an online database management server

in a way that would provide students with immediate feedback about their scores after the completion of the questionnaire. The web-based smartphone application was built by the main author MWBZ using a commonly used mobile application programming application 'JQuery' and hosted online for students to access. The initial developmental process took approximately 1 year from 2012 to the start of 2013.

In 2013, in view of the success of the pilot of the online portal and the web-based smartphone application, the authors jointly secured an educational grant. A native application version was developed and launched in October and November 2013 on both the Apple IOS and Android Play store.

Information regarding the deployment of the online e-learning website as well as learning how to use the application were provided to all students on their first day of psychiatry clinical posting. The students were given a ten-minute demonstration on how to use the features of the online e-learning portal as well as the native application by two of the authors.

Upon obtaining ethics approval from the National University of Singapore's ethics board, a user perspective survey was administered to the students after the completion of their end of posting clinical assessment. Participation in the survey was entirely voluntary and relevant participation information handouts were provided to all participants prior to the start of the survey. The questionnaire mainly focused on students' receptiveness towards smartphone technologies in psychiatry education, and whether particular aspects explored core content that might have enhanced their education.

Apart from providing questionnaires, a focus group was conducted in order to elicit qualitative data from students about their perspectives towards this blended educational model. The focus group also helped determine which aspects of this blended educational model facilitated their learning. The following questions were asked:

1. Did the Mastering Psychiatry application and website improve learning outcomes in psychiatry and enrich your (the student) learning experience?

2. Is there evidence that you (the student) have benefited in learning by using this application beyond having easier access; and has this intervention changed your learning in the future?

3. Do you have any feedback or comments about the online portal and smartphone applications that could help enhance the learning process further?

4. Can you (the student) describe how Mastering Psychiatry and its online platform might benefit you in terms of the way you acquire the needed knowledge in psychiatry?

A thematic analysis was then conducted based on the qualitative feedback from the students.

RESULTS

The online learning portal and the web-based application were both deployed and launched on the 15th of July 2012. For the entire year of 2012, there was a cumulative count of 2,791 views with a total of 46 visitors to the site. For the year 2013, there was a cumulative count of 7,429 views with a total of 2,586 visitors to the site. The number of views and visitors to the site continued to rise significantly, and in the year of 2014, 18,512 views with a total of 7,251 visitors to the site was achieved. The majority of visitors were from Singapore, with the other 3 leading countries being the United States of America, Malaysia, and India. Figures 1 to 3 provide an overview of the utilization of the online portal amongst the local cohort of 300 medical students.

Figure 2: Total number of views and total number of unique visitors to the site for year 2012

Figure 3: Total number of views and total number of unique visitors to the site for year 2013

Figure 4: Total number of views and total number of unique visitors to the site for year 2014

Looking at the utilization of the electronic and digital version of the textbook materials, there has been a total of 759, 935 and 1,902 views of the interactive electronic textbook for the years of 2012, 2013 and 2014 respectively. Since the introduction of the online video portal, there has been a total of 108,207 independent views to date. Figure 2 shows the average number of views per month between July 2013 and January 2014. A total of 346 participants completed the online assessment questionnaire that was incorporated into the website.

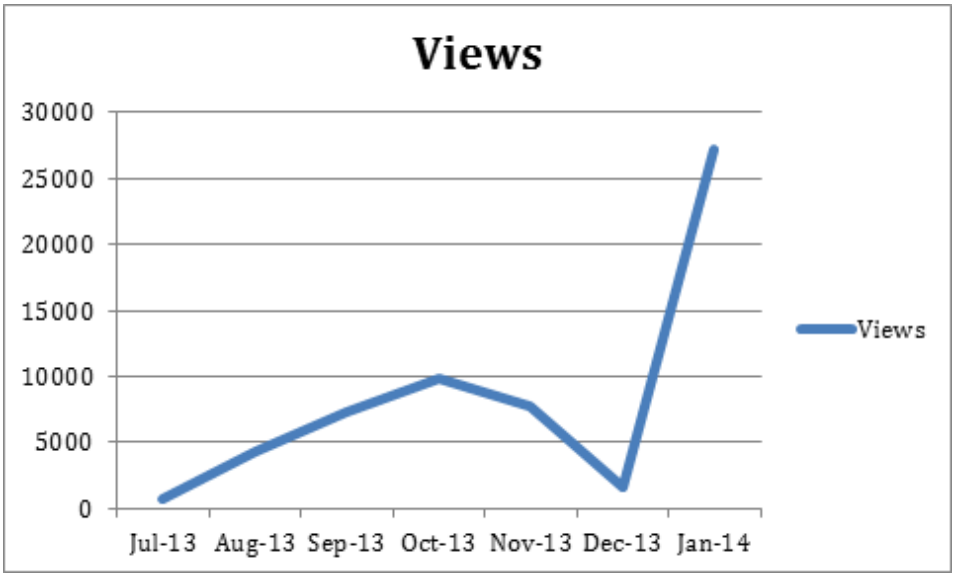

Figure 5: Line-graph showing the average cumulative number of views of the online videos per month.

Since the establishment of the web-based smartphone application, a total of 722 users have used the mobile web-based application. An impressive number of 2200 and 5000 users have downloaded the native Apple IOS and Android application from the respective application stores.

With regards to the perspective survey, a total of 185 students volunteered and completed the questionnaire form accordingly. The survey measured students' perception towards both the web-based and the smartphone applications as adjunct to conventional traditional teaching methods and online teaching methods. Every year, there are 300 medical students rotating through psychiatry posting, and our data showed that approximately 61.7% of the students participated in the survey. The majority of the students (79.2%) were around the age of 22 years old. The gender distribution for completing the survey was fairly equal, with, 54.1%males and 45.9% females taking part. More than half of the students (66.7%) owned an Apple IOS device, whereas the remaining 21.6% owned an Android device. The authors also established that at baseline, most students owned approximately 1 to 5 medically related applications on their phones. The demographic information of the sample population is reflected in Figures 6-8.

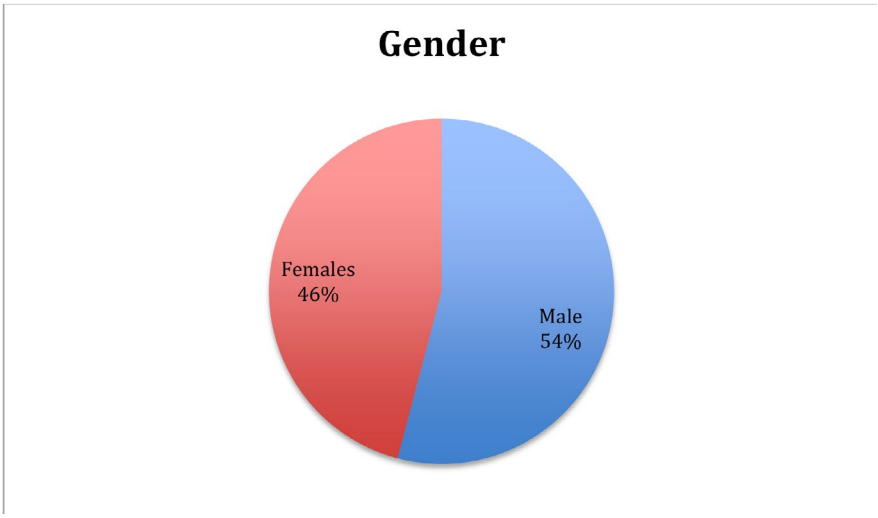

Figure 6. Baseline demographic information on Gender

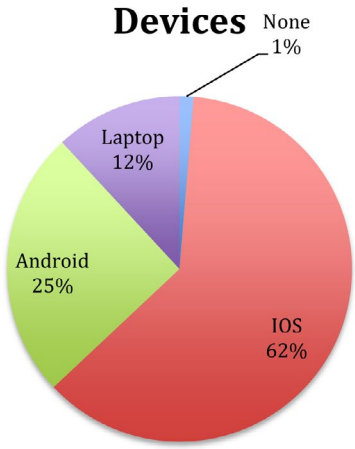

Figure 7. Baseline demographic information on Devices

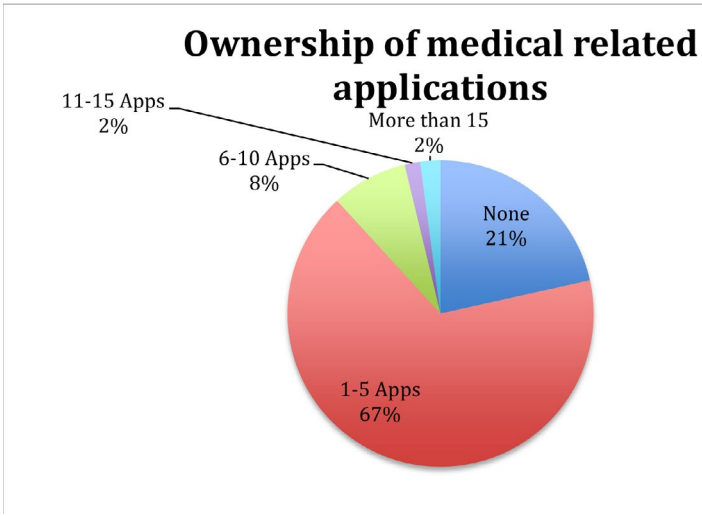

Figure 8. Baseline demographic information on Ownership of medical-related applications

Further analysis of the quantitative results showed that overall, 57.1% of the students agreed that having a smartphone application with psychiatry-related resources was very helpful. In addition, 71.4% of the students reported that a smartphone application was a good alternative to using a traditional textbook. The vast majority of students also felt that having textbook contents, clinical videos and an event management system for tutorial management on the smartphone application would be great tools to help enhance their learning of psychiatry.

Perspectives			Percentage
Usefulness of Smartphone application for Psychiatry	1.	Very useful	10.33%
	2.	Useful	46.74%
	3.	Of some use	39.67%
	4.	Useless	2.72%
	5.	Absolutely useless	0.54%
Smartphone as a companion to book / traditional teaching models	1.	Very useful	20.54%
	2.	Useful	50.81%
	3.	Of some use	20.54%
	4.	Useless	5.95%
	5.	Absolutely useless	2.16%
Usefulness of textbook contents in application	1.	Very useful	19.46%
	2.	Useful	45.41%
	3.	Of some use	28.65%
	4.	Useless	4.32%
	5.	Absolutely useless	2.16%
Usefulness of videos in application	1.	Very useful	22.99%
	2.	Useful	43.32%
	3.	Of some use	26.20%
	4.	Useless	6.42%
	5.	Absolutely useless	1.07%
Usefulness of event management system in application	1.	Very useful	27.42%
	2.	Useful	38.17%
	3.	Of some use	26.88%
	4.	Useless	5.38%
	5.	Absolutely useless	2.15%

Table 1. Quantitative results from the questionnaire

The usefulness of the online portal and smartphone application would be described in the results obtained from the focus group discussion conducted. Five students (n= 5) took part in the focus group. The reason for the small focus group sample size was that students found it difficult to find time to return for the focus group session due to the structure of their medical curriculum and short psychiatry clinical posting duration. Qualitative feedback obtained from the focus group is summarized as follows in Table 2.

Facilitation in acquiring the needed knowledge in psychiatry	"**The Mastering Psychiatry application was useful** as the content was comprehensive and covered the core "must know and must see" conditions in Psychiatry thoroughly whilst providing an adequate introduction to lesser commonly encountered but nonetheless relevant conditions. A shortcoming of some of the textbooks was that core conditions were sufficiently elaborated but lacked information on other miscellaneous conditions seen in clinical practice. The **one-stop online accessibility** enabled one to read up without having to cross-reference several other textbooks, which is a cumbersome process" "The website has an **update column** which I find useful in helping users to keep up to date with the changes made in the textbook and the application" "Putting the contents in the form of e-book also enabled us to search for the contents we want easily, thus making it **more efficient for our learning**, and we are able to identify the more important areas to focus on. This platform is usable with such ease that I would be able to revise my psychiatry contents without any issues when I feel that I am deficient in skills or knowledge in the field of psychiatry."
Enriched learning	"Furthermore, the **multimedia dimension of the application** /website helped me to learn signs and soft skills virtually without being by the bedside. For example, some of the signs in Psychiatry are difficult to describe in words but become apparent and easily understandable once observed (either during a live interview or video content, which the application provides)." "Debilitating psychiatric illness may be a sensitive issue for patients and they may be uncomfortable with a crowd of students observing them; hence bedside tutorials on such conditions may be hard to come by. **The virtual platform with filmed interviews with patients will allow all students to have equal learning opportunity**." "Soft skills such as empathy and interviewing etiquette are better learnt by witnessing, and the **video demonstration provided by the app/website is therefore useful**." "I found the availability of **online MCQ questions very useful**. It provided me with a way to practice these questions using pockets of time while on the move. Other than convenience, these questions also helped me to **consolidate my learning** and identify any gaps that I may have." "Overall, **Mastering psychiatry and its online platform have benefited the student population greatly**, and made learning psychiatry much easier than what I have initially thought it would be." "The application and website, being **portable** in clinics and on the wards, allowed **immediate access to information**." "Collaboratively edited by clinical tutors, Mastering Psychiatry and its online platform had **structured learning** in a logical manner and included comprehensive contents for exams and future clinical practice. The online nature of the application also allows for **constant updates** with the latest developments in psychiatric practice, hence making one feel confident using it as a reference in the future without worries that its contents have become obsolete or irrelevant to current practice" "The platform propels us to use **accurate sources of information**, with validated information, instead of using search engines to search for explanations"

Table 2. Qualitative feedback from the focus group discussion

DISCUSSION

Based on our current knowledge, this development is perhaps one of the first few studies to formally evaluate a blended educational model for psychiatry that has incorporated the latest advances in both Internet and smartphone technologies. The utilization results and user perspectives obtained from the current study has shown that the cohort of Singaporean students are amenable towards trying out new modalities of learning, such as online learning in combination with a smartphone application. The perspective survey as explained above has highlighted the importance a smartphone application has as a valuable educational tool in a blended educational or learning model. More than half (57.1%) of the students have indicated that having a smartphone application would be beneficial and a significant percentage (71.4%) has also reported that a smartphone application is in fact, a good companion to traditional textbooks.

We hypothesize that the positive results obtained from the study stemmed from the way medical education is being structured. Till today, medical education, especially during the clinical years, expects students to spend most of their time on the ward or in clinics, whereby the learning of the core clinical skills is taught by junior and senior doctors. This type of learning can often prove to be inconsistent, as there are many factors such as time constraints and different teaching methods that could affect the learning or teaching quality. Hence, a developed blended model like the online e-portal modules and online videos would be highly efficacious, as students are able to access the information required at any convenient time, and the information provided is of the same quality. However, it is important to note that the findings pertaining to students' perception of smartphone applications to be useful for education is not a new finding. A recent study conducted by Waldmamm and Weckbecker (2013) highlighted that students would prefer to have access to the guidelines on a smartphone instead of having hard copies. The deployment of guidelines on smartphones also encourages students to use the guidelines more frequently (ibid.). The positive feedback that our students have towards our online video vault is in keeping with the previous findings from Kohgali et al. (2011) and Roshier et al (2011). In the former, it was found that 96% of the students at the University of Dundee rated e-learning resources introduced to their cardiology curriculum as valuable. In the latter study, veterinary students from the University of Nottingham perceived online videos as being able to enhance teaching due to the accessibility.

The main strength of this current study is that we managed to not only determine the positive reception of such a new blended educational model, but we were also able to successfully show that there was a preference leaning towards newer modalities of technology use. Our current study has empowered students to make use of technology to enrich their learning. In addition, the initial results also demonstrate the feasibility of adopting this methodology for other educational needs in psychiatry in the future. Nevertheless, there are several limitations in our study. Our sample size for the user perspective survey was small and only comprised of an Asian cohort of students. Our focus group sample size was also small, with only 5 students out of a total cohort size

of 300 participating medical students. The reason for the small focus group sample size was that students found it difficult to find time to return for the focus group session due to the structure of their medical curriculum and short psychiatry clinical posting duration. Very often, students are posted to other medical or surgical disciplines such as Emergency Medicine or Obstetrics which would require them to either work on shifts or participate in procedures in the operating theatre. Given the above limitations, it was only viable for the authors to obtain focused quantitative data from students who were posted to the National University Hospital for their electives from the month of January 2014 onwards. In addition, we also acknowledge that our current user perspective questionnaire is not comprehensive enough to evaluate the full efficacy of a blended educational model in terms of demonstrating its effectiveness in transforming learning. Another limitation was that even though we had a high number of views on our portal, we were unable to track the amount of time each individual spent on the website as well as the number of views made by each individual due to privacy and personal data protection issues. The authors were unable to compare the effectiveness of such an intervention between a group with access to the online portal and a group who did not have any access as all new students were granted equal access to the portal and the application. Moreover, most of our students owned either a computer or smartphone, hence randomization was not feasible.

CONCLUSION

This study is an initial study that has demonstrated how a blended education model for Psychiatry, with the incorporation of the latest advances in both the Internet and smartphone technologies has enabled students' learning. The results shown from the perspective survey and focus group have demonstrated a positive reaction towards the use and development of the blended use of an online e-portal and applications in specific relation to Psychiatry. It is hoped that more clinicians will be willing to consider using the above methodologies and conduct further studies to evaluate changes in satisfaction scores as well as objective improvement in clinical skills. Our methods will most definitely apply in future research involving the use of technology in the field of medical education. We are also confident that our development of a blended online and smartphone application educational model will set the pace for greater technology-aided innovation not only in undergraduate education, but also in postgraduate medical education.

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