

# Mobile Applications at the Dentist

Teh Adilla Mustaza<sup>1\*</sup>, Tong Wah Lim<sup>2</sup> and Siti Mariam Ab. Ghani<sup>3</sup>

Centre for Restorative Dentistry Studies, Faculty of Dentistry,  
Universiti Teknologi MARA  
40450 Shah Alam, Selangor, Malaysia.

<sup>1</sup>tehadilla@salam.uitm.edu.my

<sup>2</sup>limtongwah@salam.uitm.edu.my

<sup>3</sup>sitimariam783@salam.uitm.edu.my

\*Corresponding Author

## ABSTRACT

*Utilization of Apps in the dental clinics for dental education in Malaysia is currently lacking, and serious transformation is needed to modernize dentistry to empower the dental community in this technological advanced era. The purpose of this study is to develop related Apps that are beneficial to be used in the dental clinics mainly for educational purposes, and to evaluate dental students' perception towards the usage of these Apps in the dental clinic. Two kinds of Apps were being developed; Apps for patients' dental education in an interactive educational game layout, and Apps for conducting oral health related quality of life survey. Subsequently, an online survey form was then used to gather undergraduate dental students' perception on using these Apps in the dental clinic. The developed Apps were successfully made available in the online market. 114 clinical year dental students of the Faculty of Dentistry Universiti Teknologi MARA participated in this study. The students' perceptions on the usage of these Apps were found to be positive. 67.5% of the students agreed that these Apps are useful in the dental clinic, 66.7% think that these Apps are beneficial to be downloaded and 68.4% will use these Apps if it is made available freely in the clinic. The willingness of most respondents to use these Apps made it a valuable tool for measuring the quality of dental health information and services being given to the community in a more robust and systematic way.*

**Keywords:** *Dental mobile application, dental student perception, patient education*

## INTRODUCTION

Mobile Applications (Apps) currently provide nine thousand softwares related to medicine and fifteen thousand softwares for wellness (Marceglia et al., 2012). However, utilization of Apps in the dental clinics for dental education in Malaysia is currently lacking. In the dental education field, most educational development is being focused for the students. Another important client in dental education; the general public, is always being forgotten and undermined by the professional dental education bodies leading to exploitation of information by manufacturing companies and opportunists that may lead to misleading information. Nowadays, the public have access to loads of information and misinformation about treatment options, materials, and alternatives (Logan, 1997). The Internet is considered to be a significant source of health information for the general public (McMullan, 2006) with more than 70,000 websites providing health information (Grandinetti, 2000).

Other current niche in dental public health apart from public dental education is the impact of dental treatment to the quality of life of the individual patients and general public. The most widely used tool to assess quality of life related to oral health is by using the Oral Health Impact Profile (OHIP) survey, which is globally accepted, validated and verified by the World Health Organization (WHO, 2011). OHIP was developed to gain accurate measure of self-reported dysfunction, discomfort and disability related to oral condition (Slade, 1997). Therefore, OHIP act as an adjuvant to conventional oral epidemiological indicators for clinical disease. Slade (1997) also explained that OHIP is focused on impairment and three functional status dimensions (social, psychological and physical), that account for four out of seven qualities of life dimensions proposed by Patrick and Bergner (1990). Moreover, OHIP aims to capture impacts that are related to oral conditions in general, not specific to certain disorders or syndromes (Slade, 1997).

Currently, there are limited Apps for patients' dental education available in the market. Therefore, the aims of this study are to describe the development of related Apps that are beneficial to be used in the dental clinics mainly for patient educational purposes and OHIP Apps, and to obtain the undergraduate students' perception towards the usage of these Apps in the dental clinics.

## **MATERIALS AND METHODS**

### **Mobile Application Development**

Two types of Mobile Apps were being developed; App for patients' dental education in an interactive educational game layout, and App for conducting oral health related quality of life survey.

App for patients' dental education was developed using App Makr (<http://machine.infinitemonkeys.mobi> – AppMakr c/o Infinite Monkeys, New Jersey, United States of America). This interactive educational App was made to educate patients regarding the most appropriate choice of dental treatment option and provide a peer reviewed validated information regarding the treatment choices to the patients and general public. This App was then, made to be downloaded freely from the App Maker Market Place (<http://apps.appmakr.com>).

The App for conducting oral health related quality of life survey include an offline survey and data collection App; Quicktap Survey, which was used to develop the OHIP survey; Malay language shortened OHIP with 14-items (Malay S-OHIP (M)). This survey is the current verified and validated OHIP survey approved by the World Health Organization (Saub et al., 2005). This OHIP survey App was made available online via the Quicktap Survey Mobile Application (<http://www.quicktapsurvey.com> - Quicktap Survey, Toronto, Canada).

### **Population and Sample**

This study was conducted in the Faculty of Dentistry, Universiti Teknologi MARA (Malaysia), with a population of 160 clinical year students. Students were given the opportunity to use the developed Apps mentioned above on their patients in the dental clinics. After using both Apps, the students were then asked to respond to an online perception survey made with Google Forms as shown in Figure 1.

The image shows a screenshot of a Google Forms survey titled "Perception on Mobile App usage in Dental Clinic". The survey is displayed on a mobile device screen. The title is in blue, and below it is a subtitle: "This is a survey regarding your perception on using mobile Apps in the dental clinic. Please try using any mobile Apps made available by your interviewer before answering the questions below." There is a red asterisk indicating a required field. The first question is "1. Please state your name" with a text input field. Below this is a instruction: "Please choose your intensity regarding purpose of Apps usage on the statements below." There are five Likert scale questions, each with a frequency scale of 1 to 5 and radio buttons for "Always", "Often", "Sometimes", "Seldom", and "Never". The questions are: 2. I used Apps for information searching in my study; 3. I used Apps to view audio visual materials for my assignment; 4. I used Apps for religious purposes (eg. iQuran, Qiblat); 5. I used Apps for information searching on global news.

**Figure 1: The Online Perception Survey Made with Google Forms (Google Inc., California, United States of America)**

## Measurement and Data Collection

This study used a perception survey questionnaire for the purpose of data collection, which was guided by previously conducted students' perception survey on using Apps in the International Islamic University Malaysia (A. Karim et al., 2006). This survey questionnaire was created using Google Forms and was made accessible online, and was modified to collect data on respondent's demographic, their usage and awareness of the Apps, their view on other potential Apps for use in the dental clinics and also their perception on using Apps in the dental clinics.

The frequency of Apps use was measured in the form of categories in the sequence of "everyday", "few days a week", "once a week", "once a month", "if needed" and "never". The measurement of purpose of use was designed using frequency scale of 1 (never), 2 (seldom), 3 (sometimes), 4 (often), and 5 (always). Seven categories were selected for the purpose of use, which comprises these items:

1. To search information for my assignment
2. To view audio visual materials for my assignment
3. For religious purposes (eg: iQuran, Qiblat)

4. To know current global news
5. For social networking (eg: Facebook)
6. To record or manage personal lifestyle (eg: period calendar, noom coach)
7. For leisure activities (eg: games and jokes)

The questionnaire also includes students' responses towards the potential Apps uses in dental clinics that comprise:

1. Patient's personal details
2. Examination, diagnosis and treatment plan
3. Patient's treatment records
4. Patient's treatment appointments and reviews
5. Patient's satisfaction survey

The last variable is the perception on using Apps in dental clinics that was measured in the sequence of 1 (strongly disagree), 2 (disagree), 3 (mixed feelings), 4 (agree) and 5 (strongly agree). The questions are as follows:

1. Does the App being useful in dental clinic?
2. If the App is available in the online market, do you think it is beneficial to be downloaded?
3. Would you like to use the App if it is made available for you?

Data collected were analysed using descriptive statistical analysis. Descriptive statistics "helps to describe, show or summarize data in a meaningful way such that, for example, patterns might emerge from the data" (Laerd Statistics, 2013). Generally, it describes data in terms of measures of central tendency (in this study, mean) and measures of spread (in this study, standard deviation). The findings were presented in tables of mean and standard deviation as well as in percentages.

## RESULTS

### Apps and Online Survey Form Development

Dental Treatment Choice and OHIP survey mobile Apps were developed as shown in Figure 2 and Figure 3. Both of these Apps were made to be compatible with mobile devices using iOS and Android operating systems.



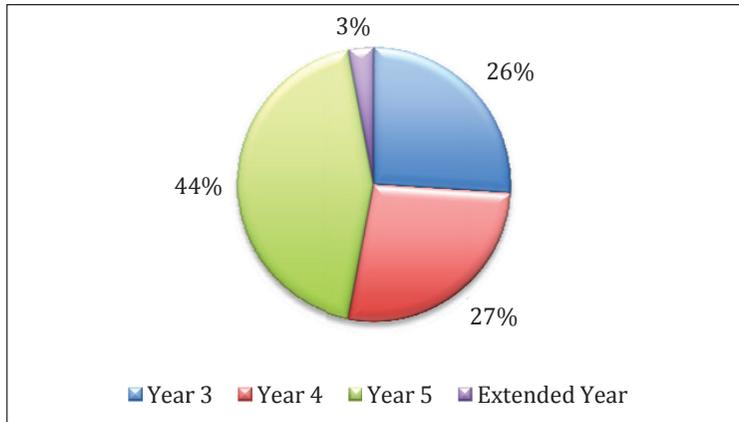
**Figure 2: The 'Dental Treatment Choice' Mobile Application Made using Appmkr (Appmkr C/O Infinite Monkeys, New Jersey, United States of America)**



**Figure 3: The Oral Health Impact Profile Survey; Malay Language Shortened OHIP with 14-Items (Malay S-OHIP (M) Mobile Application Made using Quicktap Survey (Quicktap Survey, Toronto, Canada)**

### Respondents' Demographic

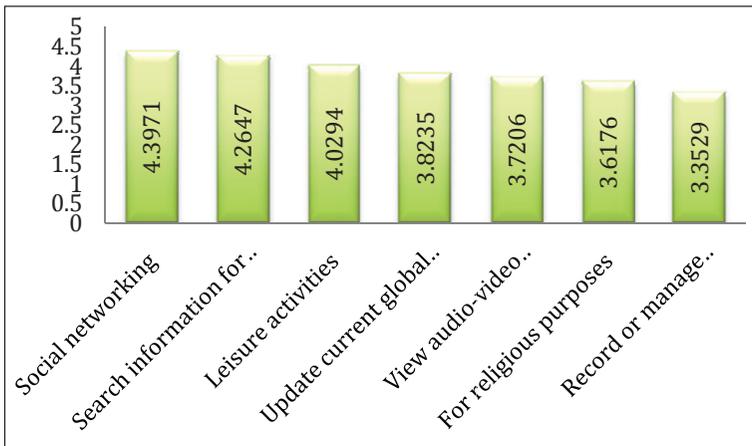
A total of 114 respondents participated in this study as shown in Figure 4, with year 3 students (26%), year 4 students (27%), year 5 students (44%) and extended students (3%). The majority of them were female (81%).



**Figure 4: The Total Respondents who Participated in this Study**

### Apps Usage Experience

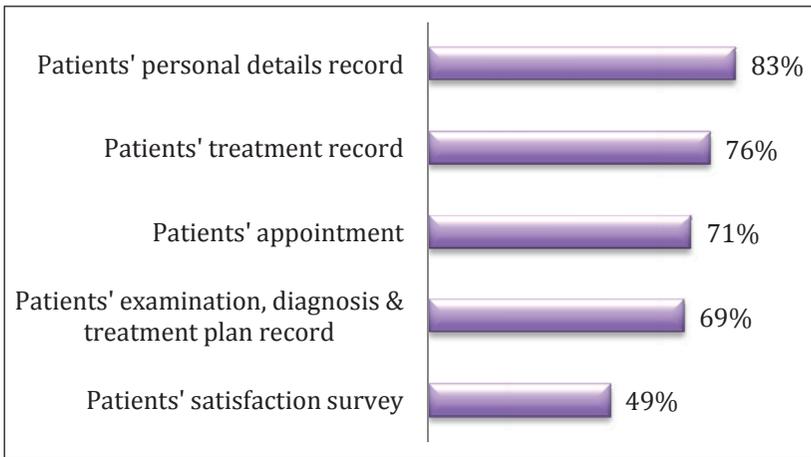
Figure 5 provides information on the purpose of Apps usage experience in several areas of students' daily life routine. The result showed that Apps was most commonly used for social networking. Other popular purposes were for searching information for assignment and leisure activities.



**Figure 5: The Purpose of Apps Usage. Collected Through a Frequency Scale of 1 (Never) To 5 (Always). The Result is displayed in Terms of Mean Distribution and the Standard Deviation. The Closer the Mean of the Total Score to 5, the More Frequent the Usage of Tablet According to Respondents' Experiences**

## Other Potential Apps to be used in the Dental Clinic

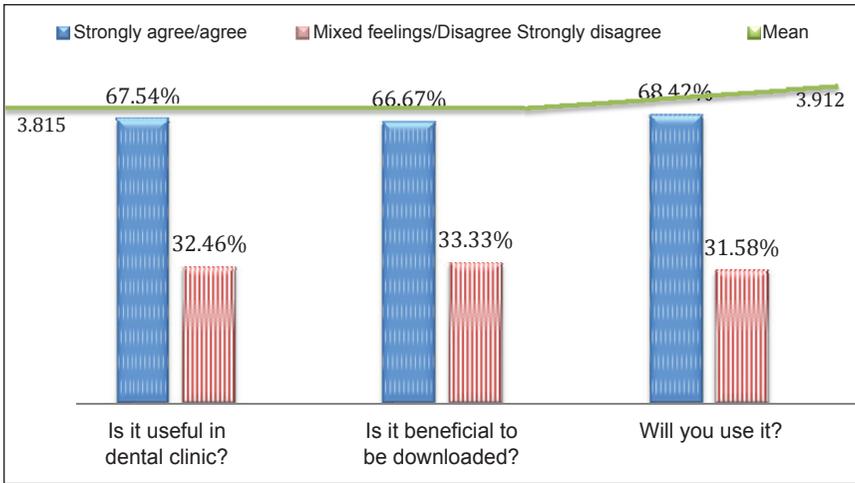
Figure 6 provides findings on the students' views regarding the potential Apps that can be used in the dental clinic. The most favorable Apps was used for patients' personal details record (83%), followed by patients' treatment record (76%), patients' treatment appointment (71%) and patients' examination, diagnosis and treatment plan record (69%).



**Figure 6: The Students' Perception Regarding the Potential Apps to be used in the Clinic**

## Perception of Apps Usage in Dental Clinic

Majority of the students supported the idea of Apps implementation in the dental clinical setting as shown in Figure 7. As shown, more than 50 percent of total respondents support (strongly agree and agree) the implementation of Apps usage in the dental clinic. The mean score that fell within the range of 3.8 to 3.9 was considerably high, which indicated that the respondents were in favour of the Apps usage.



**Figure 7: The Mean and Standard Deviation of the Perception on Apps Usefulness, Its Benefit to be Downloaded and Will Apps Going to be used in Dental Clinic**

## DISCUSSION

### Apps and Online Survey Form Development

The main significance of the Apps development in this study is the implementation of technologies in the dental clinical setting that enables dental schools to use computerised system for data storage. Besides that, patients' records keeping procedure will also be eased. Apart from that, the Dental Treatment Choice App (Figure 2) can be a reliable and validated source of information for patients and general public regarding the most suitable dental treatment choice for specific dental problems. The OHIP survey App (Figure 3) can be part of information collected from patients to gather their feedback regarding quality of dental treatment received in the Faculty of Dentistry Universiti Teknologi MARA. This will enable the Faculty to gauge the competence of the students in clinical practices as well as monitor patients' oral health related quality of life in the community.

This study also used Google Forms for the students' perception survey (Figure 1) that enables auto data transfer to Excel for data collection and data analysis. This helps to reduce human error during data transfer.

Besides that, this is a paperless study that used no paper for both Apps and perception survey online form that had reduced the cost, space needed for storage and misplacement of data collected.

### **Respondents' Demographic**

The respondents of this study were among UiTM's clinical year dental students, with a population of 160 students. The number of respondents was unevenly distributed between the clinical year students (Year 3, Year 4, Year 5 and extended year) due to the different students' clinical time available to conduct this study. A small percentage of respondents were from the extended students because they were very small in number. The high percentage of the female gender was proportionate to the dental student population in the Faculty of Dentistry, Universiti Teknologi MARA.

### **Apps Usage Experience**

The result showed that Apps was commonly used for social networking, searching information for assignment and leisure activities. These findings maybe due to the respondents' age where they are the 'millennial generation' students. This generation that grew up in a culturally diverse schools, are tech-savvy, enthusiastic, confident, well networked and learning oriented. Millennial learners develop critical thinking through experimentation, active participation, and multitasking with rapid shifts between technological devices.

### **Other Potential Apps to be used in the Dental Clinic**

The results indicated that the students preferred all the medical and dental records of the patients to be in electronic record and paperless. Prazeres (2014) did a study on the adaptation of general practitioners to electronic keeping and he reported that 80.4% of respondents preferred the electronic health records and no negative implications to medical consultations were observed. It is widely accepted that electronic record keeping is convenient and accessible to the clinicians at all time.

## **Perception of Apps Usage in Dental Clinic**

Health Apps has been widely used and various studies have found that the prevalence of usage were high and acceptable by patients. As shown by this study, most of the students agreed to the Apps implementation in the dental clinical setting. Singh et al. (2014) also reported that prevalence of smartphone and apps use in urban pediatric populations is high with increased interest in mobile health, patient education and disease management. While Lee et al. (2014) found that even the elderly patient of age 60 years old were interested in health games and mHealth technology specific to their warfarin medication management.

## **Future Prospects of the Mobile App**

From the results of this study, one could propose that further development of this Mobile App to various dental specialties would be appreciated. On the other hand, due to the significantly increase penetration of smartphones and tablets amongst the public, the continuous potential growth of this Mobile App in dentistry could be one of the most profitable business developments in the future. Another similar study focusing on obtaining patients' perception towards the usage of this Mobile App in the dental clinics is still ongoing now.

## **CONCLUSION**

Although Mobile App has not yet been implemented for everyday use in the Faculty of Dentistry, Universiti Teknologi MARA, responses from this study indicated that majority of the respondents were willing to accommodate the use of Apps in the dental clinic. The willingness of most respondents to use these Apps made it a valuable tool for measuring the quality of dental health information and services being given to the community in a more robust and systematic way.

## REFERENCES

- A. Karim, N.S., Darus, S.H., & Hussin, R. (2006). Mobile Phone Applications In Academic Library Services: A Students' Feedback Survey. *Emerald Insight*, 23(1), 35-51.
- Grandinetti, D.A. (2000). Doctors And The Web: Help Your Patients Surf The Net Safely. *Medical Economics*, 77(5), 186–188, 194–196, 201.
- Laerd Statistics. (2013). Descriptive And Inferential Statistics. <https://statistics.laerd.com/statistical-guides/descriptive-inferential-statistics.php>. Accessed 4March 2015.
- Lee, J.A., Nguyen, A.L., Berg, J., Amin, A., Bachman, M., Guo, Y., & Evangelista, L. (2014). Attitudes And Preference On The Use Of Mobile Health Technology And Health Games For Self-Management: Interviews With Older Adults On Anticoagulation Therapy. *Journal of Medical Internet Research Mhealth Uhealth*, 2(3), e32 (2014). doi 10.2196/mhealth.3196.
- Logan, H.L. (1997). The Patient And The Shifting Health-Care Paradigm. *Journal of American College of Dentists*, 64(1), 16–18.
- Marceglia, S., Bonacina, S., Zaccaria, V., Pagliari, C., & Pinciroli, F. (2012). How Might The Ipad Change Healthcare? *Journal of the Royal Society of Medicine*, 105, 233-241 (2012). doi:10.1258/jrsm.2012.110296.
- McMullan, M. (2006). Patients Using The Internet To Obtain Health Information: How This Affects The Patient-Health Professional Relationship. *Patient Education and Counseling*, 63: 24–28.
- Patrick, D.L., & Bergner, M. (1990). Measurement Of Health Status In The 1990s. *Annual Review of Public Health*, 11, 165-183. doi:10.1146/annurev.pu.11.050190.001121.
- Prazeres, F. (2014). How Do Gps Versus GP Trainees Adapt To Electronic Health Records? A Portuguese pilot study. *Informatics in Primary Care*, 21(3), 139-141. doi: 10.14236/jhi.v21i3.51.

- Saub, R., Locker, D., & Allison, P. (2005). Derivation And Validation Of The Short Version Of The Malaysian Oral Health Impact Profile. *Community Dentistry and Oral Epidemiology*, 33, 378-383.
- Singh, A., Wilkinson, S., Braganza, S. (2014). Smartphones And Pediatric Apps To Mobilize The Medical Home. *Journal of Pediatrics*, 165(3), 606-610 (2014). doi:10.1016/j.jpeds.2014.05.037.
- Slade, G.D. (1997). The Oral Health Impact Profile. In Slade, G.D. (Ed.), *Measuring Oral Health And Quality Of Life* (pp 93-104). Chapel Hill: Department of Dental Ecology, University of North Carolina.
- World Health Organization (WHO) (2011). Health Surveys And Surveillance. In *Mhealth – New Horizons For Health Through Mobile Technologies* (pp 42-51). Global Observatory for eHealth series - Volume 3.