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# Perceptions and Needs Assessment of Digital Dentistry Interdisciplinary Education Among Dental Laboratory Technology Students

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*Article*

# Perceptions and Needs Assessment of Digital Dentistry Interdisciplinary Education Among Dental Laboratory Technology Students

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**Abstract: Background/Objectives**: This study evaluates the awareness and perceptions of multidisciplinary education, with a particular focus on digital dentistry, among students in the Department of Dental Technology. The findings aim to inform the development of interdisciplinary courses and programs to enhance students' skills in response to the evolving digital landscape of dental healthcare. **Methods**: A cross-sectional survey was conducted to assess the perceptions and demands regarding interdisciplinary education in digital dentistry among students in the Department of Dental Technology. A 23-item online questionnaire was employed to collect data on general characteristics, perceptions of interdisciplinary education, the perceived necessity of such education, and the demand for interdisciplinary training, including topics related to CAD/CAM and 3D printing technologies. **Results**: Despite the relatively low level of awareness regarding interdisciplinary education, students expressed a strong perceived need for it. 76.6% of respondents preferred to collaborate with the Department of Dental Hygiene. **Conclusions**: There is a strong demand for interdisciplinary education, highlighting the need for demand-driven courses in the development of digital dental technology. The results of this study suggest the importance of integrating interdisciplinary education.

**Keywords:** Dental Interdisciplinary Education; Dental Laboratory Technology; Dental Technology Education; Digital Dentistry

## 1. Introduction

The Integrated education for the training of dental healthcare professionals began in the 1960s, and discussions on its effectiveness started in the late 1970s [1]. Although the training provided was initially limited to teaching auxiliary personnel, such as dental hygienists or dental assistants, certain procedural techniques, the potential for developing specialized dental professionals through appropriate integrated education began to be recognized. By the late 20th century, as interest in prevention for oral health grew, the education of auxiliary personnel in dentistry became a central topic [2]. In the present era, where the Fourth Industrial Revolution has become a part of daily life, well-trained dental professionals are no longer merely supplementary to dental procedures, but are increasingly recognized as essential factors in enhancing the quality of dental care [3,4]. Such collaborative education (peer team teaching) has primarily been implemented in the educational curricula between dentists and dental hygienists [5]. However, in the modern dental environment, where digital equipment and systems are used for clinical procedures and the fabrication of various types of dental prostheses [6-8], interdisciplinary education in the training of dental hygienists and dental technicians is also essential for the advancement of digital dental technologies.

Integrated education involves combining knowledge from various fields to foster new outcomes or collaboration, and to develop creative problem-solving skills. In South Korea, since the 2000s, interdepartmental education and interdisciplinary major programs have been actively encouraged [9]. Interdisciplinary education of South Korea aims mainly at developing integrated professionals with broad problem-solving abilities to address the rapidly changing demographic structure. While

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interdisciplinary education is actively implemented across various academic fields, it remains insufficient within dental-related disciplines [10].

In response to the increasing digitalization of nearly all aspects of dental treatment, there is a growing need for interdisciplinary education between dental technicians and dental hygienists, in addition to the existing collaborative education between dentists and dental hygienists. If students are able to integrate both theoretical and practical knowledge of digital dentistry through interdisciplinary education, it is expected that they will acquire the diverse skills and knowledge required in the clinical setting during their university education, thus playing a leading role in the dental healthcare field.

The aim of this study is to assess the basic awareness of multidisciplinary education, as well as the perceptions and demands regarding digital dentistry interdisciplinary education, among students enrolled in the Department of Dental Technology at Dongnam Health University in Suwon, South Korea [11]. The findings will be used to inform the development of interdisciplinary courses and programs within the dental technology curriculum and serve as foundational data for the creation of demand-driven curriculum development.

## 2. Materials and Methods

This study is a cross-sectional survey research using a convenience sampling method. It was conducted to assess the perceptions and demands regarding digital dentistry interdisciplinary education among students in the Department of Dental Technology at a university located in Suwon, Gyeonggi Province, South Korea. The findings aim to inform the development of effective educational programs and provide foundational data for future curriculum improvements based on the identified need for interdisciplinary education. No effectiveness evaluation was conducted.

The researcher posted a recruitment notice on the departmental bulletin board to invite participants. Participants were able to access the online survey via a link or QR code provided in the notice. The survey was distributed in an online format, and voluntary participation was encouraged. Upon accessing the survey site, participants were informed again about the study and asked to provide informed consent before proceeding with the survey. Consent was obtained through a survey item within the online questionnaire, and only those who voluntarily agreed to participate were included as research subjects.

There is no risk of harm associated with the research as a result of the survey, and the study was designed in a manner that does not impose physical or psychological pressure on the participants. Results from participants who voluntarily discontinued their involvement during the survey were excluded. All participants were students enrolled in the Department of Dental Technology, including those in advanced major programs.

The survey questionnaire consisted of 23 items designed to assess perceptions of and demands for digital dentistry interdisciplinary education. The survey took approximately 10 minutes to complete. The questionnaire included three items on general characteristics, five items on perceptions of convergence education, three items on the necessity of convergence education, three items on the demand for interdisciplinary education, and ten items on the current status and utilization of CAD/CAM and 3D printer training and capabilities. The detailed questionnaire is as follows:

General characteristics – 3 items

- Year of study
- Professional experience
- Work institution

Perceptions of interdisciplinary education– 5 items

- Have you heard of interdisciplinary education?
- Do you know what interdisciplinary education is?
- Are you familiar with the objectives of interdisciplinary education?
- Have you taken any interdisciplinary courses?
- Are any interdisciplinary courses or programs offered within your current curriculum?

The necessity of interdisciplinary education – 3 items

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• Do you consider interdisciplinary education is necessary in the field of dental technology?

• What educational outcomes do you expect from interdisciplinary education in dental technology?

• How would you prefer interdisciplinary education in dental technology to be structured if it were offered?

The demand for interdisciplinary education - 3 items

• If interdisciplinary education were implemented in the dental technology curriculum, which academic fields would you prefer it to integrate with?

• In relation to the dental technology curriculum, if interdisciplinary education were to be introduced, which courses would you prefer it to be applied to? (Multiple responses allowed)

• Regarding the duties of a dental technician, in which areas of work do you think interdisciplinary education is necessary? (Multiple responses allowed)

The current status and utilization of CAD/CAM and 3D printer training and capabilities - 9 items

• Have you undergone training in dental CAD/CAM?

• In which areas have you received training? (Multiple responses allowed)

• Are you fully familiar with the model scanning process and capable of utilizing it?

• In which areas of work are you able to perform scanning? (Multiple responses allowed)

• Are you able to design dental restorations using CAD software?

• Which types of dental prostheses are you able to fabricate using dental CAD software? (Multiple responses allowed)

• Are you able to output teeth designs created using CAM software through milling or 3D printer?

• Are you able to perform post-processing on teeth fabricated through the CAM process?

• Are you able to perform coloring or staining of zirconia crowns?

Descriptive statistics and frequency analysis were conducted to examine dental technology students' perceptions and demands regarding digital dentistry interdisciplinary education, as well as their general characteristics. The necessity and demand for interdisciplinary education, based on students' perceptions, were assessed using a Chi-square test, while the association between perceptions and demand for digital dental interdisciplinary education was evaluated using Pearson's correlation coefficient analysis. One-way analysis of variance (ANOVA) was conducted to examine differences in perceptions of digital dentistry interdisciplinary education by academic year. All statistical analyses were performed using IBM SPSS Statistics version 25.0 K Program for Windows (IBM Co., Armonk, NY, USA), with a significance level ($\alpha$) set at 0.05 for statistical significance.

## 3. Results

The dental technology department of the university where the participants of this study are enrolled is a technical college that, starting in 2023, has increased its freshman intake capacity to 120 students in both the first and second years, with a class size of 80 students in the third year. Upon completing the three-year program, students are eligible to take the national dental technician certification exam in South Korea. Additionally, graduates of the three-year program can obtain a bachelor's degree by completing a one-year advanced specialized program. The admission capacity for the fourth-year advanced specialization program is 20 students. The survey was organized into five main categories: general characteristics of the respondents, their perceptions of interdisciplinary education, the necessity of such education, the demand for interdisciplinary education, and, in the final category, an assessment of the current status of CAD/CAM and 3D printing education, as well as the respondents' proficiency in these technologies. The status of the students who participated in the survey is shown in Table 1. Regarding clinical work experience, 10 respondents, all in their fourth year, reported such experience. It is assumed that students in the first through third years, who have not yet obtained the Associate's degree in Health Professions and are therefore ineligible to work in related fields, either responded with 'less than one year' of experience or did not provide a response.

**Table 1.** Percent distribution of Grade level and Work experience of survey respondents.

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| | Answer Options | Response Count | Response Percent |
|---|---|---|---|
| Year of study | First Year | 71 | 35.0 |
| | Second Year | 56 | 27.6 |
| | Third Year | 66 | 32.5 |
| | Fourth Year (Advanced Major Program) | 10 | 4.9 |
| | Total | 203 | 100.0 |
| Professional experience | Less than 1 year | 125 | 61.6 |
| | 1-3 Years | 2 | 1.0 |
| | 3-5 Years | 4 | 2.0 |
| | More than 5 Years | 1 | 0.5 |
| | Non-respondents | 71 | 35.0 |
| | Total | 203 | 100.0 |

The responses to the items related to the perception of interdisciplinary education in digital dentistry are presented in Table 2. Among the respondents, 63 students, or 31%, indicated that they had never heard of interdisciplinary education. When including those with limited exposure, such as students who had heard of it only once or twice, the total proportion of students with minimal exposure to the concept rises to 66%. In contrast, only 11 students, or 5.4% of the 203 respondents, reported having frequently heard of interdisciplinary education.

**Table 2.** Percent distribution of responses to the questions regarding Perceptions of Digital Dentistry Interdisciplinary education.

| Question | Answer Options | Response Count | Response Percent |
|---|---|---|---|
| Have you heard of Interdisciplinary Education? | None ae all | 63 | 31.0 |
| | Heard of it once or twice | 71 | 35.0 |
| | Heard of it frequently | 11 | 5.4 |
| | Not sure | 58 | 28.6 |
| | Total | 203 | 100.0 |
| Do you know what Interdisciplinary Education is? | Not familiar | 103 | 50.7 |
| | Slightly familiar | 40 | 19.7 |
| | Neutral | 51 | 25.1 |
| | Moderately familiar | 7 | 3.4 |
| | Very familiar | 2 | 1.0 |
| | Total | 203 | 100.0 |
| Are you familiar with the objectives of interdisciplinary education? | Not familiar | 104 | 51.2 |
| | Slightly familiar | 37 | 18.2 |
| | Neutral | 48 | 23.6 |
| | Moderately familiar | 13 | 6.4 |
| | Very familiar | 1 | 0.5 |

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| | | | |
|---|---|---|---|
| | Total | 203 | 100.0 |
| Have you taken any Interdisciplinary courses? | Yes | 12 | 5.9 |
| | No | 125 | 61.6 |
| | Not know | 66 | 32.5 |
| | Total | 203 | 100.0 |
| Are interdisciplinary education courses available in the curriculum you are currently enrolled in? | Yes | 7 | 3.4 |
| | No | 65 | 32.0 |
| | Not know | 131 | 64.5 |
| | Total | 203 | 100.0 |

The responses to the item regarding knowledge of interdisciplinary education revealed that 50.7% of the students (103 respondents) indicated they were not well informed about it. In contrast, only 4.4% reported being familiar with or having a strong understanding of interdisciplinary education, highlighting the generally low level of awareness. Furthermore, when asked about the purpose of interdisciplinary education, only 6.9% of students indicated they were aware or had a thorough understanding, while 93.1% either answered that they were unsure or did not know the purpose. In terms of previous or current experience with interdisciplinary education, only 5.9% of respondents reported having participated in such education. Notably, 32.5% of students indicated they were unfamiliar with past experiences, and 64.5% were unaware of the current status of interdisciplinary education. These findings further emphasize the low level of awareness and experience among the survey respondents regarding interdisciplinary education.

The results of the survey item regarding the need for interdisciplinary education are summarized in Table 3.

**Table 3.** Percent distribution of responses to the questions regarding Needs of Digital Dentistry Interdisciplinary education.

| Question | Answer Options | Response Count | Response Percent |
|---|---|---|---|
| Do you consider Interdisciplinary education is necessary in the field of dental technology? | Not necessary at all | 3 | 1.5 |
| | Not necessary | 10 | 4.9 |
| | Neutral | 88 | 43.3 |
| | Necessary | 82 | 40.4 |
| | Very necessary | 20 | 9.9 |
| | Total | 203 | 100.0 |
| What educational outcomes do you expect from Interdisciplinary education in dental technology? | Experience in new fields of study | 32 | 15.8 |
| | Enhancement of creative and interdisciplinary skills | 14 | 6.9 |
| | Strengthening of employability | 36 | 17.7 |
| | Improvement of knowledge related to dental technology | 117 | 57.6 |
| | Others | 4 | 2.0 |
| | Total | 203 | 100.0 |
| | Liberal Arts | 39 | 19.2 |

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| | | | |
|---|---|---|---|
| How would you prefer interdisciplinary education in dental technology to be structured if it were offered? | Non-degree programs | 9 | 4.4 |
| | Elective courses | 113 | 55.7 |
| | Required courses | 37 | 18.2 |
| | Others | 5 | 2.5 |
| | Total | 203 | 100.0 |

Despite the relatively low level of awareness regarding interdisciplinary education, only 6.4% of students in the dental technology program responded that it was "not necessary at all" or "not necessary." Excluding the 43.3% of students who answered "neutral," 50.3% of students expressed a strong perceived need for interdisciplinary education. This suggests that, despite the relatively low awareness of interdisciplinary education, there is a significant recognition of its importance.

In terms of the expected outcomes of interdisciplinary education, respondents indicated benefits such as gaining experience in new academic fields, enhancing creative integration skills, and strengthening employability. However, over half of the respondents identified the primary benefit as an improvement in knowledge related to the duties of dental technicians.

When asked about preferred methods for the implementation of interdisciplinary courses, 55.7% of students expressed a preference for these courses to be offered as elective courses within the major. In contrast, 18.2% preferred the courses to be mandatory within the major, and 19.2% favored offering them as general education courses.

The survey results related to the demand for interdisciplinary courses in digital dentistry are presented in Table 4. The questionnaire items in this section addressed students' preferences for interdisciplinary education in relation to other academic fields, as well as specific dental technology courses and job-related areas. Multiple responses were allowed for these questions.

**Table 4.** Percent distribution of responses to the questions regarding Demands of Digital Dentistry Interdisciplinary education.

| Question | Answer Options | Response Count | Response Percent |
|---|---|---|---|
| If interdisciplinary education were implemented in the dental technology curriculum, which academic fields would you prefer it to integrate with? (Multiple responses allowed) | Nursing | 21 | 10.7 |
| | Physical Therapy | 10 | 5.1 |
| | Radiologic Science | 23 | 11.7 |
| | Emergency Medical Technology | 12 | 6.1 |
| | Occupational Therapy | 4 | 2.0 |
| | Dental Hygiene | 151 | 76.6 |
| In relation to the dental technology curriculum, if interdisciplinary education were to be introduced, which courses would you prefer it to be applied to? (Multiple responses allowed) | Fixed Prosthodontics | 45 | 22.6 |
| | Fixed Prosthodontics Laboratory | 41 | 20.6 |
| | Removable Prosthodontics | 34 | 17.1 |
| | Removable Prosthodontics Laboratory | 34 | 17.1 |
| | Complete Denture Prosthodontics | 36 | 18.1 |
| | Complete Denture Prosthodontics Laboratory | 36 | 18.1 |
| | Orthodontic Technology | 30 | 15.1 |
| | Orthodontic Technology Laboratory | 31 | 15.6 |

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| | | | |
|---|---|---|---|
| | Dental Implant Prosthodontics | 75 | 37.7 |
| | Dental Implant Prosthodontics Laboratory | 74 | 37.2 |
| | Dental Ceramics | 20 | 10.1 |
| | Dental Ceramics Laboratory | 20 | 10.1 |
| | Fundamental Dental Technology Courses (e.g., Oral Anatomy, Dental Morphology, Dental Morphology Laboratory, etc.) | 129 | 64.8 |
| Regarding the duties of a dental technician, in which areas of work do you think interdisciplinary education is necessary? (Multiple responses allowed) | Fabrication of removable dental prostheses | 90 | 45.2 |
| | Fabrication of orthodontic dental prostheses | 71 | 35.7 |
| | Fabrication of aesthetic dental prostheses | 112 | 56.3 |
| | Fabrication of fixed dental prostheses | 101 | 50.8 |

When asked about preferred interdisciplinary fields within the healthcare sector, 76.6% of students expressed a preference for collaboration with the Department of Dental Hygiene, followed by 11.7% for Radiology, 10.7% for Nursing, 6.1% for Emergency Medical Services, 5.1% for Physical Therapy, and 2.0% for Occupational Therapy. This reflects an interest in the Department of Dental Hygiene, which plays a vital role in the dental healthcare team.

Regarding the areas of dental technology where interdisciplinary education is needed, responses indicated that 35.7% of students identified orthodontic dental prosthesis, 45.2% removable dental prosthesis, 50.8% fixed dental prosthesis, and 56.3% aesthetic dental prosthesis as key areas requiring interdisciplinary education.

Additionally, when asked about which dental technology courses they would like to receive interdisciplinary education in, the highest demand was observed for basic dental technology courses such as Oral Anatomy, Tooth Morphology, and Tooth Morphology Practice.

The final category included questions aimed at assessing the current status of CAD/CAM and 3D printer education, as well as the respondents' proficiency in utilizing these technologies. The results are presented in Table 5.

**Table 5.** Current status of CAD/CAM and 3D printer training and utilization skills.

| Question | Answer Options | Response Count | Response Percent |
|---|---|---|---|
| Have you undergone training in dental CAD/CAM? | Yes | 177 | 87.2 |
| | No | 26 | 12.8 |
| | Total | 203 | 100 |
| In which areas have you received training? (Multiple responses allowed) | 3D Printing/3D Print | 18 | 10.3% |
| | Scanning/Model Scan | 82 | 46.9% |
| | Designing/Design | 85 | 48.6% |
| | Milling | 9 | 5.1% |
| | None | 1 | 0.6% |

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| | | | |
|---|---|---|---|
| Are you fully familiar with the model scanning process and capable of utilizing it? | Strongly disagree | 5 | 2.4 |
| | Disagree | 19 | 9.4 |
| | Neutral | 72 | 35.5 |
| | Agree | 80 | 39.4 |
| | Strongly agree | 27 | 13.3 |
| | Total | 203 | 100 |
| In which areas of work are you able to perform scanning? (Multiple responses allowed) | Oral scanning | 44 | 21.8% |
| | Impression scanning | 53 | 26.2% |
| | Model scanning | 172 | 85.1% |
| | Unable to perform scanning tasks | 4 | 2.0% |
| | Other | 4 | 2.0% |
| Are you able to design dental restorations using CAD software? | Strongly disagree | 10 | 4.9 |
| | Disagree | 15 | 7.4 |
| | Neutral | 94 | 46.3 |
| | Agree | 64 | 31.5 |
| | Strongly agree | 20 | 9.9 |
| | Total | 203 | 100.0 |
| Which types of dental prostheses are you able to fabricate using dental CAD software? (Multiple responses allowed) | Orthodontics | 16 | 9.8 |
| | Full denture | 24 | 14.7 |
| | Implant | 68 | 41.7 |
| | Inlay/Crown/Cap | 128 | 78.5 |
| | Partial denture | 28 | 17.2 |
| | Temporary crown | 74 | 45.4 |
| | Laminate | 11 | 6.7 |
| | Surgical stent | 7 | 4.3 |
| | Other | 2 | 1.2 |
| Are you able to output teeth designs created using CAM software through milling or 3D printer? | Strongly disagree | 28 | 13.8 |
| | Disagree | 73 | 36.0 |
| | Neutral | 60 | 29.6 |

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| | | | |
|---|---|---|---|
| | Agree | 27 | 13.3 |
| | Strongly agree | 15 | 7.4 |
| | Total | 203 | 100.0 |
| Are you able to perform post-processing on teeth fabricated through the CAM process? | Strongly disagree | 33 | 16.3 |
| | Disagree | 47 | 23.2 |
| | Neutral | 68 | 33.5 |
| | Agree | 41 | 20.2 |
| | Strongly agree | 14 | 6.9 |
| | Total | 203 | 100 |
| Are you able to perform coloring or staining of zirconia crowns? | Strongly disagree | 35 | 17.2 |
| | Disagree | 42 | 20.7 |
| | Neutral | 62 | 30.5 |
| | Agree | 47 | 23.2 |
| | Strongly agree | 17 | 8.4 |
| | Total | 203 | 100 |

Among the respondents, excluding the 10 students who had enrolled in the advanced major program after graduation, 177 out of 193 students, or 87.2%, reported having received CAD/CAM education, despite lacking clinical experience. When asked about their experience with digital equipment, 46.9% and 48.6% of the students indicated they had received training in Model Scanning and Designing, respectively. A total of 107 students, or 52.7%, responded that they were capable of performing Model Scanning.

Regarding scanning tasks, 85.1% of respondents (172 students) reported being able to perform Model Scanning, a task closely related to the dental prosthesis manufacturing process. However, fewer students—less than 30%—reported being able to perform scanning with oral scanners or impression scanners.

When asked whether they could design dental prosthetics using CAD software, 31.5% of students responded affirmatively, and 9.9% stated they could do so very confidently. In the context of creating Inlay/Crown/Cap prosthetics, 78.5% of respondents indicated that they could use CAD to design the prosthesis.

In contrast to the responses regarding CAD usage, when asked about their ability to use CAM software, milling machines, and 3D printers, only about 20% of respondents stated they were capable of doing so, while approximately 50% of the students reported they were unable to perform these tasks. When asked about the post-processing of prostheses using CAM, 20.2% of respondents indicated they could perform such tasks, and only 6.9% strongly agreed with this capability.

Similarly, when asked whether they could perform the final stages of prosthetic fabrication, such as coloring and staining, only 31.6% of respondents said they were capable of doing so, reflecting a decreasing ability to perform tasks as they advanced through the final stages of prosthesis production. The results of a one-way analysis of variance (ANOVA) conducted to investigate the differences in awareness of digital dentistry interdisciplinary education across academic years revealed no statistically significant differences. No correlation was found between students' perceptions, necessity, and demand for digital dental interdisciplinary education.

## 4. Discussion

In the early stages, interdisciplinary education in the dental field primarily involved training dental professionals to delegate supportive tasks in the clinical process to auxiliary personnel, such as dental hygienists and dental assistants, through one-sided instruction [12]. In addition to reports on quantitative assessments such as the fluctuation in the number of dental professionals, including

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dentists, dental hygienists, and dental assistants, as well as training costs and the number of graduates/completers, a consensus has emerged that a well-trained dental healthcare team is formed through dental education [13, 14].

Through peer team teaching experiences, dental school students began to recognize dental hygienists as collaborators, which led to improved attitudes toward specialized nursing. This resulted in positive changes in mutual perceptions between the two professions. Additionally, patients expressed satisfaction with the dentist-dental hygienist team-based care approach [15, 16].

Furthermore, based on studies indicating that interdisciplinary education in the dental field contributes to overall improvements in clinical conditions, the effectiveness of such education has been confirmed. Despite being conducted in a limited number of institutions, the results demonstrated high satisfaction with its impact. Additionally, the value of standardized education, shared learning, and collaborative training among dental staff was reaffirmed.

Existing interdisciplinary education in the dental field has traditionally been limited to dentists and dental hygienists [17]. However, future dentists who have been exposed to CAD/CAM training within dental school curricula have shown a high degree of adaptability to the integration of digital technology into clinical practice [18]. Additionally, they tend to perceive the use of educational software in practical exercises, such as tooth preparation, as beneficial and useful [19].

The widespread adoption of digitalization has extended into the dental field, influencing not only the clinical processes within dental practices but also the integration of digital workflows in dental laboratory tasks, significantly impacting the efficiency of dental treatments. In the current system, where nearly the entire process—from diagnosis to the final stages of dental prosthesis fabrication—is digitalized, it is believed that interdisciplinary education involving dentists, clinical staff, and dental technicians will contribute to improving the quality of dental care.

The need for interdisciplinary education in the healthcare sector has been increasingly emphasized, particularly in dental care, where collaboration between the fields of dental hygiene and dental technology is essential, especially with the advancement of digital dental technologies. However, research and practical implementation of interdisciplinary education in these fields remain insufficient to date. In the context of addressing contemporary challenges, the cultivation of interdisciplinary professionals with expertise across various disciplines is seen as a crucial solution. This is particularly significant in South Korea, which is entering an ultra-aged society due to its ultra-low birth rate. The role and purpose of interdisciplinary education are closely linked to the cultivation of innovative professionals capable of overcoming the existential challenges posed by the nation's demographic crisis [20, 21].

Among the students surveyed, 31% had never heard of the concept of interdisciplinary education, and 50.7% were unfamiliar with its meaning, indicating a relatively low level of awareness regarding interdisciplinary education. However, despite this, 50.3% of the respondents acknowledged the need for such education, suggesting that, even with limited awareness, there is a recognized demand for interdisciplinary education in response to the question regarding preferred courses for the implementation of interdisciplinary education, 64.8% of respondents expressed a desire for the inclusion of basic dental technology subjects, such as oral anatomy and dental morphology. This suggests that incorporating visual aids, which have received positive feedback in basic dental education, could enhance the effectiveness of interdisciplinary courses. For example, using three-dimensional models and interactive learning tools, akin to 3D puzzles, could significantly improve the educational outcomes in these collaborative courses [22]. The highest proportion of students expressed a preference for interdisciplinary education with the Department of Dental Hygiene. This likely reflects the recognition of dental hygienists as essential members of the dental healthcare team, as well as the understanding that effective communication with the dental team is crucial for the production of high-quality dental prostheses. Given this, the development of interdisciplinary courses between the dental technology and dental hygiene departments would be valuable if digital dentistry-related courses are introduced in the future.

In response to the question regarding which areas of dental technology require interdisciplinary education, students evenly selected fields such as removable dental prosthetics, fixed dental

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prosthetics, orthodontic appliances, and aesthetic restorations. By integrating these widely used clinical practices into interdisciplinary curricula, students could acquire the diverse skills and knowledge required in the clinical setting during their academic training [23-25]. This would enable them to take a proactive role in the dental healthcare field upon entering clinical practice.

In the survey regarding the current state of CAD/CAM and 3D printing education, 87.2% of the 193 students, despite lacking clinical experience, reported having received training in CAD/CAM. This appears to be a result of digital dentistry integration in the university's curriculum. Specifically, the second-year clinical practice course in the dental technology program involves sending students to dental laboratories or clinics, where they are exposed to introductory digital dentistry technologies such as Model Scanning and 3D Printing.

However, fewer students indicated the ability to perform post-processing, coloring, and staining—steps associated with the final stages of dental prosthetic fabrication—compared to those who were able to carry out Model Scanning and 3D Printing. This discrepancy likely arises from the fact that these finishing processes have not yet been fully incorporated into their training at this stage. The results suggest the effectiveness of the current educational approach and can serve as a valuable reference for future curriculum development aimed at advancing digital dentistry interdisciplinary education.

This study conducted a survey to explore students' perceptions, needs, and demand for digital dentistry interdisciplinary education. The findings indicated that while students' awareness of interdisciplinary education was relatively low, their demand for such education was high. No significant differences were found between the survey groups, and no correlation was established between students' perceptions and their demand for interdisciplinary education. However, the high demand for such education is expected to serve as a foundational reference for the development and implementation of digital interdisciplinary courses within the dental technology program. Further research is needed to explore in greater detail the specific courses students are interested in and their preferences for other disciplines to be integrated into the curriculum.

## 5. Conclusions

Despite several limitations, the study reached the following conclusions:

1. Although the students had little clinical experience, their exposure to digital dental technology was relatively high, suggesting that the digital courses within the school curriculum are effective.

2. No significant differences were found in responses regarding the recognition and necessity of interdisciplinary courses across different academic years.

3. Despite students' low perception and perceived necessity of interdisciplinary courses, there was a high demand for such courses. This finding holds significance as foundational data for the development and implementation of demand-driven interdisciplinary courses related to digital dental technology in the future.

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**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Dongnam Health University (1044371-202409-HR-006-01 approved on 23 september 2024).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

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**Conflicts of Interest:** The author declares no conflicts of interest.

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