

GRADUATION PROJECT

Degree in Dentistry

CLINICAL DETERMINATION OF COLOR ACCURACY PERCENTAGE WITH VITA GUIDE IN PROFESSIONALS AND STUDENTS

Madrid, academic year 2024/2025

Identification number:102

RESUMEN

Introducción: La coincidencia precisa del color es esencial en la odontología estética. La guía VITA es una de las herramientas más utilizadas en odontología para la selección del color, pero su precisión varía según las condiciones ambientales, la formación y la experiencia. Este estudio examina la precisión de la selección del color entre estudiantes de odontología y profesionales; **Objetivos:** El propósito de este estudio es comparar la precisión de la selección del color entre estudiantes y profesionales utilizando la guía VITA, y evaluar el impacto de la experiencia y la formación; **Métodos:** Se realizó un estudio empírico en la Universidad Europea de Madrid con 81 participantes (78% estudiantes de odontología y 22% profesionales). Cada participante respondió una encuesta e identificó cinco tonos diferentes utilizando dos guías VITA. Para evitar sesgos, se asignaron códigos aleatorios a los tonos y se utilizó una guía VITA normal para comparar. Se calculó el porcentaje de precisión y se analizaron factores que influyen en la selección del color, como la iluminación, la retroalimentación del paciente y la formación profesional; **Resultados:** Los profesionales dentales obtuvieron una mayor precisión en la selección del color en comparación con los estudiantes de odontología, lo que respalda la hipótesis de que la experiencia influye en la precisión. La mayoría de los participantes (65%) prefirieron la luz natural para la selección del color. Los estudiantes dependieron más de la retroalimentación de los pacientes que los profesionales; **Conclusiones:** La experiencia mejora significativamente la precisión en la selección del color, subrayando la importancia de la formación clínica. Futuras investigaciones deberían explorar el papel de las herramientas digitales y la inteligencia artificial en la mejora de la precisión en la selección del color para obtener mejores resultados en los pacientes.

PALABRAS CLAVE

Odontología, Guía VITA, Selección del color, Precisión del color, Odontología estética

ABSTRACT

Introduction: Accurate shade matching is essential in aesthetic dentistry. Vita guide is one of the most used tools in dentistry for shade matching, but accuracy varies depending on environmental conditions, training, and experience. The accuracy of shade matching between dental students and professionals is examined in this study; **Objectives:** The purpose of this study is to compare the accuracy of shade matching between students and professionals using the VITA guide. And to evaluate the impact of experience and training; **Methods:** An empirical study was conducted at Universidad Eueopea de Madrid with 81 participants (78% dental students and 22% professionals. Each participant answered a survey, and identified five different shades using two VITA Guide. To prevent bias random codes were given to the shades. And one normal VITA Guide to compare it with. Accuracy percentage was calculated, and factors influencing shade matching . such as lightning, patients feedback and professional training was analyzed; **Results:** dental professionals had higher accuracy in shade matching compared to dentistry students. supporting the hypothesis that experience has an effect on precision. Most of the participants (65%) preferred natural light for shade matching. Students relied more on patients feedback than professionals; **Conclusions:** Experience significantly improves shade matching accuracy, underlining the importance of clinical training. Future research should explore the role of digital tools and artificial intelligence improving color selection accuracy for enhanced patient outcomes.

KEYWORDS

Dentistry, VITA Guide, Shade matching, color accuracy, Aesthetic dentistry

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1 INTRODUCTION

1.1 Aesthetic Importance in dentistry

Aesthetics has become one of the most important areas of dentistry. The appreciation and expectation for aesthetics among both dentists and patients have gradually increased. Especially in treatments such as fixed prosthodontics and restorations. The art of a dentist's ability to choose the correct shade and reach the most aesthetic point is a challenge dentists face on a daily basis (1). This is among the most crucial elements in dentistry, particularly in modern aesthetic dentistry, which is fundamental in order to achieve a natural and visually appealing outcome. Any disparity between natural teeth and restorative materials can significantly affect the final appearance, thereby requiring precise selection by the dentist (2).

1.2 Evolution of color matching in dentistry

Over the past century, there has been a significant change in the use of science when it comes to color matching in dentistry. The Munsell color system created by Albert H. Munsell at the beginning of the 20th century, offered a standardized way to identify and convey colors based on the three dimensions: hue, value (the lightness), and Chroma (the saturation) (3). The value, which describes the lightness of color is always first to be determined. The standard base of color matching in dentistry and other fields was established by this method. standard shade recommendations like the Vita classical shade guide, which was first published in the 1950's, have been used by dentists since the middle of 20th century to help dentists to choose the right hues for the patients. Subsequently, this has been essential to the dental practice by facilitating more precise and reliable color matching between dental restoration materials and patients natural teeth color (4).

1.3 Tools for shade matching

The most important first step towards a clinically successful outcome is the dentist's ability to understand the correct color and material that is required in a restoration, and be able to communicate that vision to the lab. Professionals use different brands for color selection, among these exist the VITA classic and VITA 3D master shade guides, which are the most commonly used in dental practices. They offer a variety of color options to assist in selecting the most accurate match for each patient's natural tooth color (5).

Additionally, the patient's opinion is a critical factor in the treatment process, as the success of restorative procedures often depends on the patient's satisfaction with the final shade (6). In some cases, the patient may desire a shade brighter than their natural color. In fact, many prosthetic treatments fail or are inadequate due to incorrect shade selection, whether resulting from the patient's preferences or from color mismatches made by a previous dentist (7).

1.4 Shade guides

With sixteen shades arranged in four different color groups. Group A, B, C and D. Vita classical shade guide is one of the oldest and most common methods. The vita 3D-master shade guide provides dentists and dental students a more systematic method for performing an accurate shade of the patient's natural teeth.

Ivoclar vivadent's chromascop shade guide makes it simpler to match ceramic and composite materials. This shade guide contains 20 different shades in five different color groups.

Shofu's vintage halo shade guide is a set of shades for a more precise color expansion that is designed to go well with shofu's porcelain system (8).

1.5 Color perception in dentistry

Humans are often influenced by colors in everyday life, hence the difficulty in choosing the "right" color. The word colorful is usually associated with happiness and vibrancy while colors with grey tones can evoke sadness. An understanding of color perception is essential across various scientific disciplines, with modern dentistry serving as a prominent example. Advances in technology have enabled the detection of up to ten million distinct shades, far exceeding the human eye's capacity to distinguish nearly one million, thereby significantly enhancing the precision of color matching in dental care (9).

1.6 Fundamentals of tooth color characterization

Four variables are used to characterize the perception of light reflected from the tooth surface; hue, Chroma, value and opalescence. Hue is the teeth's predominant tone (yellow or reddish), value is the tooth shades lightness or darkness, regardless of hue, and Chroma is the hue's strength or saturation, which determines how bright it is. Opalescence stands for the faint blue or orange tones in the enamel (10). In the late 19th

and early 20th centuries, Albert Henry Munsell conducted a significant study of color theory, offering deep understanding of Chroma, hue, and lightness. His theory continues to influence techniques for achieving natural looking results (11).

1.7 Albert H. Munsell's color contributions to color theory

Munsell's soil color chart illustrates how altering the hues or brightness of existing colors can produce new ones. Each page in Munsell's tables corresponds to a distinct color with brightness (value). In saturation (Chroma) are arranged on chromatic scales. This means that a single hue, like hue 1, can have up to 8 different variations by adjusting Chroma or brightness (12).

Color matching is widely used in many different dental procedures such as fixed prosthodontics (13). A key component in both direct and indirect restoration is the color matching. To guarantee that the repair of patient's teeth is undetectable and visually appealing, we need to choose the right color. To create the most attractive look, crowns, bridges and veneers must match the hue of the patient's natural teeth (14). In implant restorations, the prosthetic pieces that are placed over implants are required to fit perfectly with the natural teeth. Direct and indirect restorations are used to restore the natural tooth structure. Composite fillings are generally used, notably and inlays/ onlays also require precision in color selection.

Opalescence is an essential characteristic dentist utilize to determine the most natural color for a patient. The tooth's bluish or reddish tint is caused by the enamel, which also affects how light is scattered and absorbed as it passes through the tooth (15). The color of a tooth originates from the dentin, while the enamel modifies the dentin's color. For example, in children, dentin is often lighter with a softer yellowish tone than in adults, as children's teeth have not yet been affected by aging processes or color changes over time (16).

1.8 Aesthetic goals in dental restoration

The development of dental restoration a treatment that successfully combine practical and aesthetic harmony is the main goal of the general aesthetics in dentistry. Aesthetic includes more than just treating oral health problems and pathologies, it also includes creating a natural, beautiful and calm appearance that enhances the patient's beauty and facial characteristics. The color, shape, size and placement of teeth are important

components of dental aesthetics (17). These elements are imperative to ensure that the dental restoration matches in with the patient's natural look.

1.9 Color matching techniques

An aesthetic dentist uses often the color of the patient's sclera (the white part of the patient's eye) as a reference point to choose the right color of the veneer. This technique is important for achieving a natural and harmonious appearance that enhances the patients overall facial characteristics (18). Each patient has their own unique facial characteristics, such as skin tone, eye color, and sclera brightness. As the color and brightness of the sclera are consistent and easily observable in close proximity to the smile, a reliable reference point is thus created for the dentist. Veneers may at time look very artificial or "fake" if they are noticeable white. Especially when they are whiter than the sclera itself. By matching the veneers hue to the patient's sclera, it will appear naturally bright, however without attracting an excessive attention. On the other hand, a veneer that is darker in contrast to the sclera can produce a negative change and make the patients smile appear lifeless or even unhealthy (19).

CIELAB color system and VITA shade guides are reference points commonly used by dentists, however differences among various material manufacturers can create difficulties. Studies use psychometric models to relate perceived tooth color to specific VITA shades to address uncertainties in color matching (20).

In order to create aesthetic harmony with the patient's existing teeth, dentists must take into account a number of aspects while choosing tooth color. Biomimetic color analysis and modeling are important here, and thus the increasing need for these technologies. The technique draws inspiration from models and systems found in nature, and helps dentists choose the best possible tooth color for each patient. Although constant training is required advances in digital technology and artificial intelligence are improving color selection accuracy (21).

1.10 Challenges

Aesthetic results in dentistry depends strongly on color matching, it requires skills, details, attention and knowledge of materials and environmental influences. The appearance of the patient's tooth color changes under different lightning conditions and angle of the lightning. The light can create a shadow or highlight hence affecting the

color appearance. Artificial light can cause mismatches. In modern dentistry increased translucent materials and modern composite resins have caused color matching difficulties. These materials allow light pass through just like patient's natural enamel. Which also affects how the color appear. Their opalescence and fluorescence copy how the patient's natural teeth look under different lightning, making them appear more real. Composites may also slightly change color after it has been cured, due to chemical reactions or shrinkage (22). In dentistry materials like lithium desilicated and zirconia let light through, this can lead to difficulties in creating a consistent tone. The color of the cement has an increased impact on the tone (23).

1.11 Technology and artificial intelligence in shade matching

Although clinical colorimetry and traditional shade guidelines have been around for a while, they are frequently imperfect. Although tooth color is measured using technologies such as colorimeters, spectrometers, and digital photography, difficulties remain because of subjectivity and perceptual differences (24). However, new techniques for choosing the ideal color for cosmetic restorations are made available to dentists by digital imaging, artificial intelligence, and other technology (25). Color selection is being transformed by AI and digital tools in dentistry, and many dentists have great expectations for these technologies. More precise color selections and more individualized treatments are promised by these instruments, which may improve patient happiness and the dental care experience (26).

1.12 Justification of the work

This study aims to investigate the accuracy of color selection among dental professionals and students. By comparing these two groups, we search to determine whether experience and training influence color selection accuracy. As dental students lack clinical experience normally, this research could be central in helping to improve different training methods and improve the quality of aesthetic dental treatments in the future. This resulting investigation may be important in the future, to prepare students better for color matching via different techniques.

Furthermore, the study focuses on filling a key gap in understanding how cognitive biases and environmental factors, like lighting and observation angles, affect color perception differently in trained professionals compared to student.

1.13 Hypothesis

H0: The accuracy of dental shade matching between dental professionals and dental students utilizing the VITA shade guide does not provide any significant difference.

H1: Due to increased experience among dental professionals compared to dental students, dental professionals demonstrate higher accuracy in the shade matching by using VITA shade guide.

2 OBJECTIVES

- The objective of this research is to compare the accuracy of teeth shade matching between dentists and dental students using the Vita Shade Guide.

3. MATERIALS AND METHODS

3.1 Type of study

In this paper, we conducted an empirical study (comparative cross- sectional study). Both professors and students participated in this experiment, which was carried out in the lab at Universidad Europea de Madrid. The purpose was to assess the precision between professionals and students, of dental shade matching using the VITA shade guide. A survey of 81 participants was conducted to compare the shade matching accuracy between dental professionals and students. All the participants were obliged to sign an informed consent before undergoing the survey. Initial approval was sought from UEM research committee with the (Code: 2025-108) and Department (Code: OD.050/2425).

We also reviewed scientific articles about dental shade matching and techniques. We focused on modern technology development and visual approaches. This is done by using Universidad Europea de Madrid CRAI library, Google scholar and PubMed as scientific website to find reliable resources that have papers with scientific evidence. They were used if they were written in English and Spanish.

Keywords used: shade matching, aesthetic dentistry, color matching in dentistry, VITA shade guide accuracy, color accuracy, restorative dentistry.

For the experiment, one blindfolded VITA guide with five different shades was used, alongside a visual guide with all the shades and the shade numbers. The five shades were assigned with different codes/ names to make the color matching more challenging. These codes did not correspond to the actual Vita shade Guide names but were used to prevent bias, and to make sure the participants relied on visual perception

rather than guessing. Each reference was provided to each participant at a time, to avoid confusion. We note the shade identified and compare them to the actual shade determined. Later we calculate the accuracy percentage of both groups. We use a statistical method to compare the results we get in the end of the research.

3.2 Inclusion criteria:

- Dental students enrolled at Universidad Europea de Madrid
- Dental professionals working at Universidad Europea de Madrid

3.3 Exclusion criteria:

- Dental students and professionals with lack of clinical experience
- Individuals with eye capacity disorder that could affect shade matching ability
- Those who declined participation.
- Students and dental professionals outside of Universidad Europea de Madrid

4 RESULTS

Regarding the gathered findings, we will have a closer look into the obtained results regarding color accuracy percentage with vita guide among professionals and dental students.

4.1 Professionals and student distribution

This pie chart represents a total of 81 participants from Universidad Europea de Madrid who took part in this study, where 78% were dental students and 22% were dental professionals. The majority of the participants were dental students with limited experience, which could influence the accuracy of shade matching results.

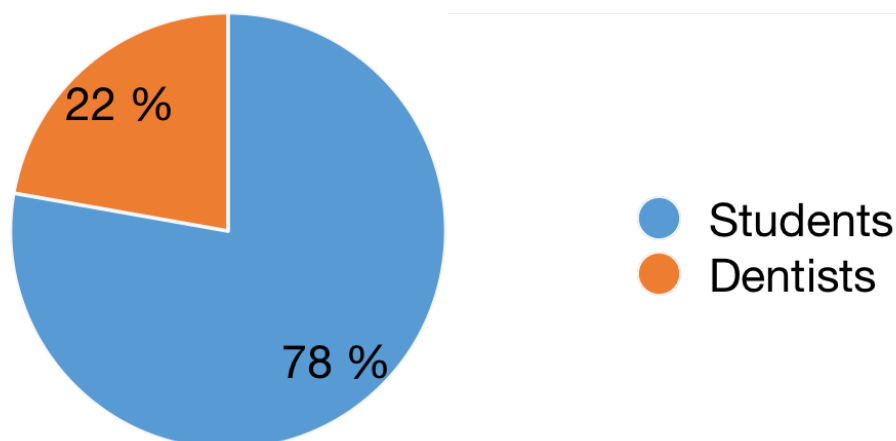


Figure 1: Pie chart of the distribution of participants

4.2 Professional experience of the participants

This graph shows the experience among dentistry students and professionals. A small percentage have mild level experience. Most participants in the survey are new professionals or early dentistry students, which may impact our results in shade matching accuracy drastically.

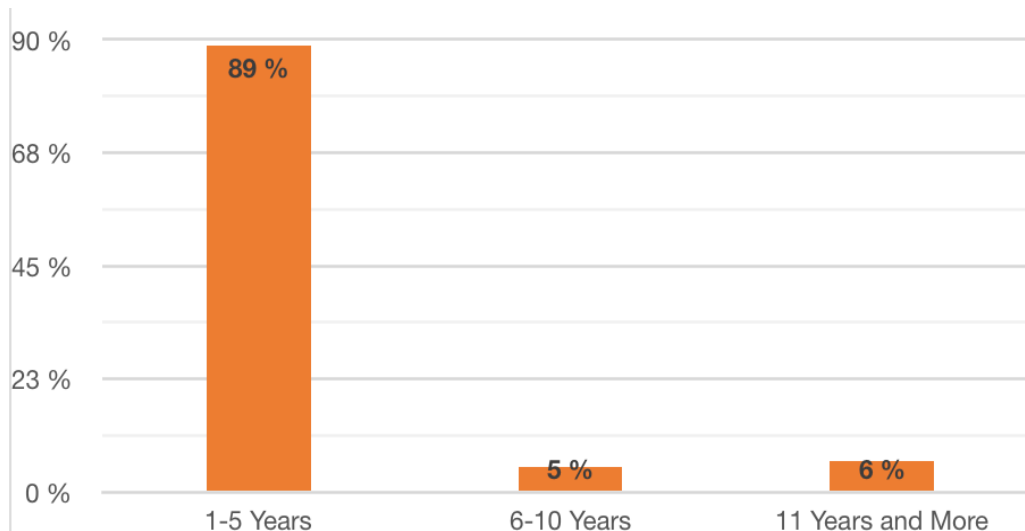


Figure 2: Results of professional experience among participants

4.3 Professional training among the participants

This graph compares the percentage of professionals and dental students who have received professional training. 56% dentists have received professional training and 44% dental students. This shows that more dentists have done training than students. students, who are still are in their learning phase lack training and experience. This could also impact our survey results.

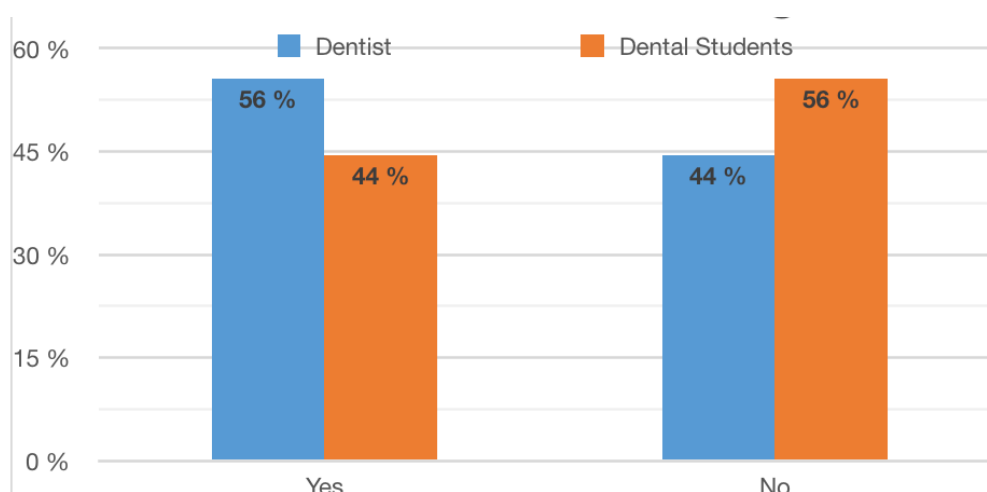


Figure 3: Comparison of professional training received

4.4 Perception of the participants regarding the color matching

The participants had to evaluate their knowledge of color matching in dentistry. The majority (67%) of the participants believe that they have a decent understanding of color matching. Meanwhile only 19% of the participants had a thoughtful understanding. A smaller group of 15% have a low confidence.

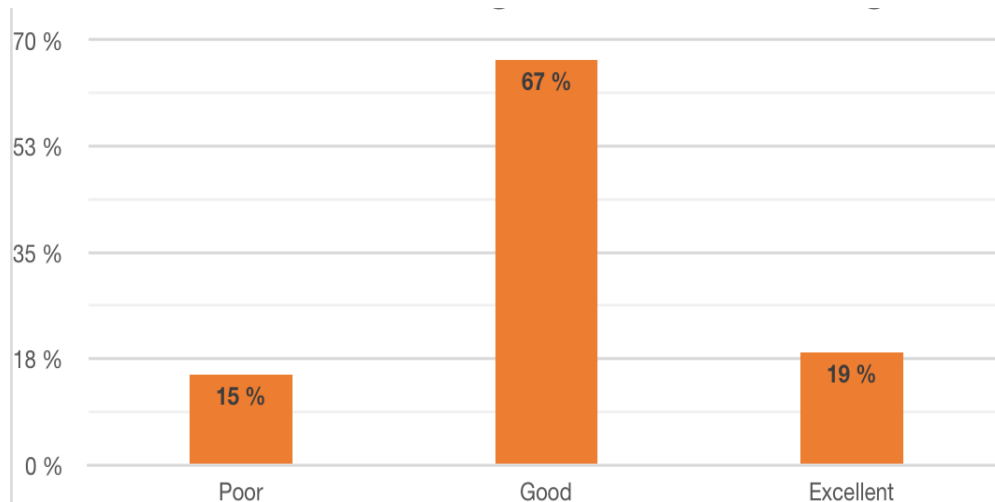


Figure 4: Participants self-assessed knowledge of shade matching.

4.5 Reliance on patient feedback

Students relied more on patient's feedback than dental professionals. 44% of students always rely on patient's feedback, compared to 33% of professionals, while 56% of professionals used patient feedback occasionally, compared to 51% of students. However, 11% of professionals never relied on patient's feedback, compared to 5% of student

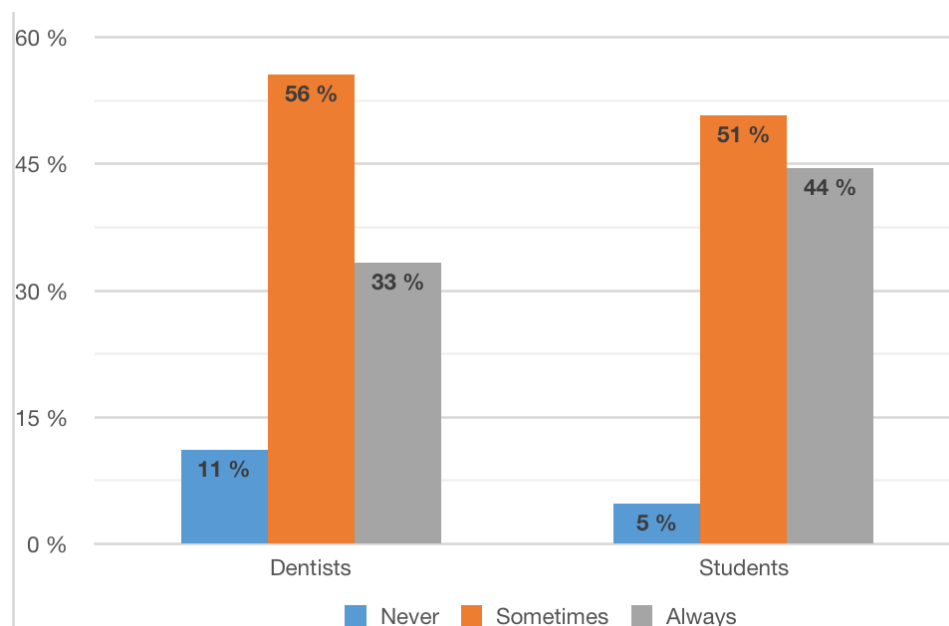


Figure 5: Reliance of patient feedback.

4.6 Factors influencing shade matching

This graph represents the results from the survey, both professionals and dentistry students agree that experience is the most critical factor for correct shade matching. 26% of the participants believe that the shade guide and materials impact precision. 14% mean that formal training alone is not enough without clinical practice. 14% believe that patients characteristics like tooth translucency, and face color affect color perception.

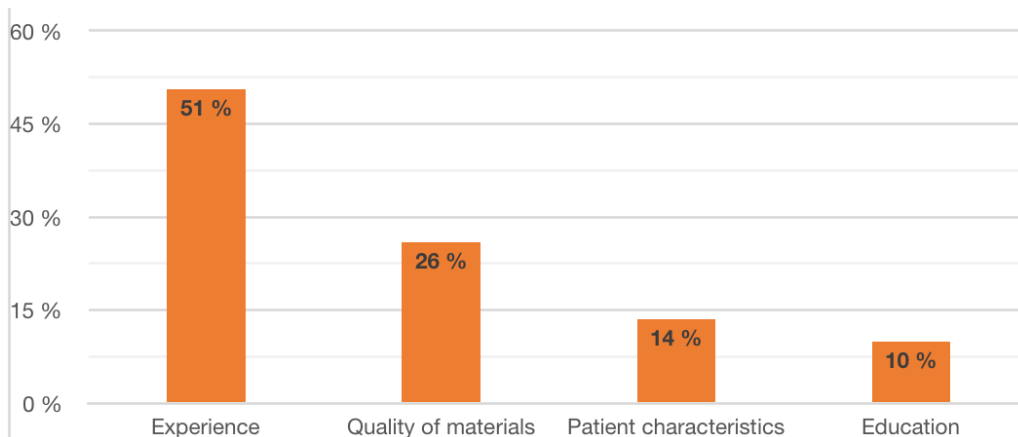


Figure 6: Factors influencing shade matching

4.7 Frequency of redoing shade matching by the participants

This shows how often the participants need to redo the shade matching during work or clinical training in the university. Since over 80% redo shade matching at some frequency level, it shows that shade matching is a challenge in dentistry.

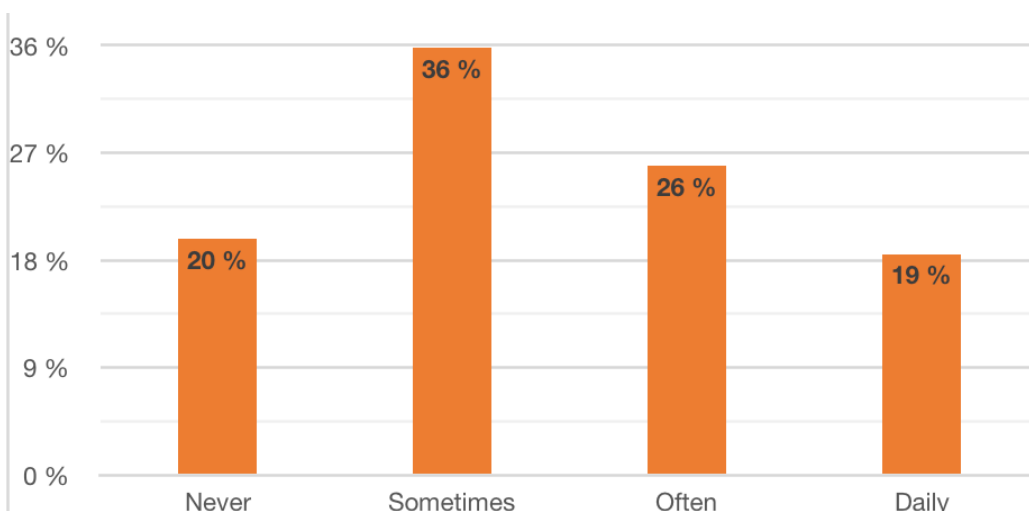


Figure 7: How often participants need to redo shade matching

4.8 Type of light in color determination

This graph shows the preferred source of light among dentists and dental students in UEM. 65 % of the participants preferred natural light for color matching. 26% rely on the

standard operatory light, like dental chair light, which may affect the color shade matching color. 9% use specialized LED lights for precise shade selection. This illustrates that the natural light is the most trusted source among our participants of the survey.

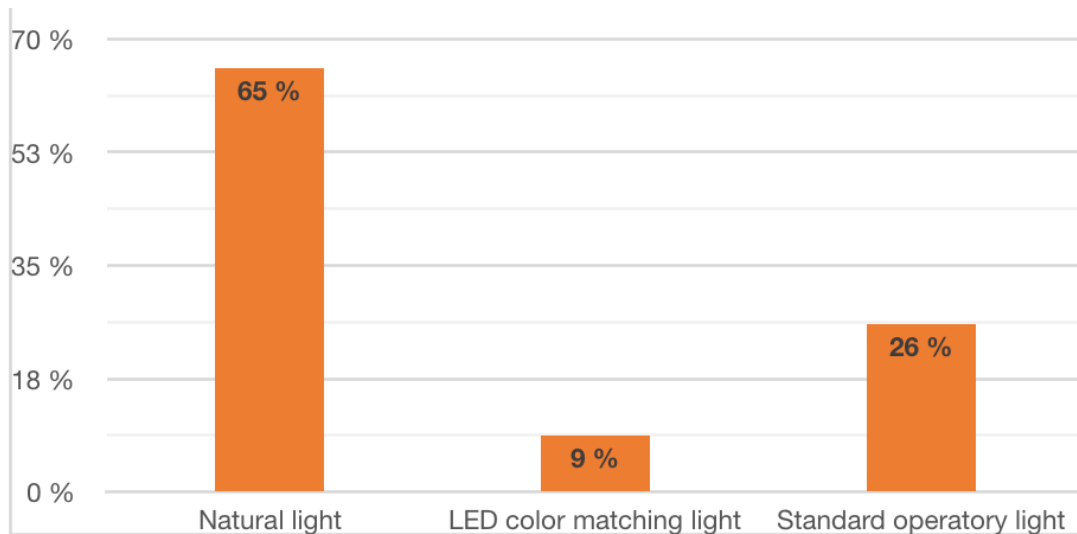


Figure 8: Preferred lighting sources for shade matching

4.9 Proportion of accurate responses regarding color matching

Regarding shade A1, the graph illustrates the accuracy, to make it more difficult to select the correct shade. 50% of the dentist had more accurate in identifying the code A1 shade. Students had less accurate, because of lack of experience and training. Regarding shade B2, 61% dentists had more accurate in identifying the shaded with code B2, while 59 % of the students had correct answer. According to accuracy of the shade with code C1, 61% of the dentists had more accurate color, and 38% dental students had the accurate color. Additionally, the graph illustrates the accuracy of the shade with code D3. 50% of the dentists had accurate answer, and 16% of the students. Finally, regarding the accuracy of the shade with code A2, 33% of dentists had accurate answer in shade matching this color and 37% of the students.

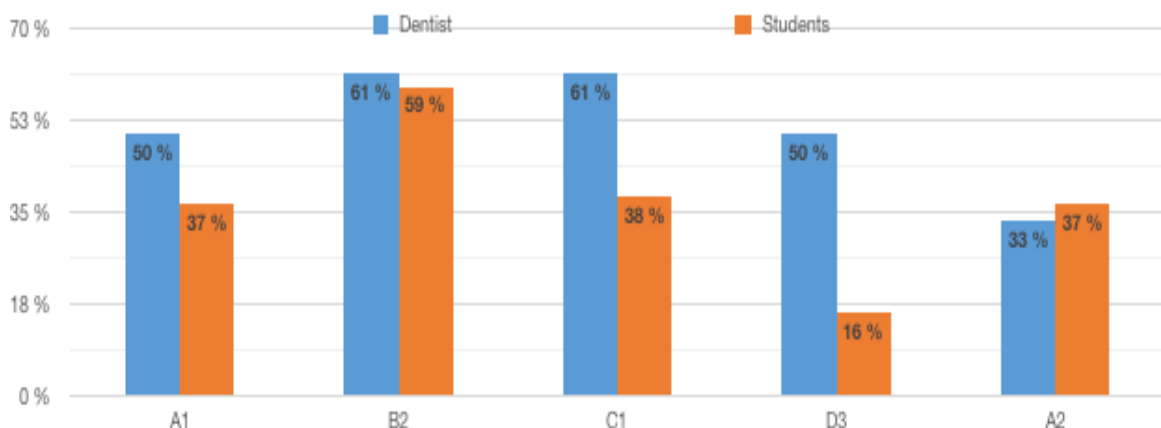


Figure 9: Accuracy of professionals and dentists in identifying different shades marked with different codes than the actual shade.

Aspect	Dental students	Dental Professionals
Percentage of total participants	78%	22%
Professional Trained	44%	56%
Influential Factor	Experience	Experience
Always Relying on client Feedback	44%	33%
Accuracy on Code A1	37%	50%
Accuracy on Code B2	59%	61%
Accuracy on Code C1	38%	61%
Accuracy on Code D3	16%	50%
Accuracy on Code A2	37%	33%

Figure 10: Table of results.

5.DISCUSSION

The purpose of this study was to see how accurately dental professionals and students used the VITA shade Guide when choosing shades. Our results showed how experience, training and lighting plays a very important role in color and shade matching. This supports the hypothesis that experience improves shade matching accuracy. The study consisted of 81 participants with 78% being dental students and 22% dental professionals (Figure1). Since most of the participants were students with limited clinical experience, this could significantly affect our results. The level of experience was varied (Figure 2).

In the study carried out by Udiljak *et al* (2018), the findings demonstrate that professionals with more clinical exposure performed significantly better than dental students (27). Also, Hardan *et al* (2022) (28), conducted a systematic review that shows a direct correlation between the quality of shade matching and exposure to clinical cases and experience. These results are consistent with our study, which showed that dental professionals were more accurate at matching shades than students (Figure9). This suggests that theoretical knowledge alone is not enough to master good color matching strategies.

The percentage of professionals and students who had received formal training was also evaluated (Figure 3). The results show that 56% of dentists had professional training compared to only 44% of dental students. Studies shows that practical training is more essential rather than theoretical knowledge alone (29). Understanding how shades are determined, calculated and consequently how they are affected helps dentists to become aware of these factors when shade matching (Figure6). Students scored less on most of the experimental questions. The difference between professionals and students may also be due to limited experience with different shade matching and relying more on theory than practice.

Participants were also asked to assess their own knowledge of color matching accuracy in dentistry (Figure 4). The majority had decent understanding of shade matching. While only 19% had in depth knowledge. A smaller percentage of 15% lacked confidence in selecting correct shade matching.

Several factors affect the accuracy of shade matching, including lightning conditions, patients feedback, and reliance on training. Also in literature, numerous factors have been found that can lead to inconsistencies and differences when choosing a shade using various shade measurement methodologies. These variables include gender, age, experience, lightning, and the dentist eye conditions (30).

65% of the participants preferred natural light for shade matching (Figure 8), different light sources can drastically change how color is perceived, artificial lightning in clinical settings is still difficult. Results may change significantly depending on whether you use dental lights or natural light during the day (31).

Reliance on patient feedback was more common among students than professionals (Figure 5). This can be because students might be less confident in their abilities to make decision on their own and rely more on patient feedback and to support their decision. Although patient happiness is essential in dentistry, choosing the wrong hue could result from relying too much on patient opinion rather than professional judgment. This is also observed according to Alnusayri *et al* (2022) (32). The research shows that relying too much on individual's opinion can result in the wrong shade being chosen.

Participants were asked about the most critical factors in achieving accurate shade matching (Figure 6). 46% selected experience as the most important factor.

Limitation of human vision and material characteristics make color matching in dentistry difficult, even with better shade guide systems. In our study we only used Vita Classical Guide, other types of shade guides such as VITA 3D Master should be used, and might give different results. However dental materials, such as composite resins and ceramics might appear differently in different light conditions due to factors like their opalescence and fluorescence. The Classical Vita Guide teeth are made of synthetic resins, and due to repeated use and cleaning cycles these shade tabs experience discoloration. It is also very unreliable because there are many different brands with different shade classifications (33).

The fact that over 80% of the participants said they regularly had to reconsider their shade selection (Figure 7) indicates that accurate shade matching is not always easy. This also highlights how crucial it is to practice and improve shade matching techniques. Also, smaller amount of participants were professionals. Similar findings by Jouhar *et al* (2022) was done where dental students score higher because they rely on visual perception and caution (34).

To test shade matching accuracy participants were presented five different shades, with five different codes. Their answers were recorded (Figure 9). In one of the tests given code A2, 37% of the dental students had correct answer, compared to 33% of dental professionals. The actual shade was shade B2 but called A2 to make it more challenging. This could be because students relied on visual perception, and overthink more while professionals were overconfident and quicker at responding.

Despite the significant findings of this study, some limitations must be noted. First, the sample size may not represent dentists from different places and clinics. Shade matching is based on vision and results can vary. Even with a standard technique, things like how people see color and outside variables such as eye fatigue can influence the shade matching. Factors such as observation angle and room lighting were not controlled in this study. Future research should investigate digital shade matching tools, it could increase the level of accuracy since the teeth have different layers and levels of translucency.

Future studies could compare different shade guide methods and digital tools, in this research we used only Classic Vita Guide. Considering that the tooth has different layers

(enamel and dentin) it is also divided in three parts, cervical, middle, and incisal thirds. Since shade selection relies on a limited range of available options and is primarily based on visual perception, meeting a patient's specific expectations becomes very challenging. And it limits the precision of color matching as a technique (35).

6. CONCLUSION

This study highlights the importance of experience in accurate shade matching in dentistry. The findings in our study confirm that dental professionals, due to their clinical exposure and training, have better precision in shade matching compared to students. The findings also highlight the influence of key factors such as lighting conditions, patient feedback, and training on shade selection accuracy.

A major takeaway from this research is the strong preference for natural light among participants, emphasizing its reliability in color determination. The reliance of students on patient feedback can be improved through enhanced training and exposure to clinical cases. However, this study has certain limitations, such as a limited sample size and the use of the VITA Classical Shade Guide. Future research should explore the potential of digital tools, artificial intelligence, and alternative shade guides to improve color matching accuracy. Advancing shade-matching techniques through technological integration and refined training methods will be essential in achieving better aesthetic results and overall patient satisfaction in restorative dentistry.

7. SUSTAINABILITY

Concerns of social, environmental, and financial sustainability are becoming more and more important when it comes to aesthetic procedures. Improving shade matching accuracy reduces the need for redoing of dental restorations, minimizing material waste and additional costs for both dental professionals and patients. Digital shade matching technologies, while requiring investment, can lead to long-term savings by enhancing efficiency and reducing incorrect shade matching in prosthetic and restorative procedures. In terms of environmental sustainability, traditional shade guides, often made of plastic or synthetic materials, contribute to waste over time as they degrade or become outdated. By using digital shade matching devices and AI-driven tools, dental offices can reduce reliance on disposable materials, reducing the environmental impact. Reducing remakes of dental restorations contributes to sustainability by

minimizing material consumption and energy use in dental laboratories. On a social level, accurate shade matching improves patient satisfaction and confidence in dental aesthetics, positively impacting mental and emotional well being. Moreover, by integrating new technologies into dental education, future professionals can be trained in more precise and sustainable shade-matching methods, ensuring better outcomes in restorative dentistry. Future research should explore how artificial intelligence and digital tools can further enhance accuracy while maintaining cost effectiveness and sustainability in dental practice.

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9. ANNEXES

Annex 1: Written informed consent delivered in english

This survey is part of the Graduation Project in Dentistry at Universidad Europea of Madrid titled clinical determination of color accuracy percentage with vita guide in professionals and students. And directed by Susana Gil. The purpose of this work is compare the accuracy of color matching using the Vita shade guide between dental professionals and students, and the information will be collected through a brief survey. Your participation in this study is voluntary. You may request to be withdrawn from the study without prior justification or prejudice to you. The information collected will be kept confidential and will not be used for any other purpose outside this research and research dissemination purposes. The data collected will be completely anonymous. No personal identifying information will be requested. Information collected in the survey will be treated in accordance with the provisions of Organic Law 3/2018, of December 5, Protection of Personal Data and Guarantee of Digital Rights. For the purposes of the provisions of the regulation of the Organic Law 3/2018, of 5 December, on the Protection of Personal Data and Guarantee of Digital Rights, you are informed and expressly consent that the data provided in the survey may be used for the aforementioned purposes. This consent is granted without prejudice to all the rights that you have in relation to the aforementioned regulations, with the possibility of accessing the information provided, rectification, cancellation and opposition at any time you wish. For such purposes, you must write to the tutor Prof. susana Gil susana.gil@universidadeuropea.es

Do you give your consent to participate in the survey as a volunteer for the results to be used in the Final Degree Project “clinical determination of color accuracy percentage with vita guide in professionals and students“

Annex 2: Written informed consent delivered in Spanish

Esta encuesta forma parte del Proyecto de Graduación en Odontología en la Universidad Europea de Madrid, titulado *Determinación clínica del porcentaje de precisión del color con la guía VITA en profesionales y estudiantes*, dirigido por Susana Gil.

El propósito de este trabajo es comparar la precisión en la selección del color utilizando la guía de tonos VITA entre profesionales de la odontología y estudiantes. La información será recopilada a través de una breve encuesta.

Su participación en este estudio es voluntaria. Puede solicitar ser retirado del estudio sin necesidad de justificación previa ni perjuicio para usted. La información recopilada se mantendrá confidencial y no será utilizada para ningún otro propósito fuera de esta investigación y su posterior difusión científica.

Los datos recogidos serán completamente anónimos y no se solicitará ninguna información que permita su identificación personal. La información de la encuesta será tratada de acuerdo con lo establecido en la **Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y Garantía de los Derechos Digitales**.

Para los fines dispuestos en dicha normativa, usted queda informado y otorga su consentimiento expreso para que los datos proporcionados en la encuesta sean utilizados para los fines mencionados. Este consentimiento se concede sin perjuicio de los derechos que le corresponden según la normativa vigente, incluyendo los derechos de acceso, rectificación, cancelación y oposición, los cuales podrá ejercer en cualquier momento. Para ello, deberá escribir a la tutora del estudio, **Prof. Susana Gil** a través del correo electrónico susana.gil@universidadeuropea.es.

¿Da su consentimiento para participar voluntariamente en la encuesta y para que los resultados sean utilizados en el Trabajo de Fin de Grado “Determinación clínica del porcentaje de precisión del color con la guía VITA en profesionales y estudiantes”?