Efficiency Test of Rangsit University Innovative Infographic Media for Laypeople Who are Interested in Orthodontic Treatment

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Abstract

The aim of this study was to evaluate if infographic media is more effective than the traditional media in orthodontic education, and to make evidence-based recommendations for the use of infographic in orthodontics. Participants were students recruited from the Rangsit University; all were between 18 and 25 of age with no history of orthodontic treatment. The participants were randomized into 2 groups: the first group was educated with traditional media (n=200) and the second group was educated with infographic media (n=200). Both groups were given questionnaires with multiple choices at pre-test and post-test periods and statistical comparisons were made between the two groups. In the group that the participants have similar learning, paired t-test was used for comparisons; while if different learning values were determined unpaired t-test was used for the comparisons. The pre-test and post- test scores within each group were significantly different statistically. No significant difference was found in the pre-test scores between the two groups (p<0.05), while post-test scores showed significant difference between the two groups (p<0.05). The RSU innovative infographic media was more effective than the traditional media to improve knowledge of laypeople about orthodontic treatment.

Keywords: *infographic media, orthodontic knowledge, orthodontic multimedia, post-test, pre-test, questionnaire*

บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อประเมินว่าสื่อวีดิทัศน์มีประสิทธิภาพในการให้ความรู้ด้านทันตกรรมจัดฟันมากกว่าสื่อสิ่งพิมพ์ เพื่อให้เป็นหลักฐานเชิงประจักษ์ในการแนะนำให้ใช้สื่อวีดิทัศน์ในการให้ความรู้ทางทันตกรรมจัดฟัน ผู้เข้าร่วมวิจัยเป็นนักศึกษามหาวิทยาลัยรังสิต อยู่ในช่วงอายุ 18-25 ปี และต้องไม่เคยได้รับการจัดฟันมาก่อน ผู้เข้าร่วมถูกแบ่งออกเป็น 2 กลุ่ม กลุ่มแรกได้รับความรู้ผ่านทางสื่อสิ่งพิมพ์ 200 คน และกลุ่มที่สองได้รับความรู้ผ่านทางสื่อวีดิทัศน์จำนวน 200 คน ซึ่งทั้ง 2 กลุ่ม จะได้รับการทำแบบทดสอบก่อนได้รับความรู้และแบบทดสอบหลังจากได้รับความรู้แล้ว ซึ่งแบบทดสอบเป็นแบบตัวเลือกให้ตอบ และได้ทำการเปรียบเทียบวิเคราะห์ค่าเฉลี่ยในแต่ละกลุ่ม โดยในกลุ่มคนที่ ได้รับความรู้จากสื่อแบบเดียวกัน ใช้สถิติ paired t-test ในการเปรียบเทียบผล ในขณะที่กลุ่มที่ได้รับความรู้จากสื่อที่ต่างกัน ใช้สถิติ unpaired t-test ในการเปรียบเทียบผล ผลการศึกษาพบว่า คะแนนจากการทำแบบทดสอบก่อนและหลังของแต่ละกลุ่มแตกต่างกัน(p<0.05) โดยแบบทดสอบก่อนได้รับความรู้จากสื่อของทั้งสองกลุ่มไม่มีความแตกต่างกัน (p<0.05) แต่แบบทดสอบหลังได้รับความรู้จากสื่อของทั้งสองกลุ่มแตกต่างกัน(p<0.05) ข้อสรุปคือ สื่อวีดิทัศน์มีประสิทธิภาพในการให้ความรู้ในทางทันตกรรมจัดฟันแก่คนทั่วไปได้ดีกว่าสื่อสิ่งพิมพ์

คำสำคัญ: *การให้ความรู้เกี่ยวกับการจัดฟัน แบบทดสอบ แบบทดสอบก่อนให้ความรู้ แบบสอบถามหลังจากให้ความรู้ สื่อวิดิทัศน์ สื่อวิดิทัศน์เกี่ยวกับการจัดฟัน*

1. Introduction

Nowadays, the world has been developed in every aspect especially in social media, technology, communication style and lifestyle (Carol and Bernstein, 2011; Melek, 2009). These developments are changing the ways information is delivered. At present, there are billions of data circulating through the internet. Each data attracts people at different levels, some are clicked, some are shared, and some become virals. New innovative tools that use graphic data to educate people have been introduced for various professional purposes. These tools give detailed data in descriptive statistics and knowledge with audiovisual media. Audiences can easily understand the complex information in a limited time with the use of infographic. As an old saying states that “A picture is worth thousand words”, it is wise to use infographic media as a tool to educate people (Mark, 2012; Jane, 2012). Infographic is defined as a visualization of a set of data that tries to convey complex information to audiences in a manner that can be

quickly consumed and easily understood. This process of developing and publishing infographics is called "data visualization information design" or information architecture (Mark, 2012).

Department of Orthodontics, Faculty of Dental Medicine, Rangsit University has developed an infographic entitled "Nice to Meet You Orthodontics". This media is used for people who are interested in orthodontics. It can also fulfill modern people's needs. The aim of this study was to test the effectiveness of this infographic and to determine whether this infographic can make people understand orthodontic treatment clearer and quicker than the traditional media.

2. Objectives

1. To evaluate if the infographic media is more effective than the traditional media in orthodontic education
2. To compare knowledge through media among the groups with different gender

3. Materials and methods

This study evaluated the pre-test and post-test scores of the experimental and control groups. The participants were divided into 2 groups randomly under a protocol approved by the Ethics committee of Rangsit University. The first or control group was educated with traditional media (n=200) that included dental brochures (from dental clinic or the hospital) and written information gathered from the dental websites (Figure 1) that have information similar to our infographic media and the second or experimental group was educated with infographic media (n=200). Infographics is defined as visualization of a data that tries to convey complex information to an audience in a manner that can be quickly consumed and easily understood (Figure 2). This process of developing and publishing infographic is called data visualization information design or information architecture. The production of the infographic media "Nice to Meet You Orthodontics" is an infographic consisting of information about the procedures that are carried out before, during and after the orthodontic treatment. Both groups were given a pre-test and post-test questionnaire on multiple choices and the mean values of each group was used in the statistical comparison. The mean pre-test and post-test scores within each group for both experimental and control groups were compared with paired t-test. The pre-test and post-test scores between each group were compared with unpaired t-test.

Figure 1 Dental brochures

Figure 2 Infographic media "Nice to Meet You Orthodontics" (www.youtube.com/watch?v=VvF3yYQAjb8)

This study also divided participants with respect to their gender (male and female), and their educational backgrounds, which are Health-sciences, Humanity-social, Engineering-technology, Economic-business and Arts-design (5 categories). The pre-test and post-test scores between male and female in each group were compared with paired t-test. The pre-test and post-test scores among 5 educational backgrounds were compared with the one-way ANOVA.

Inclusion criteria

1. Age 18-25 years old
2. People who had not had orthodontic treatment
3. People who were interested in orthodontic treatment

Exclusion criteria

1. People who have physically disability, mental retardation and psychological disorder
2. People who are illiterate.
3. Students in the faculty of dental medicine (except 1st and 2nd year), in Rangsit University

Questionaire

The validity of the questionnaires was evaluated by using Indexes of Item Objective Congruence (IOC) by three professors and/or specialists. The qualifications of the persons, who evaluated the questionnaires were consisted of:

1. Specialist in orthodontics who holding a position as a professor or assistant professor.
2. Specialist in orthodontics with a Ph.D. degree to evaluate and analyze the results.
3. Working experience of at least 10 years as an orthodontist.

If the IOC level was in the range of 0.50-1.00 then the questionnaire can be used and if the IOC level was below 0.50 the questionnaire had to be adjusted before reintroducing to the specialist. The reliability was evaluated from a pilot study, which was conducted in 30 participants, chosen randomly. Cronbach's alpha coefficient test was performed to test the reliability of the questions.

4. Results

Item Objective Congruence Index (IOC) of each picture was 1 (Table 1) and Cronbach's alpha coefficient was 0.96. (Analysed by SPSS Table 2)

Table 1 IOC of each item evaluated by 3 specialists

Pre-test	IOC	Post-test	IOC
Questionnaire no. 1	1	Questionnaire no. 1	1
Questionnaire no. 2	1	Questionnaire no. 2	1
Questionnaire no. 3	1	Questionnaire no. 3	1
Questionnaire no. 4	1	Questionnaire no. 4	1
Questionnaire no. 5	1	Questionnaire no. 5	1
Questionnaire no. 6	1	Questionnaire no. 6	1
Questionnaire no. 7	1	Questionnaire no. 7	1
Questionnaire no. 8	1	Questionnaire no. 8	1
Questionnaire no. 9	1	Questionnaire no. 9	1
Questionnaire no. 10	1	Questionnaire no. 10	1

Table 2 The results of the reliability test using SPSS

Cronbach's Alpha	N of Items
.96	30

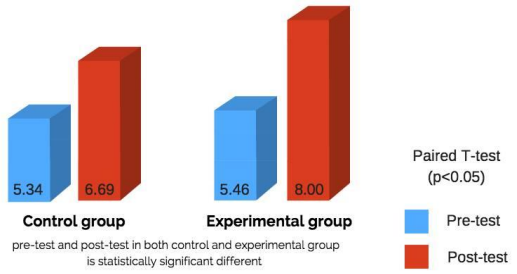


Figure 3 Paired t-test comparison between pre-test and post-test of control group (traditional media) and experimental group (infographic media)

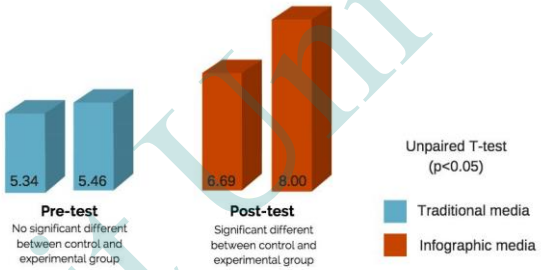


Figure 4 Unpaired t-test comparison of pre-test and post-test between control group (traditional media) and experimental group (infographic media)

The data showed that pre-test and post-test scores in both groups were significantly different. The pre-test scores did not show significant difference between the control and experimental group. There was significant difference in post-test scores between the control and experimental group (Figure 3 and 4)

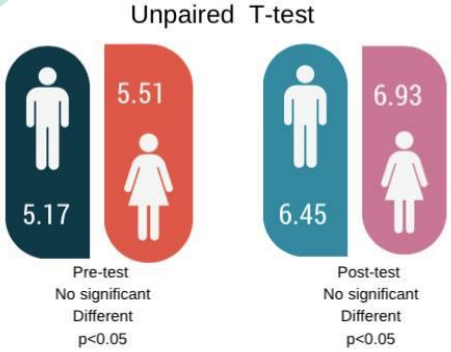
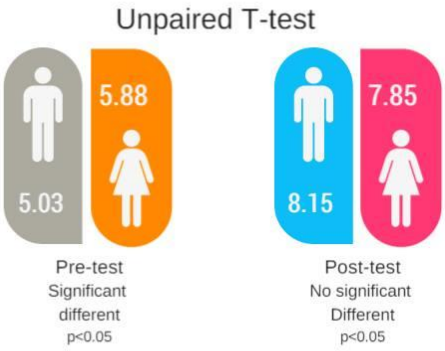


Figure 5 Unpaired t-test comparison of pre-test and post-test between male and female in control group (traditional media)



Figrue 6 Unpaired t-test comparison of post-test and post-test between male and female in experimental group (infographic media)

The data showed that pre-test scores between males and females were significantly different in the experimental group (infographic media). Other inter-gender-comparisons did not differ significantly (Figure 5 and 6)

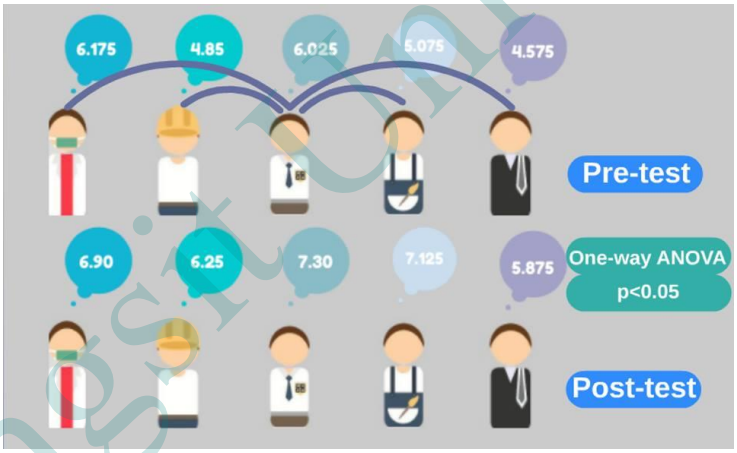


Figure 7 One-way ANOVA analysis of pre-test and post-test between 5 fields of education in control group (traditional media)

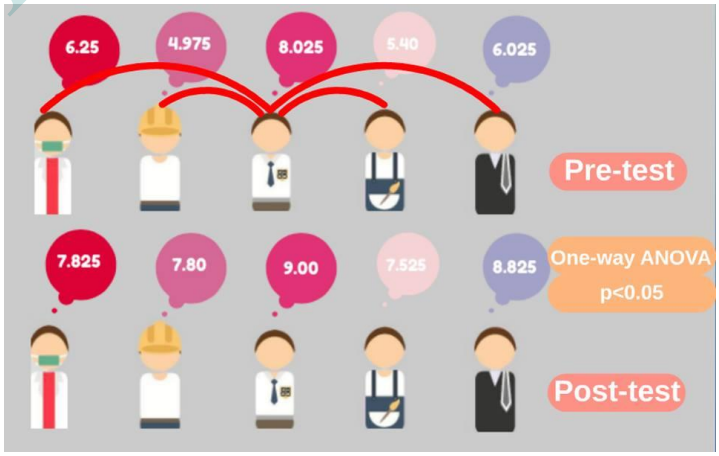


Figure 8 One-way ANOVA analysis of pre-test and post-test between 5 fields of education in experimental group (infographic media)

One-way ANOVA analysis of pre-test and post-test scores among the 5 fields of education in both control and experimental group (p<0.05) revealed statistically significant difference(Figure 7 and 8). Between-group evaluations of the pre-test scores in the control group (traditional media) showed that there was statistically significant difference between Health-sciences and Humanity-socials, Health-sciences and Engineering-technology, Humanity-social and Economic-business, while no statistically significant difference was found in the other between-group comparison (Table 3). Between groups comparisons of the post-test scores in the control group (traditional media) showed that there were statistically significant difference between Humanity-socials and Economic-business while no statistically significant difference was found in the other between-group comparisons.

The between-group comparisons of the pre-test scores in the experimental group (infographic media) showed that there was statistically significant difference between the Health-sciences and Economic-business, Humanity-socials and Economic-business, while no statistically significant difference was found in the other between-group comparisons. The between-group comparisons of the post-test scores in the experimental group (infographic media) showed significant difference between Humanity-socials and Arts-design while no statistically significant difference was found in the other between-group comparisons.

Table 3 The groups that statistically significant different in one-way ANOVA analysis of pre-test and post-test between 5 fields of education in both control group (traditional media) and experimental group (infographic media)

Test	Control group (Traditional media)	Experimental group (Infographic media)
Pre-test	Health-sciences and Humanity-socials	Health-sciences and Economic-Business
	Health-sciences and Engineering-technology	Humanity-socials and Economic-Business
	Humanity-socials and Economic-Business	
Post-test	Humanity-socials and Economic-Business	Humanity-socials and Arts-design

5. Discussion

Infographics is a new way of delivering information. It can summarize the complete information with an easy to understand diagram. It contains graphics, animation, audio and video, which attract human brains more than other types of media. People can also access these infographics through smart phones or social media anywhere, anytime. Hence, the students of the Faculty of Dental Medicine Rangsit University have created the infographic media for people who are interested in orthodontic treatment.

The RSU innovation infographic media contains information about procedures carried out before, during and after the orthodontic treatment, complications of orthodontic treatment and oral hygiene instructions for orthodontic patients that are similar to traditional media. In this study, the participants were randomly distributed into two groups (experimental and control group). The effectiveness of infographic and traditional media were assessed by questionnaires. The main objective of this study was to evaluate the effectiveness of infographic media while comparing with the traditional media. Other than the main objective, we also evaluated the effects of education background and gender.

The results of the study demonstrated that the participants in both experimental and control group mostly have the same level of basic knowledge of orthodontic treatment with no statistically significant difference (Figure 4). However, participants in the experimental group showed better scores in post-test scores than the control group (Figure 4). Therefore, it can be concluded that the infographic media is more helpful to improve knowledge of orthodontic treatment than the traditional media. Our results are consistent with the results of the other previous studies (Rosenberg et al., 2010; Chen et al., 2005; Lowe et al., 2001). These results might be due to that infographic media is more interesting for the participants, as there are animations and audio and not just only plain text in the media. Thus the participants could enjoy more when they watched this infographic media than reading the traditional media (brochure and book).

Previous studies showed that the average attention span is 7 minutes for an average person (Weinschenk, 2011). Attention span is the amount of concentrated time on a task without becoming distracted. This implies that average person can focus on the presentation for 7 to 10 minutes at most. If the person is not interested in the topic or the presenter has limited presentation skills, the attention span decreases. This means that the presenter should find ways to make changes at least every 7 minutes in order to get people's attention.

Gender maybe one of the contributing factors in understanding of orthodontic knowledge. Our study showed that there was no statistically significant difference in the pre-test and post-test scores between males and females in both groups, which is similar to other previous study (Rosenberg et al, 2010). However, the pre-test score comparison between male and female in the experimental group showed statistically significant difference. The study by Yazdanpanah, (2007) showed that females were more concentrated than males but overall neither females nor males were different in perception of orthodontic treatment.

The educational background of the participants may be a contributing factor of perception of orthodontic treatment as well. The results of our study showed that there was no statistically significant difference in the pre-test and post-test scores between some groups among the five fields of education in the control and experimental groups, while some groups had significant difference between each other as mentioned in Table 3 similar to the study by David et al.(2000). The possible reasons for the differences among different educational background may be the knowledge background of each individual, personal experiences and peers.

6. Conclusion

The results of the present study concluded that infographic media is more effective in delivering information than the traditional media. It is because the human brain keeps memory as visual data in the memory system. Therefore, infographic media attracts human brain easier and faster than plain text as it contains advanced visual and audio data. With respect to gender and fields of education there was no significant difference among the groups in understanding of orthodontic knowledge through infographic media.

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