EVALUATING THE PERSPECTIVES OF MALAYSIAN GENERAL DENTAL PRACTITIONERS ON DENTAL IMPRESSION TECHNIQUES FOR INDIRECT RESTORATION: QUESTIONNAIRE VALIDATION AND PILOT STUDY

Roslan SA[1], Mohamad Zaki SND[1], Baharudin IH[1,2], Roslan AM[1], and Kamaruzaman M[1].
[1]*Faculty of Dentistry, Universiti Teknologi MARA*
[2]*Department of Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA*

Correspondence:
Siti Aisyah Roslan,
Faculty of Dentistry,
Universiti Teknologi MARA
Email: aisyah3140@uitm.edu.my

Abstract
Accurate impressions with high dimensional stability for indirect restoration fabrications are crucial. The conventional impressions technique has multiple steps and requires material manipulation, which has an inevitable degree of error. On the other hand, intraoral scanners (IOS) are currently used as digital impression techniques and have better acquisition, precision, cost and time efficiency. Malaysian GDPs have varying demographic backgrounds, exposure, experience, and preference for dental impression techniques. This study aims to validate and assess the reliability of the twenty-item questionnaire regarding the 'Malaysian General Dental Practitioners' (GDP's) perspective on dental impression techniques for indirect restoration. A twenty-item questionnaire is categorised into four sections: (1) Demographic Characteristics of General Dental Practitioners, (2) Questions for Conventional Impression technique users, (3) Questions for Digital Impression technique users, and (4) Questions for both Digital and Conventional Impression Technique users. The questionnaire is assessed by three experts measured for its Content Validity Index (CVI) prior to distribution. A cross-sectional pilot study is then carried out with a sample size of 30 participants. The descriptive data are compared using a Chi-square test based on the type of impression techniques and preference variables. Fifteen items in the questionnaire had an I-CVI score of 1, while five items had a score of 0.67. The S-CVI/Ave value was 0.92, while the S-CVI/UA value was 0.76. Thirty responses were collected in the pilot study. There were seven respondents who are digital technique users and 23 who are conventional technique users. All respondents are interested in learning or improving their knowledge and skills in IOS (100%). 15 out of 20 items in the questionnaire have good content validity with I-CVI values of 1. The S-CVI/Ave also reflected acceptable content validity with a value of 0.92. Five items from the questionnaire yielded I-CVI = 0.67, and the S-CVI/UA value showed 0.76, indicating unsatisfactory content validity levels. All questions were retained for the pilot study. The questionnaire can be improved for content validity by removing or modifying questions to make them fit, correlate more to the study, and achieve a higher S-CVI value. On the other hand, the pilot study concluded that most respondents use conventional impression techniques but favour using intraoral scanners when fabricating indirect restoration.

Keywords: Dental Impression Technique, General Dental Practitioners, Indirect Restoration, Pilot Study, Questionnaires Validation

Introduction
Dental impression techniques are crucial to achieve accurate and well-fitting indirect restoration such as crowns, bridges, and veneers. The selection method is very critical for delivering high-quality dental care and ensuring the long-term success of indirect restorations. Therefore, impressions must record as much detail and dimensional accuracy of the intraoral environment as possible (1). It is proved that good impressions provide the basis for accurate and high-quality appliance construction (1). Inaccurate impressions may result in the

compromise of an appliance or prosthesis misfit (1, 2). In the context of prosthesis importance, misfit leads to unwanted outcomes such as cement dissolution, loss of prosthesis retention, and making the tooth more prone to biological problems such as caries (2).

Types of impression techniques

Conventional impression-taking procedures using alginates and elastomers are frequently utilised as impression materials across the multiple departments of dentistry (1, 2). Conventional impressions, regardless of the material and technique, are associated with an inevitable degree of error, which is associated with the multiple steps and material manipulation (2).

There is a vast development in digital dentistry, where computer technology and industrial processing have influenced operations of clinical approaches and dental lab work (3). Digitalisation in dentistry has further expanded since the introduction of computer-aided design/computer-aided manufacturing (CAD/CAM), Chairside Economical Restoration of Aesthetics Ceramics (CEREC), and digital imaging/radiography to cater for the needs of patients, simplifying as well as standardising the process of dental restoration fabrication (4, 5). Digital impressions with intra-oral scanner (IOS) systems or 3D digital scanners bring benefits such as accurate acquisition of 3D scans, cost and time effectiveness, reduction of material wastage, and elimination of distortion from the use of impression and gypsum materials (5).

IOS usage in dentistry

General Dental Practitioners (GDPs) play an important role in choosing the right method. The introduction of IOSs into dental treatments in Japan has caused various setbacks for dentists to cope with, e.g., sceptical attitudes toward the quality of the impression accuracy, significantly expensive initial costs, and psychological resistance toward the paradigm shift in treatment practice from analogue to digital dentistry (6). Dental impression techniques in indirect restorations are influenced by many factors, including the need for accuracy, patient comfort and preference, time efficiency, type of conventional impression material and intraoral scanner (IOS), and operator's training and experience (7, 8).

The technology of IOS is relatively widely used by the dental profession based on few regional or transnational data on the utility, usage, and user experience of this technology. The current international questionnaire study given to dentists in more than 109 countries implied that scanner use is becoming universally common (9). While intraoral scanning has perceived advantages, many Malaysian GDPs still use conventional impression-making for the fabrication of indirect restoration. The use of IOS among Malaysian GDPs is still scarce. This has raised a few questions about why this happened. There are many factors that might have contributed to different preferences on impression technique.

Questionnaire validation

An appropriate research method based on the objectives needs to be established to study the perspectives of GDP on dental impression techniques for indirect restoration. The common methods for it include surveys, interviews, focus groups, and usability testing. Surveys can be a valuable research method for understanding user perspectives on a method or instrument, allow for quantitative comparison of different user groups or demographic segments, and provide insights into variations in perspectives based on participant characteristics (1, 3-4). Validity is critical in the selection and construction of a questionnaire or a survey.

Initiating the validation, which includes the quantification stage, the foremost step involves making the content validity assessment form (response form). The quality and organisation of this form significantly impact the information obtained from experts. Fundamental criteria in the content validity assessment form encompass the representativeness and relevance of content domains, as well as the clarity of each item, with additional consideration given to the uniqueness, importance, and definition clarity of items (10).

Following the acceptance of experts as panel members, a quantitative analysis will be made. Experts must have requisite content expertise and theoretical knowledge to conduct a thorough evaluation of the questionnaires. They will rate each instrument item using a specified assessment criteria scale. An expert's familiarity with both the conceptual and operational definitions of the construct is crucial for accurately evaluating item

quality. The clarity and comprehensiveness of these definitions are subject to expert assessment.

Throughout the evaluation process, experts may suggest additional items, propose deletions, assess item wording, and offer additional comments. Therefore, a well-structured content validity assessment form plays a pivotal role in the judgment and quantification stage.

There are various quantitative indices for assessing two or more rates applicable to this study. In this case, content validity pertains to test-based rather than score-based validity. It defines the necessary content elements for the instrument and is unrelated to the obtained scores from the construct. Establishing content validity for an abstract theoretical concept is a complex process. Content validity evidence is crucial in instrument development and testing (10).

The primary objective of the study was to validate the questionnaire regarding 'Malaysian General Dental Practitioners' (GDP's) Perspectives on Dental Impression Techniques in Indirect Restoration' and a pilot study with the prepared questionnaire. For this pilot study, the first null hypothesis is that there is no difference in the perception of different types of dental impression techniques in indirect restoration among Malaysian general dental practitioners. The second null hypothesis for the pilot study was that there was no relationship between the preference and perception of dental impression-making among Malaysian general dental practitioners.

Materials and Methods

Questionnaires
Two articles from previous studies, which are 'Survey of UK dentists regarding the use of CAD/CAM technology' (4) and 'Students' perspectives on the use of digital versus conventional dental impression techniques in orthodontics' (1), became the reference for the modification of the questionnaire. Shortlisted questions were a total of twenty items. Most questionnaires were adapted from Tran et al. (4) as our subjects are similar to the research.

The questionnaire is divided into four sections. Section 1 included questions regarding the demographic characteristics of general dental practitioners. The questions touch on the general dental practitioner's background, experience, and current practice. Section 2 emphasises questions in relation to former digital impression technique and conventional impression technique users. Elements include total chair time, the reasoning behind the usage of conventional impression techniques and their interest in digital impression techniques. Section 3 consists of questions for users of digital impressions, including background, experience, and attitudes regarding digital impression techniques. Section 4 consists of questions for both digital and conventional impression technique users. This section is where the respondents' interests and perspectives regarding the teaching, learning and application of digital impression techniques were asked. The survey questions included close-ended questions such as multiple-choice questions with single responses, multiple-choice questions with multiple responses and rating scales by which we utilised a five-point Likert scale ranging from 1 (very likely) to 5 (very unlikely). Dichotomous questions with only "yes" or "no" as a response option were also used, typically asked when confirmation is required.

Twenty-item questionnaires were chosen due to their relevance towards GDP to answer the hypothesis of this study. Questions in relation to the data needed for the research are prepared, which are then assessed by three experts to obtain their views and comments prior to distribution. The questionnaire consists of four sections containing twenty questions in total.

Content validity process
The six steps for content validation include preparing a content validation form, selecting experts as a review panel, conducting content validation, reviewing domain and items, providing a score for every item and Content Validation Index (CVI) calculation.

Preparation of content validation form
Properly preparing a content validation form is vital to ensure the review panels have clear expectations and understands the required evaluation needed from them. Instructions were provided along with the rating scale, which is labelled as the Degree of Relevance in the questionnaire, where '1'= the item is not relevant to the measured domain, '2' = the item is somewhat relevant to the measured domain, '3' = the item is quite relevant to the measured

domain and '4' = the item is highly relevant to the measured domain (11). The definition and formula of I-CVI, S-CVI/Ave and S-CVI/UA were also included. The questionnaire layout was then attached and labelled as 'Tested Items' side by side with a 'Relevance' column for the review panel to rate each item.

Selection of experts as a review panel

The individuals selected as a review panel are experts from the Prosthodontics discipline. The number of experts chosen was three, by which the acceptable CVI value should be 1, according to Polit and Beck (12). Experts were informed about this research. Before the validation process, details were distributed to them, encompassing a cover letter, a content validity assessment form (response form), and a copy of the developed instrument. The cover letter articulates the study's purpose, provides a concise overview of the instrument and its scoring, and elucidates the content validity form.

Conduction of content validation

Content validation was conducted via the face-to-face approach with deadlines. Thus, good response and feedback on the questionnaire were received as well.

Review of domain and items

The experts are asked to critically assess and review each item in the domains before providing a score and are highly encouraged to leave a verbal or written comment to improve the item's relevance in the domains. This way, it would enhance and tailor the domain and its items to the topic, making it more relevant (10, 11).

Providing a score for every item

Upon completing a critical review of each domain and its items, the experts must provide each item a score independently, based on the scale given. They are then required to submit their responses to the researchers in time.

CVI calculation

The Content Validity Index (CVI) was then calculated for each item. The I-CVI is the proportion of experts who rated an item as relevant. This study calculates the number of experts who rated an item as 3 or 4 by the total number of experts (11), which is three. For each item, the Item-level CVI (I-CVI) is formulated by;

$$\text{I-CVI} = \frac{\text{Number of Experts Rating 3 or 4}}{\text{Total Number of Experts}}$$

The mean I-CVI was also calculated by taking the sum of the Item Content Validity Index (I-CVI) scores for all items and dividing it by the total number of items (11). The average of the proportion relevance assessed by all experts, or the average of the I-CVI scores for every item on the scale, is known as S-CVI/Ave, with the formula;

$$\text{S-CVI/Ave} = \frac{\text{Sum of I-CVI scores}}{\text{Number of items}}$$

or

$$\text{S-CVI/Ave} = \frac{\text{Sum of proportion relevance rating}}{\text{Number of experts}}$$

or

$$\text{CVI}_{\text{Sum}} = \frac{\sum_{i=1}^{N} \text{CVI}_i}{N}$$

Where *i* is the independent rating of the item the experts gave based on the relevance scale, and *N* is the number of items.

For Universal Agreement (UA), a score of '1' is assigned to the item that achieved 100% agreement among experts, while '0' is assigned to items that did not achieve 100% expert agreement. The value of items on the scale that receive a relevance score of three or four from all experts is known as the S-CVI/UA (11). The formula used is;

$$\text{S-CVI/UA} = \frac{\text{Sum of UA scores}}{\text{Number of items}}$$

The S-CVI/UA represents the proportion of items that achieved a CVI of 1.0, while the S-CVI/AVE represents the average CVI across all items. These calculations were performed to ensure that the scale had adequate content validity (11). Items with a CVI <1 were considered problematic and were discarded (13). Calculation of each equation was done for Item Content Validity Index (I-CVI), Universal Agreement (UA), Mean I-CVI, Scale-level Content Validity Index/Unweighted Average (S-CVI/UA), and Scale-level Content Validity Index/Average (S-CVI/AVE).

Pilot study design

One of the goals of a pilot study is to identify unforeseen problems, such as ambiguous inclusion or exclusion criteria or misinterpretations of questionnaire items (14). A cross-sectional study

targeting Malaysian General Dental Practitioners (GDP) was conducted to assess their preference between digital and conventional dental impression techniques when performing indirect restorations. Sample size 372 was obtained using Raosoft Calculator (15). The margin of error was set at 5%, confidence level at 95% and expected frequency at 50%. Sample size calculation for the pilot study was based on Viechtbauer et al. (14) with 95% confidence level. Calculation of sample size in pilot studies obtained from an online calculator (16). In this pilot study, the participants are 59 participants. Due to time constriction to conduct the study, only 30 GDPs took part in the survey.

Data collection

Data was collected via questionnaires through online platforms and physical distributions. The online platform for the survey was 'Google Forms'. The Google Form link was shared to the GDP through 'WhatsApp'. On the other hand, questionnaires were physically distributed during the Learning Through Peers session and the visit to nearby private dental clinics. The raw data collected through online and offline methods are then merged into a spreadsheet for easy viewing and access.

Statistical analysis

The research data collected through the questionnaire from Google Forms were processed using IBM SPSS Version 26 on a computer and linked from a Google Sheets database application. When applicable, the mean, standard deviation (SD), frequencies, and percentages were used to statistically analyse the data. The data sample was described using descriptive statistics. Statistical Package for the Social Science (SPSS) was used to analyse the data. Chi-square tests compare responses based on demographics and their responses (4).

Results

Content validation

Table 1 shows the relevance ratings on the item scale by three experts. Items with an I-CVI of 0.78 or higher for three or more experts could be considered evidence of good content validity (12). Content validity was verified through three experts for our questionnaire. I-CVI values for Section 1 Q4, Section 2 Q1 Q2, and Section 3 Q5 Q6 were found to have I-CVI < 0.78, which does not meet the

acceptable CVI values. However, the rest of the 15 questions had values of I-CVI = 1, yielding good content validity values. S-CVI values above 0.80 indicate that all relevant indicators and expert input are acceptable (12). S-CVI/Ave value showed 0.92. This value is more than 0.80 across three experts, concluding that the questionnaire meets satisfactory levels and is of good value in content validity. S-CVI/UA value showed 0.76 and demanded 100% agreement (10). Therefore, it does not meet satisfactory levels.

Pilot study

A total of 30 GDP completed the survey. Based on the frequency and percentage distribution of demographic characteristics of the sample (Table 2), 76.7% (n=23) of the respondents graduated from Malaysia, and 80% have 0-10 years qualified. Only 23.3% (n=7) have additional training for using digital impression technique and 26.7% (n=8) use any aspect of digital impression techniques in indirect restoration.

Section 2 was responded to by conventional impression technique users (Table 3). For question 2, the respondent must give reasons for not using digital impression techniques. The 'High costs in purchasing IOS' is the highest recorded reason with a percentage of 78.3% (n=18). Among the respondents, 4 of them are digital technique past users.

About 23.3% (n=7) of total respondents who are IOS users answered this section. 100% (n=7) agree that using intraoral scanners is more practical and efficient than conventional impression in my daily workflow and the availability of digital impression techniques has affected their clinical decision-making. 100% (n=7) feel their digital impression technique training is sufficient. Section 3 question 2 consists of the reason for their move towards a digital impression technique workflow. 'To use new dental materials which can only be fabricated with digital impression technique' recorded the highest percentage, 85.7% (n=6). All respondents are interested in learning or improving their knowledge and skills in intraoral scanning. They agree to insert theoretical and practical digital impression technique modules for Malaysian undergraduate dental schools. Table 4 summarises the frequency and percentage of distribution of respondent

perception of IOS usage and continuous learning of using it.

Table 5 presents a statistical analysis of the content of the questionnaire. The Chi-square calculation between Section 1 question 4 (Is the work that you do: Public/Private/Both?) and Section 2 question 1 (How much total chair time do you usually book for a single-unit crown preparation, impression, and temporisation appointment?) show a significant relationship, as the p-value is 0.05. Chi-square calculation between section 1, question 2 (How many years have you qualified as a dentist?) and section 3, question 5 (Do you feel your digital impression technique training is sufficient?) show a significant relationship with a p-value of 0.047. Chi-square calculation between section 1, question 3 (Do you have additional training for using digital impression technique?) and section 3, question 6 (Do you feel that the availability of digital impression techniques has affected your clinical decision-making?) show a significant relationship where the p-value is 0.008.

From the pilot study, the first null hypothesis was preliminarily rejected. There is a statistically significant difference in perception of dental impression techniques in indirect restoration among Malaysian general dental practitioners. The second null hypothesis was also preliminarily rejected since there is a statistically significant difference in the relationship between the preference and perception of dental impression-making among Malaysian general dental practitioners.

Table 1: The relevance ratings on the item scale by three experts

Domain	Item	Expert 1	Expert 2	Expert 3	Expert in Agreement	I-CVI	UA
1	Q1	1	1	1	3	1	1
1	Q2	1	1	1	3	1	1
1	Q3	1	1	1	3	1	1
1	Q4	0	1	1	2	0.67	0
1	Q5	1	1	1	3	1	1
2	Q1	0	1	1	2	0.67	0
2	Q2	0	1	1	2	0.67	0
2	Q3	1	1	1	3	1	1
2	Q4	1	1	1	3	1	1
2	Q5	1	1	1	3	1	1
3	Q1	1	1	1	3	1	1
3	Q2	1	1	1	3	1	1
3	Q3	1	1	1	3	1	1
3	Q4	1	1	1	3	1	1
3	Q5	1	1	0	2	0.67	0
4	Q1	1	1	0	2	0.67	0
4	Q2	1	1	1	3	1	1
4	Q3	1	1	1	3	1	1
4	Q4	1	1	1	3	1	1
4	Q5	1	1	1	3	1	1
					S-CVI /Ave	0.92	
Proportion Relevance		0.86 1	1	0.9	**S-CVI / UA**		0.76
Average Proportion of Items Judged as Relevance across 3 Experts					0.92		

Table 2: Frequency and percentage distribution of demographic characteristics of the sample

	Percentage (%)	Frequency (n)
Demographics		30
Graduated		
Malaysia	76.7	23
Abroad	23.3	7
Qualified as dentist		
0-10 years	80.0	24
11-20 years	20.0	6
Additional training for using digital impression technique		
No	76.7	23
Yes	23.3	7
Work sector		
Public	66.7	20
Private	30.0	9
Public and private	3.3	1
Use any aspect of digital impression techniques in indirect restoration		
Yes	26.7	8
No	73.3	22
Conventional impression technique users (Respondents who answered Section 2)	76.7	23
Digital impression techniques users	23.3	7

Table 3: Frequency and percentage distribution of sections for conventional impression technique users

Question	Percentage (%)	Frequency (n)
Section 2 Question 2		
'High costs in purchasing IOS'	78.3	18
'Clinic does not have the systems'	4.3	1
'The place I work limited to it'	4.3	1
Section 2 Question 3		4
'Clinic does not provide'.	50.0	2
'High cost'	25.0	1
'Unable to master despite the training'	25.0	1
Section 2 Question 5		
Interested in incorporating digital impression techniques as part of their workflow	87.0	20

Table 4: The frequency and percentage distribution of sections for digital and impression technique users

Question	Percentage (%)	Frequency (n)
Section 3		
Question 2		
'To use new dental materials which can only be fabricated with digital impression technique'	85.7	6
'To reduce lab fees'	14.3	1
To improve quality'	57.4	4
'To keep up with technology'	57.4	4
'To improve communication with the laboratory'	57.4	4
'To improve productivity'	71.4	5
'To use as a marketing tool for patients'	42.9	3
Question 6		
Feel that their digital impression technique training is sufficient.	100.0	7
Question 7		
Availability of digital impression techniques has affected their clinical decision-making	100.0	7

Question 8

Usage of intraoral scanners is more practical and efficient than conventional impression in my daily workflow	100.0	7
Section 4		
Question 1		
Interested in learning or improving their knowledge and skills in intraoral scanning	100.0	30
Question 2		
Agree for insertion of digital impression technique theoretical and practical modules for Malaysian undergraduate dental schools.	100.0	30
Question 3		
Likeliness to use intraoral digital impression technique scanning in your practice once you graduate if digital impression technique theoretical and practical modules are inserted for Malaysian undergraduate dental schools		
Very likely	53.3	16
Likely	26.7	8
Neutral	20.0	6

Table 5: Chi-square calculation on the content of questionnaires

Section 1 Question 4	Section 2 Question 1	p-value
0BIs the work that you do: Public/Private/Both?	1BHow much total chair time do you usually book for a single-unit crown preparation, impression, and temporisation appointment?	0.050
2BSection 1 Question 2	**3BSection 3 Question 5**	
4BHow many years have you qualified as a dentist?	5BDo you feel your digital impression technique training is sufficient?	0.047
6BSection 1 Question 3	**7BSection 3 Question 6**	
8BDo you have additional training for using digital impression technique?	9BDo you feel that the availability of digital impression techniques has affected your clinical decision-making?	0.008

Discussion

The Content Validity Index (CVI) was used for its advantages regarding the ease of computation and comprehension, the focus on the agreement of relevance, and the general agreement rather than consistency. It also gives provision to both item and scale information (17). A thorough content validation process was conducted to perform content validity of questionnaires for the Malaysian GDP on dental impression techniques in indirect restoration. Developing an accurate validity assessment or response form necessitates clarity in delineating key components. The response form should distinctly articulate the purpose of the study, operational and conceptual definitions, assessment criteria, rating scale, and unambiguous instructions (10). The selection of experts for this process was carried out with careful consideration. A panel of three experts were prosthodontics, carefully selected based on their qualifications and expertise in relevant domains. The expert needs to ensure that the questionnaire covers all relevant aspects of the concept, assess whether it correlates with a criterion and examine the construction it was intended to measure (10).

Validation process

It is reported that 15 items in the questionnaire had an I-CVI score of 1, which is a great agreement (12). Based on the content-validated instrument of I-CVI, it is >0.78. Five items had a score of 0.67. The items would be considered for revision because an I-CVI is somewhat lower than 0.78. The expert rates commented that it is unnecessary to amend or omit these items because the S-CVI /Ave outcome is favourable at 0.92. It is accepted that Ave-CVI of 0.90 or higher has excellent content validity (12). Researchers utilise I-CVI data to inform adjustments

to items, yet research reports commonly omit specific I-CVI values. I-CVIs are typically disclosed in methodological studies concentrating on content validation processes, while scale development studies primarily feature CVI values for the entire scale, presenting a potential challenge (12). Nevertheless, it is recommended that the value of UA-CVI be reported with the Ave-CVI for a more informative procedure related to the quality of the items rather than the performance of experts (12).

The universal-CVI (S-CVI/UA) is defined as the proportion of items on an instrument that achieved a rating of 3 or 4 (validator) by all the content experts (11). Most studies in the literature avoid using the UA-CVI approach since it is conservative and demands 100% agreement. Since S-CVI/UA showed 0.76, 100% agreement is not achieved. The consensus appears excessively strict when numerous validation panel experts are present. Requiring 100 percent agreement seems overly conservative in this context (12). Thus, the value of S-CVI/Ave, which focuses on the quality of items rather than the performance of experts, can be accepted. However, we believe identifying the expert's performance using the third approach might help select the experts for the second or third rounds if required (10).

It is recommended that an additional reliability test be performed to complement the CVI. To enhance the validity and reliability of the utilised instrument, pilot testing using IBM Statistical Package for Social Science or SPSS version 25 Cronbach's Alpha as a reliable measure to test the reliability of the items in the questionnaire aims to contribute to a more robust outcome (17).

A pilot study of the perspectives of Malaysian GDPs on dental impression techniques for indirect restoration

Once the items were finalised, a pilot test was done. It is not conducted to ensure the items' readability, reliability, and further validity because the study only aims to understand GDP perspectives. IOS, as a direct optical impression device, captures a 3-dimensional (3D) digital impression of the intraoral environment and is used directly at the chairside to digitise data from the oral cavity. It requires training since the optical impression requires quick and accurate readings (3, 18-19). The number of years as a qualified dentist and its relation to training on

digital impression technique may be due to the difference in experiences in varying locations, patient types and availability of the digital technique training that is held. Based on the pilot study, we can see that public and private practices have varying limitations to total chair time as the patient flow and GDP availability differ.

Subjects are aware of the trend of using digitised impression techniques. Unfortunately, the barrier is the high level of financial investment for additional training on digital impression techniques. This strengthens the need to implement digital impression technique training in undergraduate curricula to increase experience and knowledge once they enter the workforce. The trend towards digitisation and ongoing developments must be considered in dental curricula, especially in Malaysia, to prepare future dentists for their daily work life. When the efficiency of IOS was not influenced by dental experience, students perceived the conventional impression workflow as more difficult and favoured the IOS impression procedure. In general, the learning curve for the conventional impression technique is more extended to reach the same level of efficiency and quality as IOS (9). It is suggested that dental schools prepare students to be competent in both techniques to handle different clinical situations and integrate IOS courses in the postgraduate degrees or as continuous professional development modules or short courses for dental professionals (20). Thus, there is a need to establish generally accepted digital education standards—at least among the different dental universities within individual countries (21).

Conclusion
The questionnaire can be improved for content validity by removing or modifying questions to make them fit, correlate more to the study, and achieve a higher S-CVI value. On the other hand, the pilot study concluded that most respondents use conventional impression techniques but favour using intraoral scanners when fabricating indirect restoration.

Acknowledgement

Competing interests

The authors declare that they have no competing interests.

Ethical Clearance

Ethics approval of the research project has been granted by the MARA University of Technology Research Ethics Committee (FRC) with the reference number FRC/03/2022 (ERP/31/32).

Financial support

No funding was received for this work.

References

1. Schott TC, Arsalan R, Weimer K. Students' perspectives on the use of digital versus conventional dental impression techniques in orthodontics. BMC Med Educ. 2019; 19:81.

2. Abduo J, Elseyoufi M. Accuracy of Intraoral Scanners: A Systematic Review of Influencing Factors. Eur J Prosthodont Restor Dent. 2018; 26(3):101-21.

3. Zitzmann NU, Kovaltschuk I, Lenherr P, Dedem P, Joda T. Dental students' perceptions of digital and conventional impression techniques: A randomized controlled trial. J Dent Educ. 2017; 81(10):1227–1232.

4. Tran D, Nesbit M, Petridis H. Survey of UK dentists regarding the use of CAD/CAM technology. Br Dent J. 2016; 221(10):639–644.

5. Lee SJ, MacArthur RX IV, Gallucci GO, Dent M. An evaluation of student and clinician perception of digital and conventional implant impressions. J Prosthet Dent. 2013; 110(5):420-3.

6. Huqh MZU, Abdullah JY, Farook TH, bin Jamayet N, Marya A. A current update on the use of intraoral scanners in dentistry: A review of literature. Int J Clin Dent. 2022; 15(3):503-18.

7. D'Ambrosio F, Giordano F, Sangiovanni G, Di Palo MP, Amato M. Conventional versus digital dental impression techniques: What is the future? An umbrella review. Prosthesis. 2023; 5(3):851–875.

8. Joda T, Lenherr P, Dedem P, Kovaltschuk I, Bragger U, Zitzmann NU. Time efficiency, difficulty, and operator's preference comparing digital and conventional implant impressions: a randomized controlled trial. Clin Oral Implants Res. 2017; 28(10):1318-23.

9. Al-Hassiny A, Végh D, Bányai D, Végh Á, Géczi Z, Borbély J, et al. User experience of intraoral scanners in dentistry: Transnational questionnaire study. Int Dent J. 2023; 73(5):754–759.

10. Almanasreh E, Moles R, Chen TF. Evaluation of methods used for estimating content validity. Res Social Adm Pharm. 2019; 15(2):214-221.

11. Yusoff MSB. ABC of content validation and content validity index calculation. Educ Med J. 2019; 11(2):49–54.

12. Polit DF, Beck CT. The content validity index: Are you sure you know what's being reported? Critique and recommendations. Res Nurs Health. 2006; 29(5):489–497.

13. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. Res Nurs Health. 2007; 30(4):459-67.

14. Viechtbauer W, Smits L, Kotz D, Budé L, Spigt M, Serroyen J, et al. A simple formula for the calculation of sample size in pilot studies. J Clin Epidemiol. 2015; 68(11):1375-9.

15. Raosoft Inc. Sample size calculator by Raosoft, Inc. Available at: http://www.raosoft.com/samplesize.html. 2004. Accessed 22 March 2023.

16. Rik Crutzen. Calculation of sample size in pilot studies. Available at: https://www.crutzen.net/n.htm. Accessed 22 May 2023.

17. Kipli M, Khairani AZ. Content Validity Index: An application of validating CIPP instrument for programme evaluation. Int Multidiscip Res J. 2020;2(4):31-40.

18. Suese K. Progress in digital dentistry: The practical use of intraoral scanners. Dent Mater J. 2020; 39(1):52-56.

19. Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: a review of the current literature. BMC Oral Health. 2017; 17:149.

20. Lam WYH, Mak KCK, Maghami E, Molinero-Mourelle P. Dental students' preference and perception on intraoral scanning and impression making. BMC Med Educ. 2021; 21:501.

21. Zitzmann NU, Matthisson L, Ohla H, Joda T. Digital undergraduate education in dentistry: A systematic review. Int J Environ Res Public Health. 2020; 17(9):3269.