



From Lens to Screen: The Synergy of Photography and Technology in Smile Designing- A Questionnaire Based Study

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ABSTRACT:

The concept of smile design originated within the field of cosmetic dentistry, evolving as a response to the growing demand for aesthetic enhancements to dental treatments. It gained prominence in the late 20th century as advancements in dental technology and materials allowed for more sophisticated and customizable procedures. Dentists began to integrate concepts from facial aesthetics, including proportions, symmetry, and individual preferences, into their treatment planning processes. This approach goes beyond addressing dental issues and considers the overall appearance of a person's smile in relation to their facial features.

Aim Of The Study

The aim of the study was to assess using this questionnaire about the basic knowledge regarding Role Of Photography in Smile Designing among Dental 1st years and 2nd years for creating awareness.

Methods

The study was conducted among the dental undergraduates of Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India. Data was collected using a standardized self administered questionnaire.

Result

First-year BDS students responded to this poll at the highest rate, followed by second-year students. It was clear that students understood the purpose of photography, but they still needed more practice using protocols and processes.

Conclusion

Integrating photographs into the curriculum of dentistry gives rise to a more precision, artistic and patient oriented approach in the area of smile design. The use of photographs provides a critical tool for dentists, which increases their competence and contributes to the overall success of cosmetic dentistry. Emanation of

digital smile designing The concept of smile design originated within the field of cosmetic dentistry, evolving as a response to the growing demand for aesthetic enhancements to dental treatments. It gained prominence in the late 20th century as advancements in dental technology and materials allowed for more sophisticated and customizable procedures^[1]. The idea behind smile design is to combine principles of art and science to create an aesthetically pleasing and harmonious smile. Dentists began to integrate concepts from facial aesthetics, including proportions, symmetry, and individual preferences, into their treatment planning processes. This approach goes beyond addressing dental issues and considers the overall appearance of a person's smile in relation to their facial features^[2-4]. The concept of Digital Smile Design (DSD) has evolved over several generations, each marked by advancements in technology and methodology. Christian Coachman, a Brazilian dentist, introduced the concept of DSD and outlined its generational evolution in 2017. Here is an overview of the different generations of Digital Smile Design^[5]:

1. Generation 1: Analogue Drawings (Before Digitalization)



2. Generation 2: Two-Dimensional (2D) Digital Drawings
3. Generation 3: Digital 2D Drawings with Analogue Connection to Model
4. Generation 4: 2D Digital Drawings with Connection to 3D Model- Transition from 2D to 3D analysis in digital dentistry.
5. Generation 5: Complete 3D Workflow
6. Generation 6: Introduction of 4D Concept- Likely includes considerations of dynamic factors, such as facial expressions and movements over time. These generations represent the progression from traditional analogue methods to the integration of advanced digital technologies in smile designing.

Mandates of Digital Smile Design

Digital Smile Design (DSD) is a comprehensive approach in dentistry that involves using digital tools and technology to plan and design a patient's smile^[7-9]. The process includes various elements, and here are the key requirements for Digital Smile Design:

1. Digital Imaging Equipment
2. Computer Software:
3. Intraoral Scanners:
4. Face Scanning Technology:
5. CAD/CAM Technology:
6. Articulation Systems:
7. Patient Communication Tools:
8. Photography Setup:
9. Patient Database and Management:
10. Training and Skill Development:
11. Patient Collaboration:
12. Integration with Treatment Planning:

Photography Methodology

Photographic views in dentistry, particularly when using a fixed head position, are essential for documenting various aspects of the oral cavity and facial features consistently. Fixed head position refers to maintaining a standardized and stable orientation of the patient's head during image capture^[10]. This helps ensure consistency, making it easier to compare images over time and aiding in treatment planning.

1. Facial Views:

Frontal View: Capture a direct, full-face image of the patient smiling with the lips relaxed. This view is valuable for assessing overall facial aesthetics.

Profile View: Capture a side view of the patient's face,

including the nose, lips, and chin. This helps in evaluating facial harmony and profile aesthetics.

2. Intraoral Views:

Full Arch View: Capture a straight-on image of the entire upper and lower arches, including all teeth. This provides an overview of the entire dentition.

Anterior View: Focus on the front teeth (incisors and canines) to assess their alignment, size, shape, and color.

Lateral View: Capture a side view of the anterior teeth, allowing for a detailed analysis of tooth proportions and alignment.

Occlusal View: Capture an overhead view of the occlusal surfaces of the posterior teeth. This is useful for assessing the bite relationship and identifying occlusal issues.

Buccal and Lingual Views: Capture side views of individual teeth to document details such as decay, restorations, or anomalies.

3. Orthodontic Views:

Right and Left Buccal Views: Capture lateral views of the patient's smile from the right and left sides. These views are crucial for orthodontic assessments.

Smile Arc View: Capture an image along the patient's smile arc to assess the curvature and alignment of the teeth.

4. Specialized Views:

Close-Up Views: Capture close-up images of specific teeth or areas of concern to document details such as fractures, decay, or restorations.

Gingival Views: Document the gingival tissues, including the papilla and contours, to assess gum health and aesthetics.

5. Extraoral Views with Fixed Head Position:

Repose and Forced Smile Views: Capture images of the patient at rest and smiling to assess the dynamic nature of the smile.

Softwares used for Digital Aesthetic Design

There are several types of smile design software available for dental professionals, each offering unique features and capabilities^[11]. These tools are designed to aid in the digital planning and visualization of cosmetic and restorative dental procedures. Here are some types of smile design software commonly used in dentistry:

- DSDApp (Digital Smile Design App)
- Smile Designer Pro
- 3Shape Dental System



- CEREC Software
- Planmeca Romexis Smile Design
- Canary Cloud
- GALILEOS Implant Software
- Ipsen Smile Design
- EvaDent Smile Design
- OrthoCAD
- Curve Dental
- Eaglesoft
- Dextrix
- Open Dental
- Easy Dental
- BlueSkyPlan
- Dentisoft Office Cloud
- DEXIS Imaging Suite
- Mediadent Imaging Software
- Romexis Viewer

Role of Photography in Smile Designing Documentation and Analysis:

Baseline assessment: A baseline is provided by high quality photographs showing the current state of a patient's smile. Details like teeth color, shape, alignment and overall facial appearance shall also be taken into account^[12-15]. **Facial analysis:** photographs are used to analyse the features, proportions and symmetry of a patient's face enabling dentists to design his or her own smile complementing this unique facial structure^[15-17]. **Treatment Planning:** Visual aids: To create a personal treatment plan, dental practitioners will be helped by visual information derived from photographs. They may use these images for the purpose of demonstrating possible changes and to discuss potential outcomes with patients.

Communication: Photographs are a visual means of communication between the dentist, the dental team and the patient. This is to make sure everyone understands what changes are needed and how they will be achieved.

Patient Communication and Education:

Informed Decision-Making: Showing patients before-and-after photos or digitally manipulated images helps them understand the potential outcomes of different

treatment options. It is also useful for making informed decisions and limiting unrealistic expectations. **Visual Possibilities:** Some patients may have a certain preference for smile. Photography gives them a look at how changes in the shape, size and alignment of teeth can affect their overall appearance.

Study design and Sample Size Calculation: The study was done using a convenient sampling method. The study was done among the undergraduates pursuing BDS in Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India. A total of 183 responses were recorded. The sample size was calculated using an OpenEPI software. Google forms were shared in the groups of each undergraduate batch in order to record the needed information.

Questionnaire

The questionnaire content was created after the analysis of published studies. To calculate the validity and reliability of the questionnaire, Chronbach's alpha was used. Two experienced prosthodontists, from the Kalinga Institute of Dental Sciences in Bhubaneswar, Odisha, carried out a review of the questions' content and format. A panel of four experts, comprising a biostatistician, took part in assessing the content validity. The face validity has been confirmed during an initial investigation carried out using Google forms. In the opinion of the expert group, corrective measures have been taken.

The questionnaire consisted of two parts. The main objective of the first part was to obtain participants' consent. In the second part, the questions were created in order to assess the knowledge on the role of photography in designing smiles. The response of those students who are unaware of the term was not included in order to avoid bias.

Statistical Analysis

The collected data were entered in Microsoft Excel 2020 and subjected to statistical analysis by a blinded statistician. The obtained data was then analyzed using IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp.



Results

BDS 1st Year and BDS 2nd Year



When it came to responding to this survey, BDS first years were the highest followed by second years. From Figure1(a) and (b) it was evident that students have an idea about the role of photography but when it

came to the application of protocols and procedures they need more honing.

1. Are you aware that photographs are essential requirements for planning a smile designing ?

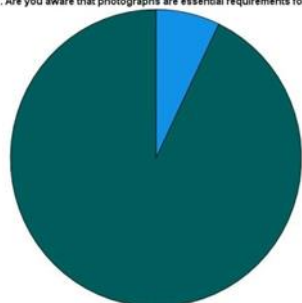


Figure 1(a)

2. If yes, Do you know about the photography protocols required to follow for DSD(Digital Smile Designing)?

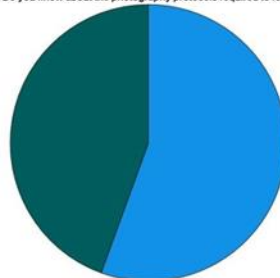


Figure1(b)

Figure 2 demonstrates 76.6% (n=131) found digital smile designing easy and convenient.

Is the digital smile design process easy and convenient ?

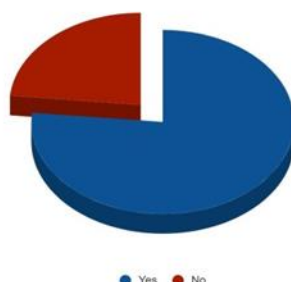


Figure 2

Response to Knowledge Based Questions on Positioning of Face The following 17 questions are based on knowledge about the methodology of documenting different aspects of the oral cavity and facial features.



Figure 4(a) gives us an insight about their knowledge on facial views with 38% of the participants knowing about the position of frontal view and 53.2% have an idea of side profile view.

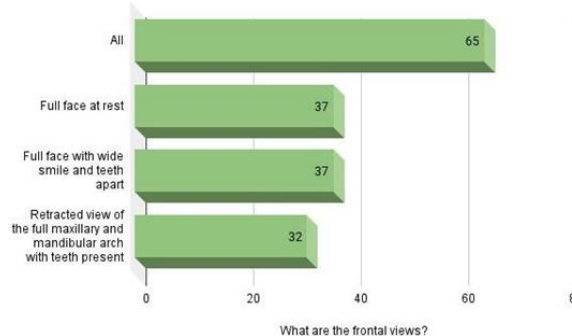


Figure4(a)

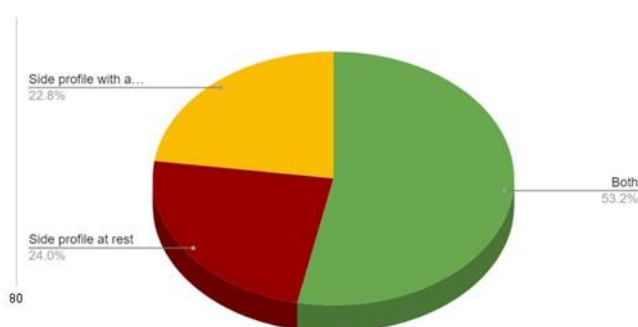


Figure 4(b)

Are you aware of the intraoral mirrors for photography?

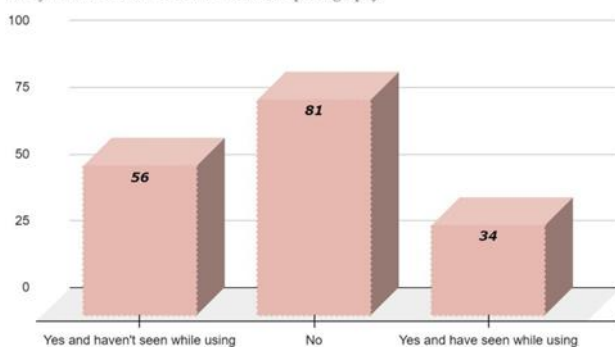


Figure 5(a)

Requisites of ideal photographs ?

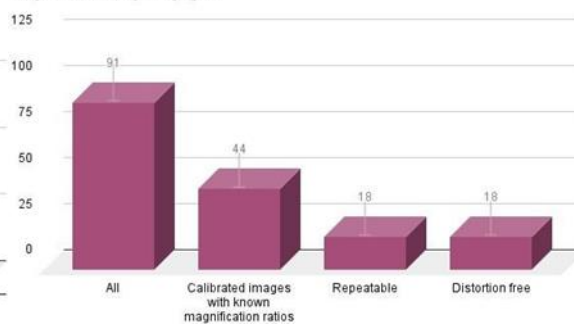


Figure 5(b)

Are you aware of the cameras, lens, lighting and camera setting used for photography?



Figure 6(a)

What should be the camera position?

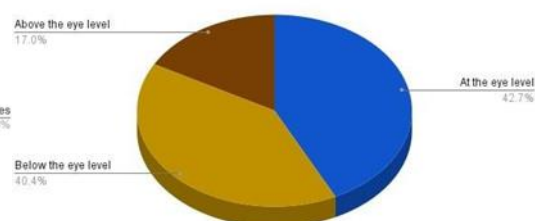


Figure 6(b)

How to check symmetry in a photograph ?

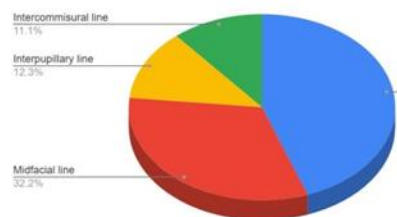


Figure 7(a)

Photograph should be ?

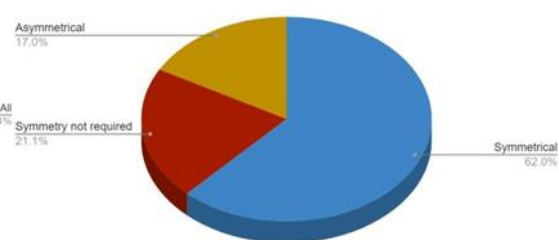


Figure 7(b)



What are the intraoral reference points?

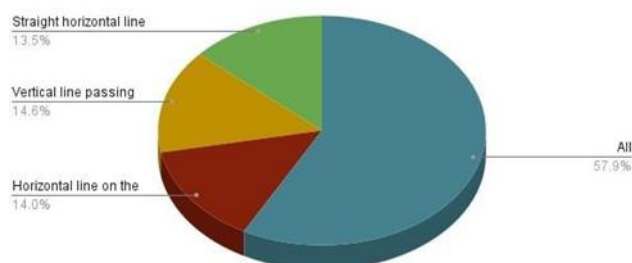


Figure 8

Discussion

This current study elucidates that dental undergraduates i.e those who have no clinical exposure do know about Smile Designing and have a knowledge of the methodology of initial phase of the process^[18]. They need more educational intervention and clinical exposure to learn about the technicality of this digital dentistry^[19]. The study gives us an insight that 52.9% of the participants knew about the requisites of an ideal photograph (figure 5(b)). Around 56.6% of the studied population have a idea on camera lens and their settings (figure 6 (a)). 44.4% of the dental undergraduate first years and second years have a knowledge on how to check the symmetry in a photograph (figure 7(a)). Figure 8 suggests that 57.9% of the participants are known to intraoral reference points.

Conclusion

The photographic approach plays an important role in smiling design, which is a specialised area of dental work that focuses on adding aesthetic characteristics to one's smile. Images, such as teeth colour, alignment and overall profile of the face, assist in documenting the present state of a patient's smile. To demonstrate possible results, dental practitioners may use virtual images enabled by the digital imaging software which help patients to understand what changes are envisaged. The integration of photography into the dental curriculum has become increasingly significant, especially in the specialized field of smile designing within cosmetic dentistry. Recognizing the pivotal role of photography in this context, dental education programs are incorporating comprehensive training on utilizing photographic techniques for documentation, analysis, treatment planning, and communication. This

introduction explores the multifaceted role of photography in smile designing within the dental curriculum.

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