

The Effect of Types of College Entrance Examination on Academic Achievement of General Chemistry in Face-to-face and Non-face-to-face Teaching-Learning

¹Min Ju Koo, ²Jong Keun Park*

¹Ph.D., Dept. of Chemistry Education, Gyeongsang National Univ. Korea

²*Professor, Dept. of Chemistry Education, Gyeongsang National Univ. Korea
kmj0214@gnu.ac.kr, mc7@gnu.ac.kr*

Abstract

After a longitudinal analysis of the data on the college entrance examination of students enrolled in the Department of Chemistry Education at Gyeongnam from 2014 to 2021, the effect on the academic achievement of general chemistry according to the type of college entrance examination was studied. And the impact on the academic achievement of general chemistry according to the type of admission screening in face-to-face and non-face-to-face teaching-learning was also studied. As a result of analyzing the academic achievement of general chemistry by admission process, students admitted through occasional screening showed relatively high grades of A and B at 88.7%, and the ratio of grades of 1~3 of chemistry I in high school was high. On the other hand, in the case of students admitted through regular admission, the ratio of grades of A and B in general chemistry was very high at 94.3%, and the ratio of grades of 3~4 in chemistry I of the College Scholastic Ability Test was high. As a result of analyzing the academic achievement of general chemistry by class type and admission process, it was found that the grades of chemistry I by face-to-face classes had an effect on the academic achievement of general chemistry in non-face-to-face classes. In both admissions, the academic achievement of general chemistry by face-to-face classes was relatively higher than that of non-face-to-face classes.

Keywords: Academic Achievement, Regular Admission, Occasional Admission, Face-to-face Classes, Non-face-to-face Classes, College Scholastic Ability Test

1. INTRODUCTION

So far, the biggest problem in education in Korea is the overheated competition for college entrance exams. This is one of the most urgent issues for Korean society to solve. Excessive competition in college entrance exams has caused the activation of the private education market such as early education, prior education, and etc. along with the deterioration of the quality of normal public education. In order to solve these problems, efforts have been continuously made to normalize middle and high school education that is sensitive to college entrance exams [1].

Considering various factors such as the grade of the school records, college scholastic ability test, essay writing, etc. in the college entrance exam, each university presents criteria for the selection of college admissions (occasional and regular admission) according to the characteristics of the university. Based on this,

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Corresponding Author: mc7@gnu.ac.kr

Tel: +82-55-772-2225, Fax: +82-55-772-2229

Professor, Dept. of Chemistry Education, Gyeongsang National Univ., Korea

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universities are selecting students with various changes in screening (occasional admission, regular admission). The occasional recruitment of the college admission process is selected by the curriculum and comparative grades of the school records, and the regular recruitment is selected by the grades of the College Scholastic Ability Test [2].

As a result of analyzing the average score of academic achievement of college according to the admission process, it was found that the college achievement of students who entered the occasional admission process (centered on school records) was relatively higher than that of students who entered the regular admission process (centered on the college scholastic ability test) [3-4]. The high school records are evaluated as valid data for predicting academic achievement in college because students who were faithful to their studies during high school faithfully perform their studies in college as well.

In addition, as a result of a study on the correlation between occasional admission and regular admission with academic achievement of college, it was found that the grades of the occasional and regular admission tests had a positive correlation with the college's academic achievement [5]. On the other hand, as a result of other studies, it was found that the occasional screening had a significant effect on academic achievement after college admission, but the regular screening did not have a statistically significant effect [6]. As a result, it is reported that the academic achievement of students admitted through the occasional screening has higher predictive power than those admitted through the regular screening [7]. Although the grades of the occasional screening are highly predictable data on academic achievement of college, the ratio of reflection in the admission process was low due to distrust in school grades such as gap problems between high schools, inflated grades, etc [8].

On the other hand, it was found that the grades of regular admission were highly correlated with college grades and had a negative correlation with the grades of college's academic achievement [9]. In addition, it is reported that the average college credit of students admitted through regular admission remains relatively higher than that of students admitted through occasional admission, and the difference decreases as the semester continues [10]. Therefore, these research results were contrary to previous research results that there was a high correlation between the grade of occasional screening and college's academic achievement.

As a result of examining the longitudinal relationship between admissions screening and college's academic achievement, it was found that the grades of students' school records and the grades of the college scholastic ability test over the past four years had a significant correlation with the academic achievement in college. As a result of the study of Lee and Park [11], academic achievement in college was found in the order of regular admission, comprehensive screening, and subject screening. This trend is the same result over the nine-year admission year analyzed, but the gap narrowed as the semester passed.

As such, in the results of previous studies, the correlation between several types of college admission screening (occasional and regular admission) and academic achievement in colleges was different. As a result of several studies, it was found that students who entered the college due to the 'occasional screening based on school records' had high academic achievement at college. Despite the results of these studies, many colleges have recently changed their admissions to 'regular admission'. Therefore, it was found that more research is needed on the correlation between academic achievement at universities according to the type of college admission screening.

Meanwhile, in the social emergency situation of COVID-19, school education was completely converted to a non-face-to-face teaching-learning [12]. Face-to-face teaching-learning is done by interaction between learners and instructors at the same place and time. On the other hand, non-face-to-face teaching-learning is a preferred teaching method for students in that it has free spatial and time limitations, allows repeated learning, and allows them to share and control knowledge and information between learners and instructors through online teaching-learning [13].

However, in non-face-to-face teaching-learning, many learners were found to have low educational effects because they could not control the learning environment on their own and their immersion in classes was reduced [13]. Therefore, it was found that in order for educational effects to appear in non-face-to-face teaching-learning, self-directed learning ability that learners can learn on their own is absolutely necessary. [14]. In other words, it was found that the learner's voluntary participation, interest, and ability had a great influence on academic achievement when the learner was immersed in teaching-learning in non-face-to-face classes.

According to a previous study that analyzed the academic achievement of colleges by face-to-face and non-face-to-face teaching-learning for students of homogeneous groups based on occasional screening, the academic achievement of general mathematics in face-to-face classes was significantly higher than that of non-face-to-face classes [14]. The grades of students who took face-to-face classes were higher than those of students who took non-face-to-face classes [15]. As a cause, non-face-to-face teaching-learning is a preferred teaching method for students, but it is difficult to control the learning environment and the immersion in class is low. In addition, it was interpreted that the educational effect was low in terms of academic achievement due to difficulties in learners' self-directed learning [13]. Since learners' self-directed learning ability is low, it was found that it was insufficient to replace face-to-face teaching-learning.

Another reason was that the evaluation system of academic achievement at universities was inflated and evaluated as a result of the transition from relative evaluation to absolute evaluation [4]. In other words, it implies that the fairness and validity of absolute evaluation should be guaranteed in non-face-to-face classes of instructors. These findings were found to be consistent with the findings of other previous studies that face-to-face teaching-learning has higher academic achievement than non-face-to-face teaching-learning [15-16]. Therefore, it was found that more research on the correlation between college admission screening and academic achievement at college is needed in face-to-face and non-face-to-face classes.

Therefore, based on the correlation between occasional admission and regular admission, and academic achievement of general chemistry at colleges, we tried to analyze the effect on academic achievement of general chemistry by college admission. In addition, we tried to study the effect on academic achievement of general chemistry according to college admission screening in face-to-face and non-face-to-face teaching-learning. It was found that learners' academic achievement was greatly affected by the type of face-to-face and non-face-to-face classes. In particular, since little research has been conducted on connection according to changes in the form of classes (face-to-face, non-face-to-face classes), this study is expected to have great implications for teaching-learning.

2. RESEARCH METHODS

2.1 Object of Study

The purpose of this study was to study the correlation between the grades of general chemistry according to the type of college admission (occasional admission, regular admission) and the academic achievement of general chemistry according to the class type (face-to-face, non-face-to-face class). The subjects of this study were 106 students who entered the department of chemistry education of G university in Gyeongnam from 2014 to 2021. They were found to have completed all chemistry I in high school. The subjects of the study are divided into occasional and regular admissions according to the type of college admissions screening, and 53 students were admitted through occasional admissions and regular admissions, respectively. The effect on academic achievement of general chemistry was analyzed according to the grade of chemistry I of each college admission process. In other words, the effect of the performance of chemistry I in the high school records and

the performance of chemistry I in the college scholastic ability test on academic achievement in colleges was analyzed.

Since December 2019, the type of teaching-learning has shifted from face-to-face classes to non-face-to-face classes according to the social distancing of COVID-19. As a result, students completed general chemistry as face-to-face or non-face-to-face classes according to the year in which chemistry was taught. Students (95 students) who took general chemistry in 2014-2019 and 2021 completed general chemistry through face-to-face teaching-learning, and students (11 students) who took general chemistry in 2020 completed general chemistry through non-face-to-face teaching-learning. The effect on academic achievement of general chemistry was analyzed according to the type of face-to-face and non-face-to-face teaching-learning.

2.2 Analysis of the Academic Achievement of General Chemistry according to the Grades of Chemistry I in the College Admission process

The subjects of this study were divided into students of occasional and regular admission according to the type of college admission screening. The occasional admission screening is evaluated based on the grades of chemistry I in the high school records, while the regular admission screening is based on the grades of chemistry I in the college scholastic ability test. The occasional and regular admission systems are 9 grades, with the first grade being the highest grade and the ninth grade being the lowest grade. In the occasional admission screening, the average of the first and second semester grades of chemistry I in high school was used. In the regular admission, the grades of chemistry I was used as the grades of chemistry I in the college scholastic ability test. In the regular admission, the grade of chemistry I of the college scholastic ability test was used as the grade of chemistry I.

Students who entered the department of chemistry education are taking general chemistry as a basic major subject throughout the first and second semesters of the first grade, and all first-year students are taking general chemistry courses. Students in the department of chemistry education took general chemistry courses for 15 weeks per semester. During the first semester, units of 1-13 of general chemistry textbooks were taught, and units of 13-28 of general chemistry textbooks were taught during the second semester. The class type was conducted as a face-to-face class from 2014 to 2019 and 2021, and as a non-face-to-face real-time class in 2020.

In face-to-face classes from 2014 to 2019, and 2021, grades were given for general chemistry based on relative evaluation. In the 2020 non-face-to-face class, the grade evaluation of general chemistry was given based on the absolute evaluation. For academic achievement of general chemistry, the average of the grades of the first and second semesters of general chemistry was used. The grades presented were 4-4.5 points as A grade, 3-3.99 points as B grade, 2-2.99 points as C grade, 1-1.99 points as D grade, 0 points as F grade, and no students received D and F grades.

The evaluation for academic achievement was divided into midterm and final exams in a semester and a paper-written test was conducted. The examination questions of the paper-written test focused on the measurement of basic content, scientific thinking, problem-solving skills, etc., such as understanding scientific concepts, application to real life, etc. The mid-term and final exam questions were presented by a professor in charge of general chemistry.

2.3 Analysis Method

SPSS 27.0 was used to find the Pearson correlation between the grades of chemistry I by college admission screening and the academic achievement of general chemistry. In order to study the effect of university

admissions on the academic achievement of general chemistry, the correlation between the grade of chemistry I by type of university admission screening and the academic achievement of general chemistry was compared and analyzed. In addition, the effect on academic achievement of general chemistry according to the teaching-learning type (face-to-face, non-face-to-face) was compared and analyzed.

2.4 Research Questions

Through a longitudinal analysis of college admissions, this study attempted to understand the effect of high school records and college scholastic ability test scores on the academic achievement of general chemistry and to study the relationship with the type of college admissions. In addition, it was intended to focus on the effect of general chemistry on academic achievement according to college admission screening in face-to-face and non-face-to-face teaching-learning. The following research questions are as follows.

1. what is the correlation between the type of college admission screening (occasional and regular admission) and the academic achievement of general chemistry?
2. what is the effect of admission students' occasional admission (grades of high school record) and regular admission (grades of college scholastic ability test) on the academic achievement of general chemistry?
3. what is the effect of face-to-face and non-face-to-face teaching-learning on the academic achievement of general chemistry according to occasional and regular screening?

3. RESEARCH RESULTS

3.1 Analysis of the Correlation between the Grades of Chemistry I in High School and the Academic Achievement of General Chemistry according to the College Admission

For students enrolled in the department of chemistry education from 2014 to 2021, the correlation between the grades of chemistry I and the academic achievement of general chemistry was analyzed according to the type of college admission. The number of students for the occasional and regular admission is 53 each, and the total number of study subjects is 106.

Table 1. Correlation between grades used in occasional and regular admission and academic achievement of general chemistry

Grade	grade of occasional admission	grade of regular admission	average grade of academic achievement in general chemistry
grade of occasional admission	1		
grade of regular admission	.a	1	
average grade of academic achievement in general chemistry	-.441**	-.350*	1

p**<0.01, p*<0.05

a. Cannot calculate one or more variables as constants

After analyzing the correlation between the grades of chemistry I by type of college admission and the average grade of academic achievement of general chemistry, the results are shown in Table 1. There was a

significant negative correlation between the grades of chemistry I by type of college admission and the average grade of academic achievement of general chemistry. This is because the lower the grade of chemistry I in high school and the lower the grade of chemistry I in the College Scholastic Ability Test, the higher the grade of academic achievement. In other words, the lower the grades of chemistry I, which is the basic data for occasional and regular admission, the higher the academic achievement of general chemistry is set.

Previous studies have shown that there is a significant difference between the average of academic performance in college according to the type of college admissions (occasional admissions, regular admissions), and students admitted through occasional admission have higher academic performance than those admitted through regular admission [1, 3].

The distribution of the grades of chemistry I in the school records and the grades of chemistry I in the college scholastic ability test were analyzed for students who entered the department of chemistry education through occasional and regular admission from 2014 to 2021, and the results are shown in Figures (1-a) and (1-b), respectively.

As shown in Figure (1-a), 39.6% of the students who entered the university through occasional screening were first-grade in chemistry I, followed by 28.3% in third grade and 20.8% in second grade. In the case of students who entered college through occasional screening, students with the grades of 1 to 3 of chemistry I were found to enter the department of chemistry education the most.

As shown in Figure of (1-b), among the students who entered the university through regular admission, the students who received grades 3 and 4 of chemistry 1 were the highest at 35.8%, and the first grade was the lowest at 3.8%. In the case of students who entered the regular admission process, it was found that many students with grades of 3 to 4 in the chemistry I of the college scholastic ability test entered the department of chemistry education.

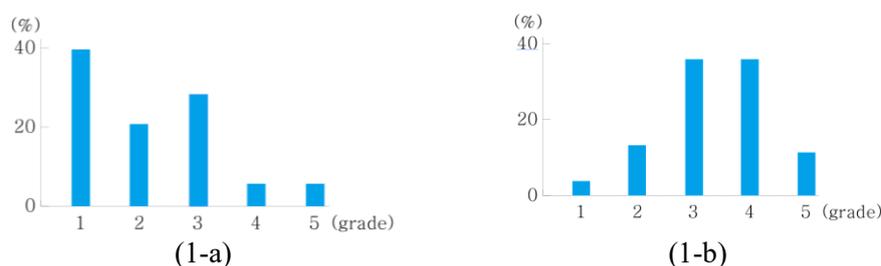


Figure 1. Distributions of grade level of chemistry I in occasional screening (1-a) and regular screening (1-b) of students (106) admitted from 2014 to 2021

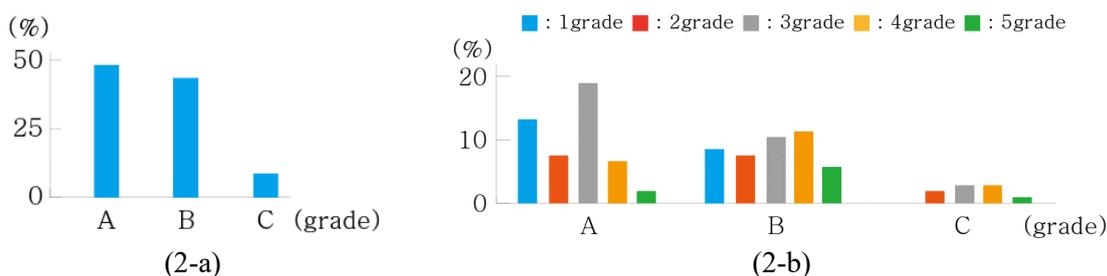


Figure 2. Distribution of grade level of general chemistry (2-a) and distribution of grade level of chemistry I in each class of general chemistry grades (2-b) of students (106) admitted between 2014 and 2021

For students admitted from 2014 to 2021, the distribution of grades of chemistry I according to each grade of general chemistry and grades of general chemistry was analyzed, and the results are shown in Figures 2-a and 2-b, respectively. As shown in Figure of (2-a), grade of A was the highest percentage (48.1%) in the distribution of grades of general chemistry, grade of B was 43.4% and grade of C was 8.5%.

As shown in Figure of 2-b, the distribution of the grade of chemistry I according to each grade of general chemistry was analyzed. In grade of A of general chemistry, grades of 1 to 3 of chemistry I were relatively high, and grades of 1 to 5 were all similar in grade B.

Regarding the 53 students who entered the university through occasional screening (the grades of chemistry I in school records) from 2014 to 2021, the distribution of grades in general chemistry and the distribution of the grade of chemistry I according to each grade in general chemistry were analyzed, and the results are shown in Figures of (3-a) and (3-b), respectively. As shown in Figure of (3-a), the ratio of grades of A to B was high at 88.7% in the grade distribution of general chemistry among students who entered university through occasional screening. It was 45.3% in grade A and 43.4% in grade B.

According to the results of previous longitudinal studies between college admissions and academic achievement in college, there was a significant correlation between the type of college admissions and academic achievement in college [1, 3]. It was found that students who entered the college through occasional screening had higher academic achievement in college. In particular, it was found that high school records had a significant effect on academic achievement in college [6]. The average college credit of students admitted through the occasional screening was the highest, followed by those who entered the regular screening, etc [4].

On the other hand, when various variables were controlled, it was found that students who entered the university through occasional screening had a negative effect on academic achievement in college [17]. This is the result of strengthening variable control (student's specialty, characteristics, etc.) compared to previous studies that have a positive effect on college admissions and academic achievement of college subjects [10].

As shown in Figure (3-b), students admitted through occasional screening showed relatively high ratios of 26.2% and 17.0% of grades of chemistry I in A and B grades of general chemistry, respectively. In other words, the higher the grade of chemistry I in high school, the higher the grade of general chemistry. Students admitted through the occasional screening were found to have relatively consistent grades of chemistry I in high school and academic achievement in general chemistry.

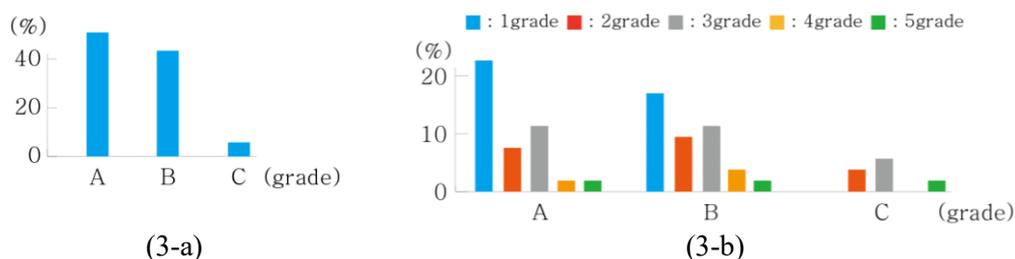


Figure 3. Distribution of grade level of general chemistry (3-a) and distribution of grade level of chemistry I in each class of general chemistry grades (3-b) of students (53) admitted through occasional screening between 2014 and 2021

Regarding 53 students who entered college with regular admission from 2014 to 2021, the distribution of grades of general chemistry and the distribution of grades of chemistry I in the college scholastic ability test according to each grade of general chemistry was analyzed, and the results are shown in Figures (4-a) and (4-b), respectively. As shown in Figure of (4-a), the ratio of A to grade in general chemistry was high at 94.3%. It was 50.9% in grade A and 43.4% in grade B.

As a result of a study on the longitudinal relationship between the grades of regular admissions and the academic achievement of college, students admitted through regular admissions showed higher academic achievement of college than those admitted through occasional admissions [10, 11]. In other words, students admitted through regular admission showed higher rates of grades of A and B in academic achievement of general chemistry. Due to the high confidence in the grades of chemistry I, it is judged that they chose the college scholastic ability test and entered by the regular admission [18].

As a result of several other studies, it was found that for students admitted through occasional screening, the grade of chemistry I in high school and the academic achievement of general chemistry were relatively well matched. It was found that the grade of chemistry I in the school records predicted the grade of general chemistry better than the grade of chemistry I in the college scholastic ability test [19].

In addition, there was no significant effect between the grades of the college scholastic ability test and the academic achievement of college [3], and there was no difference in the university's academic achievement between regular and occasional screening [20]. In this way, the research results were different according to the recruitment type of the admission process. It is judged that different results were found because the evaluation factors and reflection rates were different for each university according to the type of admission process.

As shown in Figure 4-b, for students admitted through regular admission, the ratio of grade 3 of chemistry I of the college scholastic ability test in grade A of general chemistry, was the highest at 26.4%, and in the grade of B, the grade of 4 of the chemistry I was the highest at 18.9%. This is because students who entered the college entrance examination have a high percentage of grades of 3 to 4 in chemistry I in the college scholastic ability test.

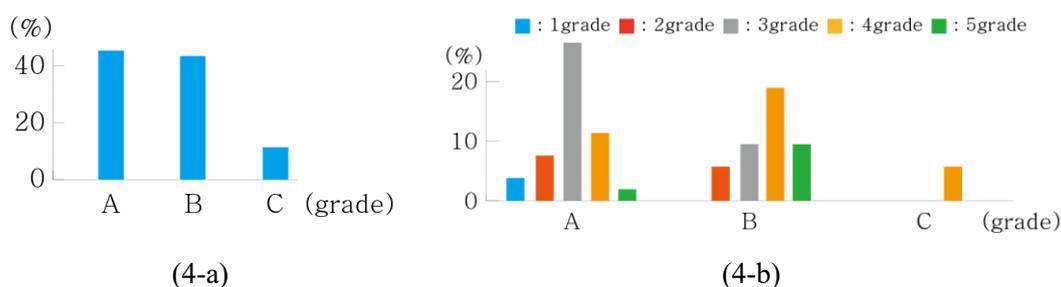


Figure 4. Distribution of grade level of general chemistry (4-a) and distribution of grade level of chemistry I in each class of general chemistry grades (4-b) of students (53) admitted through regular screening between 2014 and 2021

3.2 The Relationship between the Grade of Chemistry I by College Admission Process and Grades of General Chemistry according to Changes in Face-to-face/Non-face-to-face Classes

For students enrolled in the Department of Chemistry Education, the correlation between grades of chemistry I and academic achievement of general chemistry in regular and occasional screening according to class types was studied. The 26 students who entered in 2019 and 2021 completed face-to-face classes, and the 11 students who attended in 2020 completed non-face-to-face classes, respectively, chemistry I in high schools and general chemistry in college.

The effect of non-face-to-face classes on the academic achievement of general chemistry was analyzed for students who entered the Department of Chemistry Education through occasional screening. General chemistry was conducted as a non-face-to-face class in 2020, and general chemistry as a face-to-face class in 2021. The number of students admitted through regular admission was too small to analyze the correlation between them.

Figures (5-a) and (5-b) show the distribution of chemistry I in high school according to each grade in general

chemistry and the distribution of general chemistry, respectively, for students admitted occasional admission in 2020. In Figure (5-a), the grades of students who completed general chemistry through non-face-to-face classes were the highest in grade of A at 50.0%, followed by grade of B at 40.0%. It was found that the academic achievement of general chemistry by non-face-to-face classes was affected by the grade of chemistry I by face-to-face classes.

In Figure (5-b), the distribution of the grades of chemistry I by face-to-face class was shown according to each grade in general chemistry taken as a non-face-to-face class. The first grade of chemistry I was the highest in the grade of A in general chemistry. Students with high grades of chemistry I class in high school by face-to-face class also showed high academic achievement in general chemistry by non-face-to-face class. This showed a similar tendency to previously studied results [4].

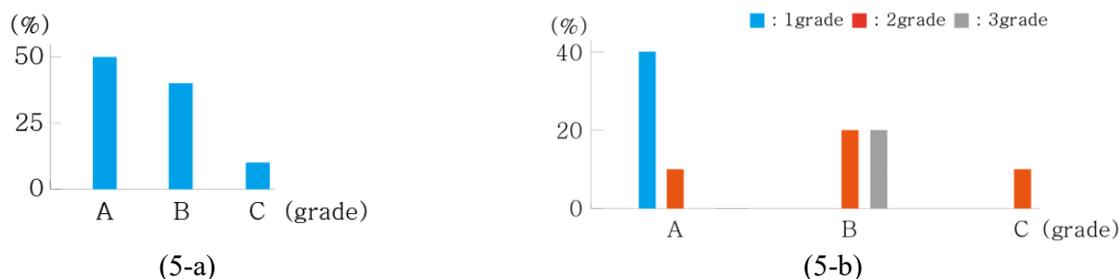


Figure 5. For students who entered the occasional screening in 2020, distribution of grade level of general chemistry (5-a) and distribution of grade level of chemistry I in each class of general chemistry grades (5-b) among students who have completed face-to-face classes of chemistry I and non-face-to-face classes of general chemistry

For students who entered the Department of Chemistry Education through occasional and regular admission, chemistry I was conducted as a non-face-to-face class in high school in 2020 and general chemistry as a face-to-face class in 2021. The effects of occasional and regular admissions on academic achievement of general chemistry in face-to-face classes were analyzed. In face-to-face classes, the grades of general chemistry were made by relative evaluation.

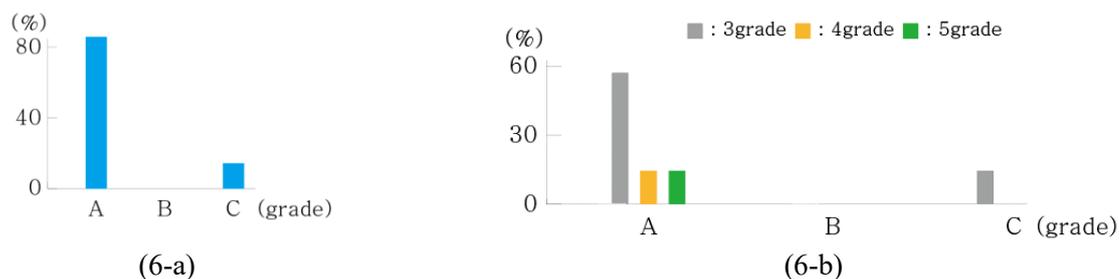


Figure 6. For students who entered the occasional screening in 2021, distribution of grade level of general chemistry (6-a) and distribution of grade level of chemistry I in each class of general chemistry grades (6-b) among students who have completed non-face-to-face classes of chemistry I and face-to-face classes of general chemistry

Figures (6-a) and (6-b) show the distribution of the grade of general chemistry and the distribution of the grade of chemistry I in high school according to each grade of general chemistry, respectively, for students admitted through occasional screening in 2021. In Figure (6-a), the grades of students who completed general chemistry through face-to-face classes were the highest in grade of A at 85.7%, and grade of B was not shown.

The academic achievement of general chemistry by face-to-face classes was relatively higher than that of non-face-to-face classes in Figure (5-a).

In Figure (6-b), the distribution of chemistry I by non-face-to-face classes was presented according to each grade of general chemistry taken as face-to-face classes. In grade of A of general chemistry, grade of 3 of chemistry I was the highest, and in grade of B, the distribution of grades of chemistry I was not shown. This is because the population of students who entered the Department of Chemistry Education through occasional screening is small. Even if general chemistry is conducted as a face-to-face class, the degree of understanding of general chemistry is also considered to be low because the understanding of chemistry I is low in high school due to non-face-to-face classes.

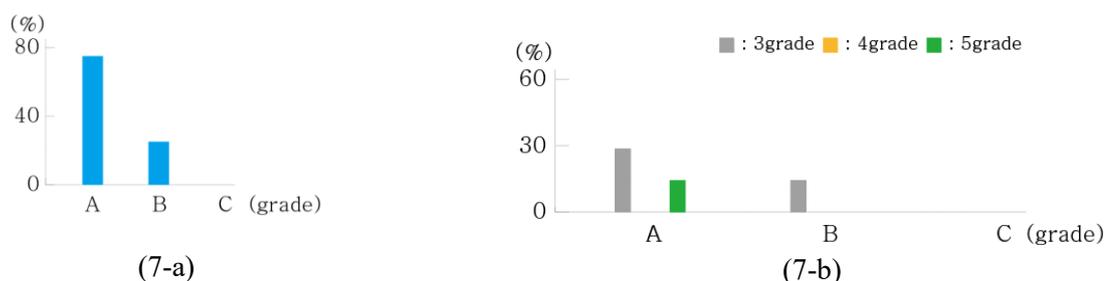


Figure 7. For students who entered the regular screening in 2021, distribution of grade level of general chemistry (7-a) and distribution of grade level of chemistry I in each class of general chemistry grades (7-b) among students who have completed non-face-to-face classes of chemistry I and face-to-face classes of general chemistry

Meanwhile, Figure. (7-a) and (7-b) is shown the distribution of grades of chemistry I in high school according to each grade of general chemistry and grades of general chemistry, respectively, for students who entered the regular admission in 2021. As shown in Figure (7-a), the grades of students who completed general chemistry by face-to-face classes were the highest in grade of A at 75.0%, grade of B at 25.0%, and grade of C was not shown. The academic achievement of general chemistry by regular admission was relatively higher than that of occasional admission in Figure (6-a).

In Figure (7-b), the distribution of grades of chemistry I by non-face-to-face classes was analyzed for students who entered the regular admission according to each grade of general chemistry by face-to-face classes. In the grades A and B of general chemistry, the third grade of chemistry I was high. The ratio of grades of A and B was high in the grades of general chemistry of students admitted through regular admission.

As a result of a previous study, it was found that the academic achievement of face-to-face classes was higher than that of non-face-to-face classes [21]. In non-face-to-face teaching-learning, it was found that the academic achievement of non-face-to-face classes was relatively low due to difficulties such as learner-teacher interaction, low concentration of learners, and instructor-centered classes. In non-face-to-face classes, learners' autonomous and active teaching-learning is emphasized. In terms of instructors, factors such as consideration of learners' level, checking of learners' degree of understanding, difficulty in feedback to learners, etc. were found to have a great influence.

4. CONCLUSIONS

This study longitudinally analyzed the grades according to the type of university admission screening (occasional admission, regular admission) for students who entered the Department of Chemistry Education in Gyeongnam from 2014 to 2021. The effect of the grades of chemistry I in school records in the occasional

screening and the grades of chemistry I in the College Scholastic Ability Test in the regular screening on the academic achievement of general chemistry was studied. In addition, the effect on academic achievement of general chemistry according to admission screening in face-to-face and non-face-to-face teaching-learning was studied, respectively.

As a result of analyzing the grades of students who entered the school between 2014 and 2021, it was found that the grades of chemistry I of students who entered the college entrance examination through occasional admission were grades of 1 to 3, and the grades of chemistry I of students who entered the college entrance examination through regular admission were grades of 3 to 4. Their academic achievement in general chemistry was high in grades of A and B. In addition, as a result of analyzing the distribution of the grades of chemistry I in each grade of academic achievement of general chemistry, grades of 1~3 of chemistry I were relatively high in grade of A of academic achievement of general chemistry.

As a result of analyzing the grades of general chemistry according to the college entrance examination of students who entered from 2014 to 2021, the ratio of A and B grades (88.7%) was high in the grades of general chemistry of students admitted through the occasional screening, and the first grade of chemistry I was relatively high in A and B grades of the general chemistry. Therefore, it was found that the grade of chemistry I in high school had an effect on the academic achievement of general chemistry.

In the case of regular admission, the ratio of grades of A~B was high (94.3%) in the distribution of grades of general chemistry. In the A and B grades of general chemistry, the 3rd and 4th grades of chemistry I in the College Scholastic Ability Test were the highest, respectively. This is because students admitted through regular admission have a high proportion of grades of 3~4 in chemistry I of the College Scholastic Ability Test.

Meanwhile, as a result of studying the correlation between grade of chemistry I and academic achievement of general chemistry by type of college entrance examination according to class type, in the case of students who entered the university through occasional admission in 2020, they completed general chemistry through non-face-to-face classes, and the ratio of grades of A and B was 50.0% and 40%, respectively. It was found that the understanding of the content of chemistry I by face-to-face classes in high school had an effect on the academic achievement of general chemistry by non-face-to-face classes. As a result of analyzing the distribution of the grade of chemistry I by face-to-face class in each grade of general chemistry as a non-face-to-face class, in the A grade of general chemistry, the first grade of chemistry I was the highest. Students with high grades in chemistry I by face-to-face classes also showed high academic achievement in general chemistry by non-face-to-face classes.

In the case of students who entered the school through occasional screening in 2021, general chemistry was completed as a face-to-face class, and the grade of general chemistry was the highest in A. The academic achievement of general chemistry by face-to-face classes was relatively higher than that of non-face-to-face classes in 2020. As a result of studying the distribution of grades in chemistry I by non-face-to-face classes in each grade of general chemistry completed as face-to-face classes, in the A grade of general chemistry, the 3rd grade of chemistry I was the highest.

In the case of students who entered the school through regular screening in 2021, when general chemistry was completed as a face-to-face class, the third grade of chemistry I was the highest in the A grade of general chemistry. The academic achievement of general chemistry of students admitted through the regular admission was relatively higher than that of the occasional admission.

For the first time, a study was conducted on the effect of class type and grade of university entrance examination on academic achievement in general chemistry. The grade of the school records used in the occasional screening is determined based on the continuous grades of three years of high school, indicating the continuous academic competence of the subject. On the other hand, since the grade of the college scholastic

ability test used for regular admission is determined by one test, it is difficult to see it as a continuous academic competency. In this way, face-to-face and non-face-to-face classes can affect the grades of school records and the grades of the college scholastic ability test, and these grades can affect the academic achievement of college. Since there is a close relationship between them, the results of these studies are expected to greatly contribute to the basic data of admission screening by universities.

In the results of this study above, the effect on academic achievement of general chemistry according to the type of admission process will be systematically understood only when a longer-term study is conducted. In addition, it is necessary to analyze the difference in academic achievement by admission screening in the non-face-to-face class with various variables controlled.

REFERENCES

- [1] T. -M. Kim, S. -J. Yang, S. -Y. Lim, N. -Y. Park, J. I. Jo, and J. -G. Kim, "Academic Achievement and Dropout Rates Depending on Different Types of College Admissions Options," *Journal of Higher Educational Research*, vol. 4, no. 2, pp. 1-16, 2021. <https://doi.org/10.22838/jher.2021.4.2.1>
- [2] S. -S. Park, "A Study on Admission Factors and Scholastic Achievement," *The Journal of Korean Education*, vol. 34, no. 4, pp. 27-56, 2007. <https://doi.org/10.22804/jke.2007.34.4.002>
- [3] H. Lee and N. Kwon, "Comparisons between College Admission Types in Academic Achievement and the Related Factors, and the Structural Relations," *Asian Journal of Education (AJE)*, vol. 19, no. 3(67), pp. 825-851, 2018. <https://doi.org/10.15753/aje.2018.09.19.3.825>
- [4] J. -H. Choi and S. Lee, "A Longitudinal Study of College Students' Academic Achievement and Department Satisfaction According to the Admissions Process: Focusing on the Case of D University," *Korean Association for Learner-Centered Curriculum and Instruction*, vol. 21, no. 19, pp. 75-90, 2021. <https://doi.org/10.22251/jlcci.2021.21.19.75>
- [5] S. -J. Kang, "Methodological Comparisons between Estimation Method for Criterion-Related Validity of College Admission Scores," *Journal of Educational Evaluation*, vol. 14, no. 1, pp. 171-197, 2001.
- [6] H. Y. Lee, M. H. Jo, and H. W. Lee, "Relationships among High School Grade, the College Scholastic Ability Test Scores, and University Academic Achievement by Types of Admission: A Case of A University," *The Journal of Career Education Research*, vol. 29, no. 2, pp. 109-127, 2016. G704-00128 5.2016.29.2.012
- [7] J. Woo and D. Jung, "Analysis of Relation between College Student Academic Achievement and its Factors under Current Admission Process," *Admission Studies*, vol. 1, pp. 153-179, 2012. I410-ECN-0102-2013-300-002143915
- [8] E. Chi, "Evaluating the Predictive Validity of Various College Admission Materials: CSAT, HSA, Essay, Interview, and Recommendation Letters," *Journal of Educational Evaluation*, vol. 14, no. 2, pp. 155-172, 2001.
- [9] H. C. Kim, "Comparison of the Effects between Motivational Selection Criteria Scores for Admission on the College Students' Academic Achievement," *Korean Journal of Educational Research*, vol. 42, no. 4, pp. 343-378, 2004. G704-000614.2004.42.4.022
- [10] S. B. Oh, "Analysis of School Life Transition of Students by University Admission Process," *Korean Education Inquiry*, vol. 33, no. 1, pp. 1-18, 2015. G704-SER000014634.2015.33.1.002
- [11] S. W. Lee and K. B. Park, "A Comparative Study on Academic Achievement among Students by University Admission Type," *The Journal of Learner-Centered Curriculum and Instruction (JLCCI)*, vol. 18, no. 12, pp. 131-154, 2018. <https://doi.org/10.22251/jlcci.2018.18.12.131>

- [12] M. J. Koo and J. K. Park, "A Study on the Factors Affecting Academic Achievement in Non-face-to-face Teaching-Learning," *The International Journal of Advanced Culture Technology*, vol. 10, no. 2, pp. 162-173, 2022. <https://doi.org/10.17703/IJACT.2022.10.2.162>
- [13] Y. J. Park, K. H. Lee, and H. S. Lee, "A Comparative Study on Academic Achievement and Class Satisfaction of College General Mathematics according to Face-to-face Classes and Remote Classes," *The Journal of the Korea Contents Association*, vol. 22, no. 1, pp. 324-336, 2022. <http://doi.org/10.5392/JKCA.2022.22.01.324>
- [14] S. Y. Beak, "A Study on the Factors Affecting Academic Achievement of Non-face-to-face Online Learners Due to COVID-19," *Information Society & Media*, vol. 23, no. 2, pp. 258-280, 2022.
- [15] S. Cho, "Comparison of Academic Achievement of Classroom Learning and On-line Learning: A Case Study," *The Journal of Business Education*, vol. 34, no. 6, pp. 23-39, 2020. <https://doi.org/10.34274/krabe.2020.34.6.002>
- [16] S. Im and E. Jung, "Analysis of the Changes in Fourth and Sixth Grade Elementary Students' Mathematical Achievement during the COVID-19 Pandemic," *Korean Journal of Elementary Education*, vol. 32, no. 3, pp. 249-266, 2021. <https://doi.org/10.20972/kjee.32.3.202109.249>
- [17] H. J. Gong, N. Jang, and J. Kim, "Effects of Early Admissions on Korean Students' Engagement and Outcomes Using Propensity Score Weighting," *Korean Journal of Educational Administration*, vol. 40, no. 4, pp. 207-236, 2022. <http://dx.doi.org/10.22553/keas.2022.40.4.207>
- [18] M. J. Koo and J. K. Park, "Influences on the Academic Achievement of General Chemistry Based on the Interest for Chemical Subjects of High School," *The International Journal of Advanced Culture Technology*, vol. 10, no. 1, pp.170-179, 2022. <https://doi.org/10.17703/IJACT.2022.10.1.170>
- [19] M. J. Koo and J. K. Park, "Influences for the understanding of General Chemistry according to the completion of chemical subjects in high school," *The International Journal of Advanced Culture Technology*, vol. 9, no. 4, pp. 237-247, 2021. <https://doi.org/10.17703/IJACT.2021.9.4.237>
- [20] S. -Y. Park and J. -Y. Kim, "Analysis of Longitudinal Impact on Student Adaptation to College and Academic Achievement of College Admission System," *The Journal of Educational Administration*, vol. 36, no. 5, pp. 323-353, 2018. <https://doi.org/10.22553/keas.2018.36.5.323>
- [21] M. J. Koo, W. J. Jung, and J. K. Park, "Study on the Change in Science Grades and the Influence of Science Grades by Level according to Non-face-to-face and Face-to-face Teaching-Learning," *The International Journal of Advanced Culture Technology*, vol. 10, no. 3, pp. 226-236, 2022. <https://doi.org/10.17703/IJACT.2022.10.3.226>