

# Analysis of the Difference in the Importance of Instructors and Clinical Dental Hygienists for Oral Pathology Learning Objectives

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**Background:** The purpose of this study was to identify the differences in the importance of oral pathology learning objectives for instructors and clinical dental hygienists and provide basic data that can guide learning objectives for acquiring practically necessary basic knowledge in the clinical field.

**Methods:** Through the first-stage expert meeting, 27 items with less than four points out of 129 learning objectives in 15 detailed areas were deleted, 12 additional opinions were reflected, 114 learning objectives were set, and a survey was conducted with 253 people.

**Results:** There were statistically significant differences in 92 items after examining the difference between professors and clinical dental hygienists. Among the areas of inflammation and repair, “Can explain the five symptoms of inflammation” had the highest with a score at 4.76 in the case of the professors. Among the areas of tooth damage, “Can explain abrasion” had the highest with a score at 4.61 in the case of the clinical dental hygienists.

**Conclusion:** I would like to propose the existing 15 detail areas and 129 learning objectives as 14 detail areas and 98 learning objectives and strengthen the job competency of dental hygienists in the future. First, you need to develop competencies that are highly relevant to your work. Second, it is necessary to develop related textbooks and educational materials based on revised learning objectives and competencies. Third, based on revised learning objectives, the dental hygienist national examination should be improved. Through these changes in education, the education of oral and maxillofacial disease subjects should strengthen job competencies among dental hygienists with learning objectives that can be applied to actual clinical practice based on basic knowledge rather than knowledge orientation. In addition, it is possible to improve the quality of dental hygiene studies.

**Key Words:** Dental hygiene, Dental hygienist, Learning objective, Oral pathology

## Introduction

The increase in the elderly population following economic improvement, an increase in highly-educated individuals, and medical advances have increased the interest in healthcare with media development. At the same time, with an increased interest in oral health, the demand for extensive and high-quality oral healthcare services, rather

than limited treatment services, is also increasing<sup>1)</sup>. Thus, dental hygienists, who play a pivotal role in oral healthcare, play a very important role.

Every department of dental hygiene should re-establish and standardize the curriculum system to cultivate dental hygienists who perform extensive roles required by society. However, the dental hygiene curriculum of every educational institution is operated differently depending

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on the characteristics and conditions of each college's, educational objectives, and professors' intentions<sup>2)</sup>. In 2017, the Ministry of Education drew the standardization of curriculum through the National Competency Standard to integrate the valuable curriculum for three-year-course colleges. However, it was performed only by focusing on three-year-course colleges, and the curriculum shows huge differences in each college.

Based on research, when new dental hygienists initially enter clinical setting following graduation from the regular dental hygiene curriculum and acquiring their licenses, they are equipped with theoretical knowledge that is difficult to apply to their actual work<sup>3)</sup>. Even though the learning objectives used for school curriculums have been considered important because they were frequently used in state examinations, the process of adapting to clinical settings after graduation could be difficult<sup>4)</sup>.

Due to this, professors' roles in the education site is very important. In addition to the importance of the curriculum, it is necessary to provide education applicable to the actual work by establishing accurate learning objectives by considering the characteristics of each subject.

Oral pathology plays a core role in many studies addressing human diseases in studies explaining the entire process of diseases, such as causes, mechanisms, symptoms, treatments, and prognoses of diseases. If dental hygienists can detect oral diseases early and differentially diagnose diseases that could be missed in actual clinical settings while performing their job, they can perform their work more effectively. Therefore, the purpose of this study was to recognize the importance of oral pathology based on the learning goals presented in oral pathology and analyze the difference between the importance of instructors and clinical dental hygienists. In addition, we intend to provide basic data that can be a guide for setting learning goals to acquire basic knowledge that is practically necessary in the clinical field.

## Materials and Methods

### 1. Subjects

The population of the study subjects was divided into an opinion survey of instructors who teach related subjects in

the dental hygiene department and an opinion survey of clinical dental hygienists.

As of 2021, dental hygiene departments are open to 82 domestic universities. Considering the response rate of lecturers, the study was conducted with the cooperation of the Korean Association of Dental Hygiene Professors and targeted dental hygiene departments in universities across the country. A total of 62 people responded, showing a 75.6% response rate.

Dental hygienists with more than five years of clinical experience (experience determined to be familiar with treatment by understanding the duties of a dental hygienist to some extent) are targeted, and active members among current dental hygienists license holders (regular members of the Korean Dental Hygienists Association who paid their full dues, 5,925 people as of September 2020, 3%). A total of 180 people were used as the standard. The study was conducted when consent was given using an online survey (Google). Of the 205 respondents, 191 were finalized, excluding 14 false responses.

### 2. Methods

The tools used in this study are for experts (those who have more than ten years of teaching experience in oral pathology and experience in national exam questions or those who majored in oral pathology and have less than ten years of teaching experience). Based on the 5th edition of dental hygiene and learning objectives<sup>5)</sup>, the necessity of learning objectives was confirmed in oral pathology education subjects. The first survey was conducted to determine whether security is needed in the future and whether learning objectives should be added. In the second round, a face-to-face meeting was held, and opinions were coordinated through an analysis of the results. The questionnaire was revised and supplemented to conduct a survey using Google for professors and clinical dental hygienists. The reliability of the tool was Cronbach's  $\alpha=0.932$ .

### 3. Statistical analysis

A statistical analysis of the collected data was performed using the IBM SPSS Statistics ver. 23.0 (IBM Corp., Armonk, NY, USA). According to the characteristics of

the investigated data, the general characteristics were frequency and percentage, and a t-test was performed to determine the difference between each area of the two groups. The significance level for determining significance was set at  $p < 0.05$ .

## Results

### 1. General characteristics of professors

The general characteristics of oral pathology professors are shown in Table 1. The most common age groups were 46~50 years old (25.8%), 41~45 years old (24.2%), 36~40 years old (19.4%), over 51 years old (19.4%), and under 35 years old (11.3%). The ages ranged from 31 to 64 years, and the average age was  $44.79 \pm 7.83$  years.

The total educational experience was the highest at 43.5% for 6~10 years, followed by 25.8% for 11~15 years, 21.0% for over 16 years, and 9.7% for under 5 years. The educational experience was at least one year to a maximum of 34 years. The average educational experience was  $12.47 \pm 7.01$  years. Related subjects' teaching experience was the highest at 40.3% for less than 5 years, followed by 33.9% for 6~10 years, 14.5% for 11~15 years, and

11.3% for 16 years or more. The teaching experience was at least one year to a maximum of 30 years, and the average teaching experience was  $8.21 \pm 6.29$  years. The survey subjects were assistant professors and associate professors (30.6%), professors and adjunct professors (12.9%), instructors (8.1%), and research professors (4.8%).

### 2. General characteristics of clinical dental hygienists

The general characteristics of clinical dental hygienists are shown in Table 2. The most common age group was under 30 years old (41.4%), followed by 31~35 years old (28.3%), 36~40 years old (17.3%), and over 41 years old (13.1%). The ages ranged from 25 to 55 years, and the average age was  $33.58 \pm 6.31$  years.

Working career was highest at 58.6% for 5~10 years, followed by 19.4% for 11~15 years, 13.6% for 16~20 years, and 8.4% for over 21 years. The working career ranged from a minimum of five years to a maximum of 35 years, with an average of  $11.17 \pm 6.06$  years.

Regarding the type of workplace, 66.5% of dental clinics were higher than 33.5% of dental hospitals.

**Table 1.** General Characteristics (Professors)

Characteristic	Division	n	%
Total		62	100.0
Age (y)	≤35	7	11.3
	36~40	12	19.4
	41~45	15	24.2
	46~50	16	25.8
	≥51	12	19.4
Total teaching experiences	≤5	6	9.7
	6~10	27	43.5
	11~15	16	25.8
	≥16	13	21.0
Related subjects teaching experience	≤5	25	40.3
	6~10	21	33.9
	11~15	9	14.5
Official	≥16	7	11.3
	Professor	8	12.9
	Associate professor	19	30.6
	Assistant professor	19	30.6
	Research professor	3	4.8
Adjunct professor		8	12.9
	Instructor	5	8.1

**Table 2.** General Characteristics (Clinical Dental Hygienists)

Characteristic	Division	n	%
Total		191	100.0
Age (y)	≤30	79	41.4
	31~35	54	28.3
	36~40	33	17.3
	≥41	25	13.1
Working career	5~10	112	58.6
	11~15	37	19.4
	16~20	26	13.6
	≥21	16	8.4
Type of workplace	Dental clinic	127	66.5
	Dental hospital	64	33.5
Type of duty position	Oral & Maxillofacial surgery	23	12.0
	Prosthodontics	19	9.9
	Orthodontics	12	6.3
	Care coordination	24	12.6
	Hospital management	27	14.1
Academic background	Overall	86	45.0
	College	67	35.1
	University	82	42.9
≥Graduate school	42	22.0	

With regard to the type of duty position, 45.0% of the cases were responsible for the overall task, followed by hospital management (14.1%), care coordination (12.6%), oral and maxillofacial surgery (12.0%), prosthodontics (9.9%), and orthodontics (6.3%).

The final academic background was bachelor’s degree (42.9%), associate’s degree (35.1%), and master’s degree (22.0%).

### 3. Difference in learning objectives and the importance for oral pathology professors and clinical dental hygienists

The differences between groups in the importance of each learning objective are shown in Table 3~9.

In the field of diagnosis and biopsy of oral lesions, “Can describe the type of biopsy” was the highest with 0.78 points, and “Can explain how to fill out a biopsy request form” showed the lowest difference with 0.10 points. The overall item score for the diagnosis and biopsy of oral

lesions was statistically significantly higher with the professors at 4.13 points than the clinical dental hygienists at 3.69 points (Table 3).

In the field of inflammation and repair, “Can describe the cells involved in acute inflammation” was the highest with 1.21 points, and “Can explain systemic signs of inflammation” showed the lowest difference with 0.22 points. Professors were significantly higher than clinical dental hygienists in all items except “Can explain systemic signs of inflammation.” The overall item score for inflammation and repair was statistically significantly higher with the professors at 4.29 points than with the clinical dental hygienists at 3.70 points (Table 3).

In the field of immunity, “Can distinguish between cellular immunity and humoral immunity” was the highest with 1.10 points, and “Can explain autoimmune diseases” showed the lowest difference with 0.69 points. In all five learning objectives, professors were statistically significantly higher than clinical dental hygienists. The overall item

**Table 3.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
1. Diagnosis and biopsy of oral lesions	1) Can explain the diagnostic process	4.06±0.84	3.93±0.78	0.13	1.178 (0.240)
	2) Can describe the type of diagnosis	3.97±0.84	3.79±0.80	0.18	1.525 (0.129)
	3) Can explain the need for a biopsy	4.56±0.59	3.91±0.81	0.65	5.848 (<0.001)
	4) Can explain the indications for biopsy	4.44±0.59	3.69±0.85	0.75	7.661 (<0.001)
	5) Can explain the requirements for biopsy	4.34±0.59	3.80±0.90	0.54	5.350 (<0.001)
	6) Can explain biopsy tips and sequence	3.90±0.80	3.52±0.95	0.38	3.121 (0.002)
	7) Can describe the type of biopsy	4.23±0.75	3.45±0.89	0.78	6.691 (<0.001)
	8) Can explain how to fill out a biopsy request form	3.60±0.81	3.50±1.03	0.10	0.734 (0.463)
	Total	4.13±0.50	3.69±0.69	0.44	5.352 (<0.001)
2. Inflammation and repair	1) Can explain five signs of inflammation	4.76±0.50	4.04±0.83	0.72	8.239 (<0.001)
	2) Can list causes of inflammation	4.52±0.56	4.06±0.76	0.46	4.362 (<0.001)
	3) Exudate can be explained	4.13±0.71	3.86±0.84	0.27	2.274 (0.024)
	4) Can describe the cells involved in acute inflammation	4.48±0.59	3.27±1.00	1.21	11.599 (<0.001)
	5) Can explain the difference between acute and chronic inflammation	4.66±0.51	4.20±0.70	0.46	5.535 (<0.001)
	6) Can explain microscopic events of inflammation	3.79±0.77	2.86±0.89	0.93	7.376 (<0.001)
	7) Can explain systemic signs of inflammation	4.13±0.68	3.91±0.85	0.22	1.832 (0.068)
	8) Can explain the regeneration	4.02±0.71	3.61±0.85	0.41	3.734 (<0.001)
	9) Can describe granulation tissue	4.24±0.74	3.58±0.85	0.66	5.463 (<0.001)
	10) Can describe primary and secondary wound healing	4.26±0.74	3.67±0.94	0.59	5.043 (<0.001)
	Total	4.29±0.43	3.70±0.61	0.59	8.293 (<0.001)

Values are presented as mean±standard deviation. p-value by the independent t-test.

**Table 4.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
3. Immunity	1) Can explain the immune response	4.42±0.66	3.68±0.82	0.74	6.398 (<0.001)
	2) Can describe the cells involved in the immune response	4.19±0.74	3.24±0.94	0.95	8.182 (<0.001)
	3) Can distinguish between cellular immunity and humoral immunity	4.08±0.87	2.98±0.99	1.10	7.776 (<0.001)
	4) Can explain active and passive immunity	4.05±0.85	3.15±0.96	0.90	6.579 (<0.001)
	5) Can explain autoimmune diseases	4.39±0.63	3.70±0.84	0.69	5.936 (<0.001)
	Total	4.22±0.61	3.34±0.74	0.88	9.243 (<0.001)
4. Immunological oral disease	1) Can list immunological oral diseases	4.56±0.59	3.45±1.01	1.11	10.625 (<0.001)
	2) Can explain the cause of recurrent aphthous ulcers	4.50±0.62	3.74±0.97	0.76	7.216 (<0.001)
	3) Can explain the clinical symptoms of recurrent aphthous ulcers	4.63±0.52	3.81±0.92	0.82	8.764 (<0.001)
	4) Can list systemic diseases with recurrent aphthous ulcers	4.29±0.68	3.50±1.04	0.79	6.881 (<0.001)
	5) Can explain lichen planus	4.48±0.69	3.64±0.91	0.84	7.649 (<0.001)
	6) Can explain Behcet's syndrome	4.21±0.77	3.45±0.97	0.76	5.581 (<0.001)
	7) Can explain Sjogren's syndrome	4.19±0.80	3.52±1.07	0.67	5.258 (<0.001)
	8) Can explain the location of recurrent aphthous ulcers and recurrent oral ulcers	4.34±0.78	3.59±0.98	0.75	5.495 (<0.001)
	Total	4.40±0.50	3.58±0.78	0.82	9.328 (<0.001)

Values are presented as mean±standard deviation. p-value by the independent t-test.

score for immunity was statistically significantly higher with the professors at 4.22 points than the clinical dental hygienist 3.34 points (Table 4).

In the field of immunological oral disease, “Can list immunological oral diseases” was the highest with 1.11 points, and “Can explain Sjogren’s syndrome” showed the lowest difference with 0.67 points. In all eight learning objectives, professors were significantly higher than clinical dental hygienists. The overall item score for immunological oral diseases was statistically significantly higher with the professors at 4.40 points than the clinical dental hygienist 3.58 points (Table 4).

In the field of infectious disease, “Can explain the cause of candidiasis” was the highest with 1.03 points, and “Can explain the clinical symptoms of hand, foot, and mouth disease” showed the lowest difference with 0.26 points. In all 14 learning objectives, professors were significantly higher than clinical dental hygienists. The overall item score for infectious disease was statistically significantly higher with the professors at 4.32 points than the clinical

dental hygienists with 3.54 points (Table 5).

In the field of tooth damage, “Can explain abrasion” was the highest with  $-0.27$  points, and “Can explain erosion” and “Can explain abfraction” showed the lowest difference with  $-0.06$  points. Items showing statistically significant differences are “Can explain attrition” and “Can explain abrasion.” Clinical dental hygienists were significantly higher than professors. The overall item score for tooth damage was higher than that of clinical dental hygienists at 4.42 points and professors at 4.30 points, but there was no statistically significant difference (Table 5).

In the field of pulpitis and periapical diseases, “Can explain periapical granulomas” was the highest with 0.56 points, and “Can explain pulp necrosis” showed the lowest difference with  $-0.02$  points. In all 10 learning objectives, professors were significantly higher than clinical dental hygienists. The overall item score for pulpitis and periapical diseases was statistically significantly higher with the professors at 4.60 points than the clinical dental hygienist

**Table 5.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
5. Infectious diseases	1) Can classify and list infectious diseases	4.39±0.75	3.74±0.93	0.65	4.944 (<0.001)
	2) Can explain oral tuberculosis	4.32±0.74	3.45±1.05	0.87	7.183 (<0.001)
	3) Can explain actinomycosis	3.89±0.85	3.15±1.00	0.74	5.223 (<0.001)
	4) Can explain oral syphilis	4.37±0.70	3.49±0.93	0.88	7.869 (<0.001)
	5) Can explain the cause of herpes labialis	4.53±0.56	3.71±0.89	0.82	8.478 (<0.001)
	6) Can explain the clinical symptoms of herpes labialis	4.63±0.55	3.77±0.92	0.86	8.891 (<0.001)
	7) Can explain chickenpox-herpes zoster	4.18±0.73	3.59±0.90	0.59	5.141 (<0.001)
	8) Can explain the cause of candidiasis	4.69±0.49	3.66±0.98	1.03	10.817 (<0.001)
	9) Can explain the clinical symptoms of candidiasis	4.68±0.50	3.72±0.99	0.96	9.902 (<0.001)
	10) Can explain Hutchinson’s incisors and mulberry molars	4.32±0.69	3.48±1.07	0.84	7.141 (<0.001)
	11) Can explain opportunistic infections of oral diseases	4.53±0.62	3.56±1.02	0.97	8.972 (<0.001)
	12) Can explain oral disease (papilloma) caused by HPV (human papillomavirus) infection	4.24±0.71	3.63±1.00	0.61	5.218 (<0.001)
	13) Can explain coxsackievirus infection	3.85±0.84	2.96±1.05	0.89	6.106 (<0.001)
	14) Can explain the clinical symptoms of hand, foot, and mouth disease	3.97±0.82	3.71±0.85	0.26	2.071 (0.039)
	Total	4.32±0.46	3.54±0.78	0.78	9.547 (<0.001)
6. Tooth damage	1) Can explain attrition	4.34±0.78	4.57±0.62	-0.23	-2.063 (0.042)
	2) Can explain abrasion	4.34±0.76	4.61±0.58	-0.27	-2.528 (0.013)
	3) Can explain erosion	4.24±0.76	4.30±0.80	-0.06	-0.485 (0.628)
	4) Can explain abfraction	4.29±0.79	4.23±0.91	0.06	0.502 (0.616)
		Total	4.30±0.73	4.42±0.63	-0.12

Values are presented as mean±standard deviation. p-value by the independent t-test.

4.35 points (Table 6).

In the field of intraosseous odontogenic infectious diseases, “Can explain jaw osteomyelitis” was the highest with 0.47 points, and “Can explain the healing process of wounds caused by tooth extraction” showed the lowest difference with 0.03 points. Items showing statistically significant differences are “Can explain jaw osteomyelitis,” “Can explain acute osteomyelitis,” and “Can explain chronic osteomyelitis.” Professors were significantly higher than clinical dental hygienists. The overall item score for intraosseous odontogenic infectious diseases was statistically significantly higher with the professors at 4.21 points than the clinical dental hygienist 3.97 points (Table 6).

The difference in the field of oral developmental disorders was -0.02 for “Can explain cleft lip” and -0.05 for “Can explain the cleft palate,” indicating that there was no statistical difference between the professors and

clinical dental hygienists. These almost showed a similar level. The overall item score for oral developmental disorders was 3.95 points for professors and 3.99 points for clinical dental hygienists, which were about 0.04 points higher for clinical dental hygienists (Table 7).

In the field of developmental disorders of teeth, “Can explain taurodontism” was the highest with 0.47 points, and “Can explain dens evaginatus” showed the lowest difference with -0.02 points. The overall item score of developmental disorders of teeth was higher than that of professors at 4.05 points and clinical dental hygienists at 3.93 points, but there was no statistically significant difference (Table 7).

In the field of odontogenic cysts, “Can explain odontogenic keratocyst” was the highest with 1.11 points, and “Can explain the residual cysts” showed the lowest difference with 0.71 points. In all six learning objectives,

**Table 6.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
7. Pulpitis and periapical diseases	1) Can explain the cause of pulpitis	4.69±0.49	4.49±0.67	0.20	2.588 (0.011)
	2) Can list the types of pulpitis	4.68±0.53	4.25±0.83	0.43	4.746 (< 0.001)
	3) Can explain the difference between reversible and irreversible pulpitis	4.63±0.52	4.42±0.76	0.21	2.382 (0.018)
	4) Can distinguish acute and chronic pulpitis	4.69±0.53	4.45±0.72	0.24	2.914 (0.004)
	5) Can explain acute pulpitis	4.69±0.53	4.47±0.68	0.22	2.656 (0.009)
	6) Can explain chronic pulpitis	4.60±0.52	4.41±0.69	0.19	2.186 (0.030)
	7) Can explain pulp necrosis	4.44±0.64	4.46±0.70	-0.02	-0.249 (0.803)
	8) Can distinguish acute and chronic apical disease	4.55±0.64	4.40±0.77	0.15	1.383 (0.168)
	9) Can explain the cause of periapical disease	4.50±0.56	4.32±0.76	0.18	1.939 (0.055)
	10) Can explain acute periapical abscess	4.63±0.55	4.36±0.76	0.27	3.059 (0.003)
	11) Can explain chronic periapical abscess	4.53±0.56	4.32±0.78	0.21	2.267 (0.025)
	12) Can explain periapical granulomas	4.52±0.59	3.96±0.91	0.56	5.513 (< 0.001)
	13) Can explain the periapical cyst	4.71±0.49	4.25±0.79	0.46	5.465 (< 0.001)
	Total	4.60±0.40	4.35±0.62	0.25	3.671 (< 0.001)
8. Intraosseous odontogenic infectious diseases	1) Can explain jaw osteomyelitis	4.15±0.80	3.68±0.95	0.47	3.448 (< 0.001)
	2) Can explain acute osteomyelitis	4.02±0.71	3.58±0.97	0.44	3.836 (< 0.001)
	3) Can explain chronic osteomyelitis	3.92±0.75	3.56±0.96	0.36	3.038 (0.003)
	4) Can explain odontogenic maxillary sinusitis	4.27±0.75	4.05±0.83	0.22	1.905 (0.058)
	5) Can explain alveolar osteitis (dry socket)	4.60±0.52	4.42±0.72	0.18	2.099 (0.074)
	6) Can explain the healing process of wounds caused by tooth extraction	4.56±0.59	4.53±0.62	0.03	0.398 (0.691)
	7) Can explain drug-related osteonecrosis of the jaw bone	3.98±0.94	4.02±0.97	-0.04	-0.226 (0.822)
	Total	4.21±0.53	3.97±0.67	0.24	2.542 (0.012)

Values are presented as mean±standard deviation. p-value by the independent t-test.

professors were significantly higher than clinical dental hygienists. The overall item score for odontogenic cysts was statistically significantly higher with the professors at 4.41 points than the clinical dental hygienist 3.44 points. Notably, the differences between the two groups were higher in odontogenic cysts than in the other subregions (Table 8).

In the field of non-odontogenic cysts, “Can explain ranula” scored 0.89 points and “Can explain mucocele” scored 0.76. Professors were significantly higher than clinical dental hygienists. The overall item score for non-odontogenic cysts was statistically significantly higher with the professors at 4.25 points than the clinical dental hygienist 3.42 points (Table 8).

In the field of tumor, “Can describe the characteristics of benign and malignant tumors” was the highest with 0.85 points, and “Can explain the definition of a tumor”

showed the lowest difference with 0.63 points. In all five learning objectives, professors were significantly higher than clinical dental hygienists. The overall item score for tumor was statistically significantly higher with the professors at 4.29 points than the clinical dental hygienist at 3.58 points (Table 8).

In the field of odontogenic tumors, “Can explain ameloblastoma” was the highest with 1.26 points, and “Can explain cementoblastoma” showed the lowest difference with 0.83 points. In all seven learning objectives, professors were significantly higher than clinical dental hygienists. The overall item score for odontogenic tumors was statistically significantly higher with the professors at 4.27 points compared to clinical dental hygienists at 3.22 points (Table 9).

In the field of non-odontogenic tumors, “Can explain precancerous lesions” was the highest with 1.40 points,

**Table 7.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
9. Oral developmental disorders	1) Can explain cleft lip	3.97±0.70	3.99±0.80	-0.02	-0.237 (0.813)
	2) Can explain cleft palate	3.94±0.72	3.99±0.79	-0.05	-0.520 (0.604)
	Total	3.95±0.69	3.99±0.78	-0.04	-0.385 (0.701)
10. Developmental disorders of teeth	1) Can explain supernumerary teeth	4.31±0.71	4.35±0.67	-0.04	-0.390 (0.697)
	2) Can explain microdontia	4.03±0.80	4.27±0.76	-0.24	-2.126 (0.035)
	3) Can explain macrodontia	3.76±0.82	4.03±0.83	-0.27	-2.251 (0.025)
	4) Can explain gemination	4.24±0.79	4.11±0.77	0.13	1.160 (0.247)
	5) Can explain fusion	4.26±0.74	4.09±0.76	0.17	1.520 (0.130)
	6) Can explain concrescence	4.29±0.73	4.11±0.79	0.18	1.589 (0.113)
	7) Can explain dens in dente	4.15±0.72	4.08±0.80	0.07	0.579 (0.563)
	8) Can explain dens evaginatus	4.18±0.71	4.20±0.77	-0.02	-0.194 (0.847)
	9) Can explain about enamel pearl	3.89±0.79	3.56±0.92	0.33	2.706 (0.008)
	10) Can explain the Talon cusp	3.74±0.70	3.29±0.95	0.45	4.033 (< 0.001)
	11) Can explain taurodontism	3.68±0.76	3.21±1.00	0.47	3.338 (< 0.001)
	12) Can explain dilaceration	3.73±0.70	3.90±0.94	-0.17	-1.551 (0.123)
	13) Can explain the causes that can cause abnormalities in the structure of the teeth	4.23±0.73	3.91±0.92	0.32	2.448 (0.015)
	14) Can explain the cause of enamel hypoplasia	4.32±0.74	4.04±0.86	0.28	2.298 (0.022)
Total	4.05±0.59	3.93±0.62	0.12	1.300 (0.195)	

Values are presented as mean±standard deviation. p-value by the independent t-test.

**Table 8.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
11. Odontogenic cysts	1) Can explain odontogenic cysts	4.53±0.64	3.59±0.96	0.94	8.788 (< 0.001)
	2) Can list the types of odontogenic cysts	4.44±0.66	3.36±1.03	1.08	9.506 (< 0.001)
	3) Can explain the radicular cyst	4.68±0.59	3.66±1.18	1.02	8.847 (< 0.001)
	4) Can explain the residual cyst	4.08±0.75	3.37±0.97	0.71	5.977 (< 0.001)
	5) Can explain the dentigerous cyst	4.42±0.75	3.44±0.98	0.98	8.169 (< 0.001)
	6) Can explain odontogenic keratocyst	4.37±0.73	3.26±0.97	1.11	9.571 (< 0.001)
	Total	4.41±0.58	3.44±0.88	0.97	9.924 (< 0.001)
12. Non-odontogenic cysts	1) Can explain mucocele	4.21±0.77	3.45±0.98	0.76	6.264 (< 0.001)
	2) Can explain ranula	4.29±0.75	3.40±1.03	0.89	7.289 (< 0.001)
	Total	4.25±0.74	3.42±0.93	0.83	6.289 (< 0.001)
13. Tumor	1) Can explain the definition of a tumor	4.34±0.74	3.71±0.90	0.63	4.940 (< 0.001)
	2) Can list the cause of the tumor	4.21±0.77	3.56±0.96	0.65	5.399 (< 0.001)
	3) Can list the classification of tumors and the tumors that belong to them	4.10±0.69	3.42±0.99	0.68	5.952 (< 0.001)
	4) Can describe the characteristics of benign and malignant tumors	4.66±0.54	3.81±0.94	0.85	8.840 (< 0.001)
	5) Can explain how tumor spreads	4.16±0.77	3.44±1.05	0.72	5.807 (< 0.001)
Total	4.29±0.60	3.58±0.86	0.71	7.103 (< 0.001))	

Values are presented as mean±standard deviation. p-value by the independent t-test.

and “Can explain salivary gland tumors” showed the lowest difference with 0.56 points. In all nine learning objectives, professors were significantly higher than

clinical dental hygienists. The overall item score for non-odontogenic tumors was statistically significantly higher with professors at 4.32 points compared to clinical



**Table 9.** Differences in the Importance of Learning Objectives between Professors and Clinical Dental Hygienists

Category	Learning objectives	Professor	Dental hygienists	Average difference	t(p)
14. Odontogenic tumor	1) Can explain the definition of odontogenic tumor	4.47±0.64	3.47±0.98	1.00	9.180 (<0.001)
	2) Can list the classification of odontogenic tumors and the tumors that belong to them	4.42±0.69	3.31±1.03	1.11	9.587 (<0.001)
	3) Can explain ameloblastoma	4.52±0.67	3.26±1.02	1.26	11.086 (<0.001)
	4) Can explain adenomatoid odontogenic tumor	4.29±0.73	3.07±0.99	1.22	8.899 (<0.001)
	5) Can explain calcifying epithelial odontogenic tumors	3.89±0.87	3.02±1.03	0.87	5.960 (<0.001)
	6) Can explain odontoma	4.37±0.70	3.27±1.10	1.10	9.172 (<0.001)
	7) Can explain cementoblastoma	3.97±0.82	3.14±1.04	0.83	6.420 (<0.001)
	Total	4.27±0.61	3.22±0.92	1.05	10.173 (<0.001)
15. Non-odontogenic tumor	1) Can explain non-odontogenic tumor	4.05±0.87	3.05±1.00	1.00	7.043 (<0.001)
	2) Can explain oral papilloma	4.31±0.73	3.27±1.00	1.04	8.770 (<0.001)
	3) Can explain fibroma	3.97±0.76	3.28±1.01	0.69	5.618 (<0.001)
	4) Can explain precancerous lesions	4.71±0.58	3.31±1.06	1.40	14.424 (<0.001)
	5) Can list the types of precancerous lesions	4.53±0.64	3.29±1.08	1.24	10.966 (<0.001)
	6) Can explain carcinoma	4.19±0.78	3.24±1.04	0.95	6.603 (<0.001)
	7) Can list the causes of squamous cell carcinoma	4.58±0.58	3.26±1.06	1.32	12.269 (<0.001)
	8) Can explain the clinical symptoms of squamous cell carcinoma	4.56±0.59	3.36±1.08	1.20	11.133 (<0.001)
	9) Can explain salivary gland tumors	4.06±0.74	3.50±1.01	0.56	4.749 (<0.001)
	Total	4.32±0.46	3.28±0.90	1.04	11.870 (<0.001)

Values are presented as mean±standard deviation.  
p-value by the independent t-test.

dental hygienists at 3.28 points (Table 9).

## Discussion

The dental hygiene academic community must improve the quality of dental hygiene research through changes in education so that the learning content is not limited to knowledge and can be converted into various activities through knowledge. Therefore, after entering society, it is necessary to operate practical education to fulfill social roles and responsibilities as dental hygienists in clinical and community settings<sup>6)</sup>.

Cho<sup>7)</sup> said that in order to increase the professionalism of dental hygienists and expand their work areas, it is urgent to establish new educational goals that reflect the needs of the times and standardize the curriculum. Additionally, knowledge in the field of biomedical science provides the basis for dental hygiene through an understanding of the basic structure, function, and inter-relationships of the human body. It has been reported that

by increasing the weight of biomedical subjects, clinical judgment and decision-making ability can be increased, and the qualifications of medical personnel can be improved<sup>8)</sup>. The importance of analyzing the oral pathology learning objectives to confirm the importance of the basic subjects is explained below.

Among the learning objectives for each detailed area, the items with a large difference in opinions between groups are as follows: The items that showed the biggest difference between diagnosis and biopsy of oral lesions were “Can describe the type of biopsy.” Contrary to the professor’s opinion that it is important to distinguish between types of biopsies, clinical dental hygienists believe that biopsies are of low importance because only limited types of biopsies are performed, even if they are performed at work. According to the National Health Insurance Service’s health insurance statistics<sup>9)</sup>, as of 2019, there were 35,936 dental hygienists (84% of the total 42,657).

The items that indicated the biggest difference in the field of inflammation and repair were “Can describe the

cells involved in acute inflammation” and “Can distinguish between cellular immunity and humoral immunity” in the field of immunity. In these two fields, it is thought that professors emphasize the importance of basic knowledge, whereas clinical dental hygienists underestimate the importance of items that are not directly related to actual clinical practice.

The item that indicated the biggest difference in the field of immunological oral disease was “Can list immunological oral diseases.” This is seen as a result of considering the perspective that although understanding immunological oral diseases overall is important from the professor’s point of view, clinical dental hygienists only need to know about representative oral diseases that occur in clinical practice.

The item that indicated the biggest difference in the field of infectious diseases was “Can explain the cause of candidiasis.” This appears to be because the professor thinks it is important to recognize the cause of the disease, while clinical dental hygienists are more interested in symptoms that are immediately visible.

There were no significant differences between professors and clinical dental hygienists in the areas of tooth damage, pulpitis and periapical diseases, intraosseous odontogenic infectious diseases, and developmental disorders of teeth compared to other areas.

Odontogenic cysts, odontogenic tumors, and non-odontogenic tumors had many items with an average difference of one point or more compared to other areas. This result indicates that the acquisition of basic knowledge is important from the perspective of professors, whereas clinical dental hygienists think that the treatment area commonly found in clinical practice is important. This reflects the tendency to think that treatment is insignificant when the number of treatments is small. This can be interpreted in the same context as the difference between working at the clinic and hospital levels. In other words, in the case of a large-scale hospital, there are a certain number of cysts and tumors. However, it seems that there is a difference in the degree to which they feel the importance because it is judged as a treatment that is not commonly seen at the clinic level. As indicated in the study of Kim and Ha<sup>8)</sup>, unlike the work performed in

clinical practice, it is necessary to recognize the problem of learning goal-oriented lecture management and review the necessity of applicable integrated education.

To summarize the survey results, based on 129 learning objectives in 15 detail areas, 27 learning objectives with a consent score of less than four were deleted, and 12 learning objectives were added to reflect primary expert opinions. We surveyed the opinions of a questionnaire consisting of 114 learning objectives. As a result, 92 items were found to be different among the opinions of professors and clinical dental hygienists in related subjects.

For the development of dental hygiene academia, academic excellence must be secured by establishing an academic system and identity through the establishment of a major field. Establishing the dental hygiene major initially involves compensating for the weaknesses in the basic dental hygiene field<sup>10)</sup>. In this sense, although there are some subjects, the current status analysis and opinions of the professor in charge of the subject and clinical dental hygienists with more than five years of experience were comparatively analyzed. I think that this study’s attempt to suggest a learning goal related to work in the clinical field is meaningful. However, considering the interconnection of basic subjects, there is a limitation that requires a comprehensive analysis of several subjects rather than a single subject. In the future, it will be necessary to improve the systematic learning objectives of basic dental hygiene subjects and expand the subjects.

In conclusion, I would like to propose the existing 15 detail areas and 129 learning objectives as 14 detail areas and 98 learning objectives and strengthen the job competency of dental hygienists in the future.

First, you need to develop competencies that are highly relevant to your work. Second, it is necessary to develop related textbooks and educational materials based on revised learning objectives and competencies. Third, based on the revised learning objectives, the dental hygienist national examination should be improved.

Through these changes in education, the education of oral and maxillofacial disease subjects should strengthen the job competency of dental hygienists with learning objectives that can be applied to actual clinical practice based on basic knowledge rather than knowledge orientation.

In addition, it is possible to improve the quality of dental hygiene studies.

## Notes

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

### Ethical approval

This study was approved by the Institutional Review Board of Dong-Eui University (IRB No. DIRB-20209-HR-R-50).

### Author contributions

Conceptualization: Sun-Mi Lee and Eunae Sandra Cho. Data acquisition: Sun-Mi Lee and Jung-Hwa Lee. Formal analysis: Sun-Mi Lee. Supervision: Eunae Sandra Cho. Writing—original draft: Sun-Mi Lee and Eunae Sandra Cho. Writing—review & editing: Eunae Sandra Cho and Jung-Hwa Lee.

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