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## Development of Prototype Outcomes-Based Training Modules for Aesthetic Dentistry

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### Abstract

The objective of the study is to know the essential components of Aesthetic Dentistry that will be a basis for prototype Outcomes-based training modules. Using a 5-point Likert scale, the researcher-made questionnaire assessed the different elements of Aesthetic Dentistry which are needed in the designing of the training module, the manner of presentation and the form of assessment that were needed in the training module. Statistical tools that were used for the study are percentage, frequency, weighted mean and standard deviation. The information gathered from the respondents was relevant in the development of a Prototype Outcomes-based Training Modules in Aesthetic Dentistry

**Keywords:** Aesthetic Dentistry; Outcomes-Based Education; Training Modules in Dentistry; Prototype Training Modules.

### Introduction

Enhancing one's appearance is an enduring trend. During the time of the Romans, white teeth were admired and ivory was used to replace missing teeth. This concept of beauty holds true in today's society. The replacement of a tooth solely for function such as mastication without the consideration of aesthetics is a thing of the past. A beautiful smile is a must nowadays. An aesthetic and pleasing smile should come hand in hand when replacing a missing, fractured or malaligned tooth in the oral cavity.

The history of Aesthetic Dentistry is said to be young because it was only decades ago that it was established. The advent of superior bonding materials prompted the birth of Aesthetic Dentistry. The new adhesive techniques made possible the restoration of anterior teeth with thin ceramic veneers and tooth-colored restoration [1]. Aesthetic Dentistry responds to the demand of patients to have a perfect smile that aesthetic doctors and dermatologists cannot deliver.

The mouth is central to one's appearance. A smile is powerful. It can either make or break your look. It can communicate without words. It can also change the day of one person in a second.

Education as a field has grown to respond to the different demands of the learner. Training dentists in today's world does not stop in mere lecturing and hands-on training. Knowing the needs of the learner will help the educator properly address the issue. Moreover, assessing them in their work motivates them to learn even more. "Classroom assessment provides valuable information that allows the teacher to adapt instructional procedures to the learning needs of their students" [2] Dentists, as in any health profession, should continuously learn throughout their lifetime. In order to deliver quality dental services to the patients, dentists must undergo training in specific courses to ensure the best possible treatment will be effectively and efficiently delivered to the patient as a result of their learning experiences.

Training a dentist is different from undergraduate dental students. There is much expected from both the trainer and the trainees. There are existing programs in Aesthetic Dentistry but none of which are geared towards Outcomes-Based Education. Outcomes-Based Education, as defined by Spady, means "clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences" [3]. The field of education found answers as to how a person may be trained regardless of profession. Outcomes-based education is said to focus on what the students learned rather than the inputs. This type of education is seen as appropriate by the researcher in the field of dentistry. The scarcity in Aesthetic Dentistry training modules motivated the researcher to develop one in order to benefit the researcher's training program as well as its participants. The real test in Aesthetic Dentistry is not the mere knowledge of beauty but whether the dentist successfully made a smile more pleasing.

### **Materials and methods**

The researcher obtained an approval sheet for the conduct of scientific procedures using human subjects and was signed by four IERC members. After which, the researcher sought the permission of the Dean of institution A, to conduct a study in the school. The researcher wrote a letter to the program heads of the institution B and institution C. A cover letter was then prepared for distribution to the respondents to avail them of the official information explained in the study. The researcher personally administered the questionnaire to the respondents and gave them sufficient time to answer the questionnaire.

The descriptive survey method was used in conducting the study. The respondents were 10 licensed dentists, 15 faculty members, 3 program directors and 52 participants of an Aesthetic Dentistry program held in the Philippines before October 2014. The questionnaire was used as the instrument by the researcher in determining the elements of Aesthetic Dentistry which became the basis for designing a prototype Outcomes-based training modules.

The main data gathering instrument was the survey questionnaire which consisted of the following:

1. the different elements of Aesthetic Dentistry which are needed in the designing of the training modules;
2. the manner of presentation;
3. the form of assessment that will be needed in the training modules; and
4. the training modules for Aesthetic Dentistry.

Part I dealt on the contents of the training modules which includes the introduction to Aesthetic Dentistry, cosmetic contouring, Minimal Invasive Dentistry and all-ceramic restorations. Part II dealt on the mode of presentation of training modules in Aesthetic Dentistry. Part III dealt on the modes of assessment. The three parts required the respondents to rate the components of Aesthetic Dentistry using the scale 5 (VMI/VMN) = Very much important/ Very much needed, 4 (MI/MN) = Much important / Much needed, 3 (MoI/MoN) = Moderately important / Moderately needed, 2 (LI/LN) = Least important/ Least needed, 1 (NI/NN) = Not important/ Not needed.

The researcher requested five (5) experts for content validation of the questionnaire. These were administrators and faculty in the School of Dentistry, a Curriculum and Supervision teacher from graduate school and one of the Board of Directors of institution C. Furthermore, the researcher conducted a test on the validity of the instrument used. A dry-run was conducted to 30

Restorative dentistry faculty members. Selected faculty members who validated the questionnaires were not included in the study. The researcher asked the respondents for their feedback in answering the questions. The researcher improved the questionnaire based on the respondents' suggestions.

The data were treated in relation to what was asked in the specific objectives. IBM SPSS version 21 was used for this purpose. The statistical data that were used in the study were the frequency count which was used to determine the number of occurrences in each item for the components of the training modules. Percentage was utilized for the items for the components of the training modules to standardize the frequency of occurrence per as fractions of 100. Weighted mean was employed to get the typicality of the responses on each component of the training modules from the set of options while standard deviation was used to determine the deviation of responses on the components of the training modules.

### Results

It could be gleaned from Table 1 that the respondents felt that the indications and limitations of bleaching as well as external bleaching are “very much important/very much needed” in designing a training module. Amongst all others in the Introduction to Aesthetic Dentistry, these two got the highest mean 4.57 and 4.55 respectively. This is justified by Dr. Jagyasi (2014) who mentioned in his article in 2014 that cosmetic bleaching and bonding are two of the most popular dental services provided by the dentists in Philippines. He also added that discolored and stained teeth can make you look ugly and it makes the patients lack self-confidence [4]. The results also yielded that the concept of smile design and digital photography is also “much important/much needed”. Aesthetic analysis scored the highest mean of 4.13 among the other concepts of smile design followed by dental analysis with a mean of 3.79. Third is the facial analysis which was followed closely by dentolabial analysis with a mean of 3.61. All of these concepts are intertwined. This is because of the harmony that each contributes to beauty. The means of the Principles of digital photography does not vary greatly from each other. The Practical Exercises in Digital Photography has the lowest mean of 3.81 while profile photography has the highest mean of 3.89. Dr. Patel (2013) stated that clinical photography is a very important tool in general practice in documenting treatment, especially in aesthetic and cosmetic cases [5].

Table 1: Introduction to Aesthetic Dentistry

	Mean	Standard Deviation	Verbal Interpretation
1.1 Concept of smile design	4.13	4.60	MI/MN
1.1.1 Aesthetic Analysis			
1.1.2 Facial Analysis	3.64	.92	MI/MN
1.1.3 Dentolabial Analysis	3.61	.89	MI/MN
1.1.4 Dental Analysis	3.79	.86	MI/MN
1.2 Bleaching	4.57	.61	VMI/VMN
1.2.1 Indications and Limitations			
1.2.2 Internal Bleaching	4.03	1.04	MI/MN
1.2.3 External Bleaching	4.55	.57	VMI/VMN
1.2.4 Home Bleaching / In-Office Bleaching	3.99	.89	MI/MN
1.3 Principles of Digital Photography	3.83	.73	MI/MN
1.3.1 Requirements for the Photographic Documentation			
1.3.2 Profile Photography	3.89	.71	MI/MN
1.3.3 Practical Exercises in Digital Photography	3.81	.71	MI/MN

Interestingly, Table 2 presents the most heterogenous response. With regard to direct aesthetic treatment using composite, peg shaped lateral, diastema closure and reconstruction following trauma elicited a “very much important/ very much needed” response with both peg

shaped lateral and diastema having the same mean of 4.54. Black triangles gave a “least important/least needed” response with a mean of 2.05. A probable reason for this result is because of its demand. Nash (2013) said that fees can generally be lower for direct than indirect procedures since there is no second appointment or temporary restorations required and no laboratory expenses [6]. For the adhesive, respondents stated that the generation of dental adhesives are “moderately important/ moderately needed” with a mean of 3.40. The technique using dental adhesives has a mean of 3.44 with a verbal interpretation of “much important/much needed”. According to Nazarian (2007), there a variety of aesthetic and functional materials to choose from when faced with the need to perform aesthetic procedures. This may be the reason why the technique in using the dental adhesives scored higher rather than just simply knowing the generations of dental adhesives out in the market [7].

Table 2: Cosmetic Contouring

	Mean	Standard Deviation	Verbal Interpretation
2.1 Direct Aesthetic Treatment Using Composite			
2.1.1 Peg shaped Lateral	4.54	.67	VMI/VMN
2.1.2 Diastema Closure	4.54	.71	VMI/VMN
2.1.3 Black Triangles	2.05	1.44	LI/LN
2.1.4 Reconstruction Following Trauma	4.50	.69	VMI/VMN
2.2 Adhesive			
2.2.1 Generation of Dental Adhesive	3.40	.96	MoI/MoN
2.2.2 Technique Using Dental Adhesive	3.44	.96	MI/MN

From Table 3, we can see that in all aspects of all-ceramic restorations, the respondents stated that they are all “very much important/very much needed in the training module. It can be seen in the table that the highest mean of 4.45 corresponds to the installation and cementation of inlays. Ranked second are the tooth preparation of veneers and the diagnosis and treatment

planning of veneers with a mean of 4.44. The aspect which ranked the least is the diagnosis and treatment planning for inlays with a mean of 4.38. The findings of the Shenoy and Shenoy in 2010 stated the disadvantage of dental ceramics as restorative materials is that it is not capable of withstanding forces such as mastication. This limitation does not pose as a barrier to the respondents because it is still ceramics that give the utmost aesthetic results [8]. Alternately, Yang, Cook and Paddock in 2005 justified the use of ceramics when they said that patients often demand aesthetic posterior restorations forcing the restorative dentist to utilize alternatives to traditional direct or indirect metallic restorative materials. Current porcelain systems provide outstanding aesthetics and sufficient strength to be considered for many posterior applications [9].

Table 3: All-Ceramic Restoration

	Mean	Standard Deviation	Verbal Interpretation
4.1 Inlay	4.28	.76	
4.1.1 Diagnosis and Treatment Planning			VMI/VMN
4.1.2 Indications and Contraindications	4.34	.69	VMI/VMN
4.1.3 Tooth Preparations	4.44	.65	VMI/VMN
4.1.4 Installation and Cementation	4.45	.67	VMI/VMN
4.2 Onlay	4.43	.63	VMI/VMN
4.2.1 Diagnosis and Treatment Planning			
4.2.2 Indications and Contraindications	4.43	.65	VMI/VMN
4.2.3 Tooth Preparation	4.40	.67	VMI/VMN
4.2.4 Installation and Cementation	4.43	.69	VMI/VMN
4.3 Veneers	4.44	.59	VMI/VMN
4.3.1 Diagnosis and Treatment Planning			
4.3.2 Indications and Contraindications	4.36	.64	VMI/VMN
4.3.3 Tooth Preparation	4.39	.67	VMI/VMN
4.3.4 Installation and Cementation	4.35	.66	VMI/VMN

It could be disclosed in Table 4 that with regard to objectives, to demonstrate the required skills and dexterity needed in aesthetic work is the only one which respondents felt that is “very much important/very much needed in the mode of presentation. This garnered a mean of 4.24 while to apply the principles and techniques in aesthetic dentistry in real world setting and explain

the importance of aesthetic dentistry in relation to other disciplines in dentistry obtained a mean of 4.20 and 4.13 respectively. For the activities, all of which obtained a verbal interpretation of “very much important/very much needed” with performing clinical practical training having the highest mean of 4.26. Ricard (1990) emphasizes that for a module to be useful, congruence must be evident between learner needs and its content. Special attention should be directed to outcomes, activities, and evaluation procedures. Effective modules outline material clearly and attractively. Content is distributed logically and creatively; information is accessible [10].

Table 4: Modes of Presentation

	Mean	Standard Deviation	Verbal Interpretation
<i>MODES OF PRESENTATION</i>			
1. Objectives	4.13	.67	MI/MN
1.1 Explain the importance of Aesthetic Dentistry in relation to other Disciplines in Dentistry			
1.2 Apply the principles and techniques in Aesthetic Dentistry in real world setting	4.20	.67	MI/MN
1.3 Demonstrate the required skills and dexterity needed in aesthetic work	4.24	.72	VMI/VMN
2. Activities			
1. Conducting and holding clinical conferences	4.21	.69	VMI/VMN
2. Preparing simulated model cast and ivory tooth	4.24	.73	VMI/VMN
3. Performing clinical practical training	4.26	.73	VMI/VMN

It is apparent from Table 5 that traditional assessment was seen to have more importance/need as compared to authentic assessment. This is contrary to the conclusion of Varley (2008) that the advantages of this assessment are that it makes students strive and do things at higher level of standards which also fosters mastery of the subject matter [11]. The objective type of test has a mean of 4.24 with the only one with the verbal interpretation of “very much important/very much needed. Dikli (2003) on the other hand, stated that the disadvantage of which, is that students may misinterpret the question if it was not delivered clearly and precisely [12]. The portfolio has a mean of 2.59 with a verbal interpretation of “least important/least needed” perhaps because this is not a common type of assessment used in Dentistry or the faculty members might not very familiar with this type of assessment.

**Discussion**

Based on the results of the data, the following findings are enumerated:

1. Different Components of Aesthetic Dentistry which are Needed in Designing of the Training Module

The following components of Aesthetic Dentistry were rated very much needed by the participants:

- Bleaching
  - o indications and limitations of bleaching
  - o external bleaching

- Direct Aesthetic Treatment Using Composite
  - o peg shaped lateral
  - o diastema closure
  - o reconstruction following trauma
- All-Ceramic Restoration
  - o inlay
  - o onlay
  - o veneers

Table 5: Modes of Assessment

	Mean	Standard Deviation	Verbal Interpretation
<b>MODES OF ASSESSMENT</b>			
1. TRADITIONAL ASSESSMENT	4.24	.68	VMI/VMN
1.1 Objective-type of test			
1.2 Alternative-answer type of test	4.10	.69	MI/MN
1.3 Multiple choice	4.08	.63	MI/MN
2. AUTHENTIC ASSESSMENT	4.20	.69	MI/MN
2.1 Performance type (hands-on)			
2.2 Rubrics	3.89	.81	MI/MN
2.3 Portfolio	2.58	1.29	LI/LN

2. Presentation of Training Modules.

The training modules must contain the following:

- Objectives
  - o Demonstrate the required skills and dexterity needed in aesthetic work
- Activities
  - o Conducting and holding clinical conferences
  - o Preparing simulated model cast and ivory tooth
  - o Performing clinical practical training

3. Modes of Assessment Needed in the Training Modules

The traditional assessment was seen to have more importance/need as compared to authentic assessment.

4. Training modules to be prepared in Aesthetic Dentistry

A Prototype Outcomes-based Training Modules in Aesthetic Dentistry was designed based on the study.

**Conclusions**

Grounded on the findings of the study, the following conclusions were made:

1. External bleaching as well as its indications and limitations, direct aesthetic treatment using composite for peg-shaped lateral, diastema closure and reconstruction following trauma, all-ceramic restoration of inlay, onlay and veneers are the components needed in the Aesthetic Dentistry training modules.

2. Demonstration and hands-on training is the preferred mode of training.

3. The trainors favored the objective type of assessment in the training. The objective type of assessment is needed in the Aesthetic dentistry training modules.

4. The Outcomes-based training modules must be part of the Aesthetic Dentistry training modules

The training modules must contain the following parts:

- a. Training Outcomes
- b. Training Content
- c. Training Procedures
- d. Training Workshops and Activities
- e. Training Assessment

Furthermore, the training module must be pilot tested and validated for its usefulness  
Replication of the study may be done at a larger scale.

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