

# The Operation Effect of the Education Process of the Foundation of Competency for Students of the Department of Dental Hygiene

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## Abstract

**Objectives:** Outcome-based education systems are executed by setting an education goal, and function as an education quality management system that analyzes such education results and consistently improves the process of achieving education goals. **Methods/Statistical Analysis:** The core competency of the competency-based education process of clinical dental hygiene is that graduates can perform dental hygiene management as a dental hygienist for patients/recipients, and in order to evaluate this competency, major detailed competencies were composed into 13 questions and investigated. Evaluation points were granted from a minimum of 0 to a maximum of 10, and the evaluations took place before and after class in the form of a self-administered questionnaire. We used a level of significance of  $p < 0.05$ . **Findings:** In the major of Dental Hygiene, we meant to operate a competency-based education process, and later evaluate the effect of the education. The self-evaluation points of every detailed competency showed an increase, showing statistical significance except in a few elements. Competency-based education processes are being judged as efficient studying methods where the academic achievement competencies can be developed. **Improvements/Applications:** This research has its meaning when we provided it. But there has been no comparison group so far, so we must think about the limit of this part.

**Keywords:** Competency, Department of Dental Hygiene, Education, Student

## 1. Introduction

Recently, universities are attempting a revolution of education with outcome-based education and an education paradigm centered on the customers, and this outcome-based education paradigm, which is the foundation accreditation system, has a purpose of improving results

of education through the process of input → process → output → outcome<sup>1,2</sup>. Thus, outcome-based education systems are executed by setting an education goal, and function as an education quality management system that analyzes such education results and consistently improves the process of achieving education goals<sup>3</sup>. Such outcome-based education indicates an education sys-

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tem that can be directly connected to the development of students' competency, and the dictionary definition of competency is the power to achieve something. Education processes centered on competencies reveal to the students what competencies they must have when the education is over<sup>4,5</sup>. Therefore the following must be considered<sup>6</sup>: what does the student wish to study? Why must they study it? How can a professor help the student study it, and how can they check if they learned it or not? Recently, in dental education, the need to develop academic results based on outcome in order to train dental medical personnel was brought up, and this was developed to be used as an evaluation of certification for educational institutes<sup>7</sup>. Therefore this research has selected a section of dental hygiene subjects, and in order to achieve the core competencies of dental hygiene students, competency-based education processes have been designed and applied, and wish to evaluate the effect of such education processes.

In 2012, The Commission on Dental Accreditation of America proposed the standards for the evaluation of certification for Dental Hygiene students. The competencies of a dental hygienist are being defined as leading with communication, knowledge, skills, clinical inference emotions, and introspection in everyday treatment, with correct judgment at the center. Such capabilities not only train doctors, dentists, nurses, dental hygienists or other health-related specialty personnel, but also teachers, policemen, and other various fields of professional occupations, and is starting to take place as a core term in order to understand and organize high school education<sup>8,9</sup>. Recently in the field of professionalized personnel education, an education goal is set on the foothold of competency, and the effort to reform the method of evaluating education processes. Competency profiles of professional personnel are filled out, necessary knowledge, skills, and attitudes are defined, and on these bases education processes are being improved and a change to education evaluations are being made<sup>10</sup>. In its history of 50 years, following the quantitative growth of high school education institutes, dental hygiene education institutes in our country have been putting much effort into helping dental hygiene students possess internal stability with their studying and education systems. However the current state is that competency regulations for the role performance of dental hygienists and education processes based on such regulated competencies have not been composed of, and in addition, education that consists of the evaluation of whether the learner was educated

about the means to achieve their competencies is not being realized<sup>11,12</sup>.

## 2. Proposed Work

As junior Dental Hygiene students in Chungnam as the recipients, the Clinical Dental Hygiene IV education process was developed into a competency-based education system from September to December of the year 2015, and was operated and evaluated as a three hour, three credit, and second semester class. Through a workshop with technological education specialists, a proper evaluation blueprint of a competency-based education process for Clinical Dental Hygiene IV was developed. In the competency-based education evaluation, core capabilities that are necessary for University S students and major core capabilities that are demanded at the Department of Dental Hygiene were selected, detailed class goals necessary for related capabilities were established, and evaluation tools and standards of scoring were set. The detailed competency-based evaluation document is like chart 1. In addition, for the class to proceed properly, professionals monitored the competency-based class operation process. After the class finished, the goal points and overall achievements were evaluated, and for the major core capabilities of Clinical Dental Hygiene IV, a self-evaluation competency development survey was taken through constant updates. (Table 1, 2)

### 2.1 Corecompetency Self-Evaluation by Dental Hygiene Students

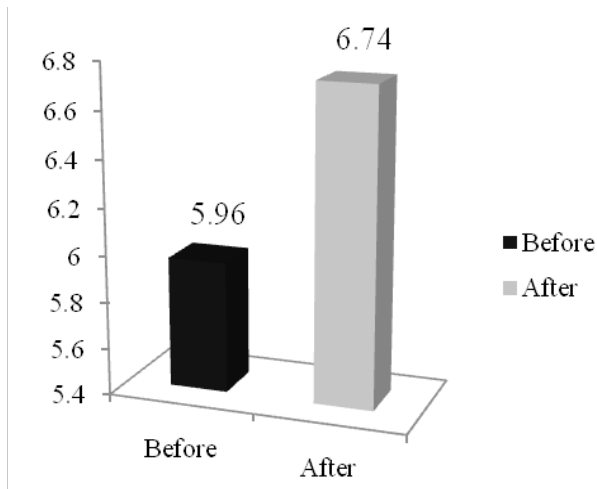
The core competency of the competency-based education process of clinical dental hygiene is that graduates can perform dental hygiene management as a dental hygienist for patients/recipients, and in order to evaluate this competency, major detailed competencies were composed into 13 questions and investigated. Evaluation points were granted from a minimum of 0 to a maximum of 10, and the evaluations took place before and after class in the form of a self-administered questionnaire. When we operated Clinical Dental Hygiene IV as a competency-based education process, we meant to measure the difference on how dental hygiene students evaluate themselves for their major core competencies. Before the capability-based education processes of Clinical Dental Hygiene were operated, it was 5.96 points, and after it was 6.74, showing that a before and after difference existed in the self-evaluations ( $p = 0.022$ ) Figure 1.

**Table 1.** Competency-based evaluation document for clinical dental hygiene IV

| Set up of Evaluation Tools and Scoring Standards | Name of Evaluation Tool             | Evaluation Points | Involved Capabilities                       | Evaluation Conformity              |       |   |
|--|-------------------------------------|-------------------|---|------------------------------------|-------|---|
|  |                                     |                   |   | Performance Index                  | Value | Scoring Standards   |
|  | Team Project Presentation           | 10                | Communication                               | Delivery                           | 5     | Standard of Rubric<br>With 5-1 points, higher numbers mean a better score.<br>(Evaluated with points 5-3-2-1) |
|  |                                     |                   |   | Supplementary Data                 | 5     |   |
|  | Subject Studying and Team Portfolio | 10                | Skills to utilize resources and information | Critical Evaluation on Information | 5     |   |
|  |                                     |                   |   | Effective Use of Information       | 5     |   |
|  | Midterm Exam                        | 20                | Dental Hygiene Student Evaluation/Judgment  | Degree of Understanding            | 20    | Whether the Exam Answer is Right or Wrong   |
|  | Individual Trial                    | 10                | Dental Hygiene Student Evaluation/Judgment  | Degree of Understanding            | 10    |   |
|  | Team Trial                          | 10                | Dental Hygiene Student Evaluation/Judgment  | Degree of Understanding            | 10    |   |
|  | Final Exam                          | 10                | Dental Hygiene Student Evaluation/Judgment  | Degree of Understanding            | 10    |   |

**Table 2.** Evaluation achievement analysis After operating: Competency-based classes of Clinical Dental Hygiene IV

| Achievement Analysis of Class Goals | Evaluation Tool                      | Evaluation Points | Achievement Points per Each : competency |   |  |  | Achievement for each Evaluation Tool |                       |
|-------------------------------------|--------------------------------------|-------------------|--|---|--|--|--------------------------------------|-----------------------|
|                                     |                                      |                   | Communi-<br>cation                       | Utilization<br>of Resources<br>and<br>Information<br>Skills | Dental<br>Hygiene<br>Student<br>Evaluation | Dental<br>Hygiene<br>Student<br>Judgment         | Goal<br>of<br>Points                 | Achievement<br>(+, -) |
|                                     | Team Project Presentation            | 10                | 7.53/10                                  |   |  |  | 7                                    | +0.53                 |
|                                     | Subject Studying and Team Portfolio  | 10                |  | 8.72/10   |  |  | 7                                    | +1.72                 |
|                                     | Midterm Exam                         | 20                |  |   | 12.7/20                                    |  | 14                                   | -1.83                 |
|                                     | Individual Trial                     | 10                |  |   |  | 5.26/10  | 7                                    | -1.73                 |
|                                     | Team Trial                           | 10                |  |   |  | 7.97/10  | 7                                    | +0.97                 |
|                                     | Final Exam                           | 10                |  |   | 6.9/10                                     |  | 7                                    | -0.1                  |
|                                     | Goal of Points/<br>Evaluation Points | 7/10              | 7/10                                     | 21/30   | 14/20                                      | Overall Achievement:<br>(Achieved, not achieved) |                                      |                       |
|                                     | Achievement<br>Points                | 7.53              | 8.72                                     | 19.07   | 13.23                                      |  |                                      |                       |
|                                     | Achievement(+, -)                    | +0.53             | +1.72                                    | -1.93   | -0.77                                      |  |                                      |                       |



**Figure 1.** Level change of self-evaluation before and after classes of every detailed competency of clinical dental hygiene IV.

## 2.2 Statistical Analysis

The collected data was analyzed using the Statistical Package for the Social Sciences (SPSS 21.0) program (SPSS Inc. Chicago. IL.USA). The operation evaluation of the competency-based education process took place

through the analysis of the class goal achievement that was presented in the evaluation document, and for the major core competencies, a paired-t test was carried out through self-evaluation before and after class. We used a level of significance of  $p < 0.05$ . In addition, the self-evaluation points of every detailed Competency showed an increase, showing statistical significance in except a few elements. ( $p < 0.05$ ) (Table 3)

## 3. Conclusion

In the major of dental hygiene, we meant to operate a competency-based education process, and later evaluate the effect of the education. Through the competency-based evaluation document, we were able to design a class operation and evaluation method for the realization of the detailed capabilities of the students. After finishing the education process through the achievement goal, the achievements of all students are to be figured out, promising us important information that will help us operate the classes to a degree that suits the students. In addition, by presenting the detailed evaluation contents about the

**Table 3.** Difference in detailed competencies self-evaluation for before and after operating competency -based education processes and clinical dental hygiene IV

| Question  | Before and After Education | Mean | Standard Deviation (SD) | p-value* |
|---|----------------------------|------|-------------------------|----------|
| Can utilize basic medicine and dental clinical knowledge in the process of managing dental hygiene  | Before                     | 5.40 | 1.53                    | 0.037    |
|   | After                      | 6.23 | 1.88                    |          |
| Under the consent of the patient/recipient, can Collect general, environmental, cultural, and social information, and can grasp impacts on Oral health.                             | Before                     | 6.14 | 1.79                    | 0.209    |
|   | After                      | 6.65 | 1.89                    |          |
| Can collect the medical history of the whole body, dental medical history, and family medical history of the patient/recipient, and can grasp impacts on oral health.               | Before                     | 6.19 | 1.74                    | 0.105    |
|   | After                      | 6.86 | 1.98                    |          |
| Can grasp the degree of anxiety and dental phobia of the patient/recipient.   | Before                     | 6.72 | 1.76                    | 0.414    |
|   | After                      | 6.28 | 1.42                    |          |
| Clinical tests, radiation tests, periodontal tests, and overall testscan be conducted and recorded in an accurate method. Can grasp the danger factors that can cause oral disease. | Before                     | 5.77 | 1.78                    | <0.001   |
|   | After                      | 6.58 | 1.87                    |          |

|   |        |      |      |       |
|---|--------|------|------|-------|
| Based on the information collected, can establish the requirements related to the oral health of the patient/recipient, and can make a decision for their dental hygiene.   | Before | 5.49 | 1.58 | 0.004 |
|   | After  | 6.88 | 1.87 |       |
| Can identify the main causes and potential problems that can be obstacles when it comes to improving health and oral health, and can decide upon a order of priority for the medical treatment planning of dental hygiene of the patient/recipient. | Before | 5.77 | 1.56 | 0.001 |
|   | After  | 6.77 | 1.90 |       |
| Can explain the medical treatment and education planning to a patient/recipient, and can finalize their agreement.  | Before | 6.60 | 1.59 | 0.045 |
|   | After  | 7.33 | 1.95 |       |
| In order to prevent cross-infection, they must have knowledge about the scientific principle of sterilization, disinfection, and pasteurization, and can put the theory into practice.  | Before | 6.44 | 1.78 | 0.036 |
|   | After  | 7.28 | 1.88 |       |
| Can fulfill dental hygiene mediation to prevent dental caries, periodontal diseases, and other oral disease   | Before | 6.12 | 1.40 | 0.013 |
|   | After  | 6.86 | 1.95 |       |
| Using adequate oral health evaluation indexes and Testing tools, can measure and interpret the change in the oral health of the patient/recipient.  | Before | 5.86 | 1.49 | 0.039 |
|   | After  | 6.67 | 2.16 |       |
| Can evaluate the results and satisfaction that comes from the mediation of their dental hygiene with the information they state and the change in their behavior, such as knowledge, attitude, or behavior.   | Before | 6.07 | 1.67 | 0.001 |
|   | After  | 6.91 | 1.76 |       |

method of class evaluation and sharing it with the students, they are able to recognize the goals and standards that they must achieve through participating in class, and it being considered that they will more systematically prepare for the class. Competency-based education processes are being judged as efficient studying methods where the academic achievement capabilities can be developed. Currently the development in competency-based education processes in the field of dental hygiene is insufficient, and thus we thank that this research has its meaning when we provided it.

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