Original Article

Effect of school environment on the dropout rate of enrolled students: focus of the department of dental hygiene

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ABSTRACT

Objectives: This study aimed to analyze the impact of school environment indicators on the dropout rates of dental hygiene students. **Methods**: A correlation was established between dropout rates and several key variables, and hierarchical regression analysis was employed to identify the factors that influence dropout rates. **Results:** Schools with fewer students exhibited higher dropout rates than those of larger institutions. High dropout rates were negatively correlated with employment rates, research grants, tuition fees, and the total number of dental students. Among these variables, graduate employment rate was the only significant factor affecting attrition rates. **Conclusions:** To reduce the dropout rates among dental hygiene students, it is essential to enhance their employability skills and foster a strong collaboration between educational institutions and employers.

Key Words: Dental hygiene, Dropout rate, Employment, Regression analysis, Schools, Students

Introduction

Universities are confronted with the challenge of reconciling the needs of society with the founding philosophy and educational objectives of universities in order to educate students in an appropriate environment that is responsive to the evolving needs of different eras. Since 1995, when the regulations on the establishment of universities were relaxed, the quantitative growth of domestic universities has accelerated. However, this expansion has not been accompanied by a corresponding improvement in the quality of education, and various problems have arisen in management. Furthermore, with the rapid decline of the school-age population, schools must identify new needs and deliver educational outcomes.

These trends prompt a discussion of the school as an institution. The primary functions of schools are teaching, learning, administration and service. The impact of these functions on students varies depending on the specific characteristics and context of the school in question. In regard to teaching, we consider indicators such as the professor-student ratio, student enrolment, and the full-time faculty ratio with respect to research, we examine indicators such as research funding and research output. Finally, with regard to administration and service, we investigate various activities and their relationship with related organisations [1-4]. The Higher Education in Korea website (https://www.academyinfo.go.kr) provides the public with convenient access to key information about universities. It offers details about school operations, students, faculty, research and industry-academia cooperation, budget, and teaching.

In the year 2021, the fill rate for new students was 91.5%. Nevertheless, projections indicate that this figure is likely to decline to 59.9% by 2040. It will be necessary to modify the methodology employed in the delivery of education and to implement long-term measures such as quality control in order to ensure the continued efficacy integrity of the educational process. The recruitment of

new students is becoming increasingly challenging for numerous academic disciplines, including dental hygiene, as a consequence of a declining school-age population. In response to this demographic shift, some universities are promoting the introduction of condensed curricula and online learning as strategies to enhance their appeal to prospective students. Nevertheless, this approach has given rise to concerns about the potential impact on the quality of education [5]. It is insufficient to focus solely on the recruitment of new students; the retention of existing students and the resulting dropout rate must also be addressed. By 2021, 97,326 students, representing 4.9% of all enrolments, will have discontinued their studies [6]. Previous studies on attrition have indicated that the size of the school, the percentage of full-time faculty and tuition fees are influential factors [7-9].

Nevertheless, despite the pivotal role of the school environment, research examining the relationship between dropout rates and key indicators remains scarce. The majority of existing studies have focused on the personal characteristics of students, with a paucity of research exploring dropout rates among dental hygiene students.

This study aimed to bridge this gap by examining the characteristics of dental hygiene colleges and universities, including their educational conditions, research funding, and expenditure on services. The objective was to gain insights into how these factors influence student dropout rates.

Methods

1. Subjects

A total of 72 schools with dental hygiene departments listed on the Higher Education in Korea website in the 2024 (academic year 2023) were included in the study. They consisted of 27 four-year universities and 45 three-year colleges. Five schools with no graduates yet and two schools with 10 or fewer students were excluded.

2. Variables

The dependent variable was the status of dropout students from the Higher Education in Korea website, which is available for anyone to check and use. The independent variables were selected based on previous studies [9] as follows: the characteristics of the schools, status of graduates' employment, the conditions of education, the research fund and service expenditure, and the school finance.

3. Data analysis

The data collected was analysed using SPSS program (ver. 18.0; IBM Corp., Armonk, NY, USA). The variables collected were subjected to descriptive statistics and correlational analysis, and hierarchical regression analysis was used to determine how the independent variables affected the dropout rate.

Results

1. Dropout rates by school characteristics

The characteristics of schools, including the status of graduates' employment, the conditions of education, the research fund and service expenditure, and the school finance, as well as the state of dropout students, are presented in <Table 1>.

Table 1. Dropout rates and school characteristics

Variables	Mean	SD
Status of dropout students (%)	7.63	5.04
Characteristics of the schools		
Status of graduates' employment (%)	82.61	8.26
Conditions of education		
Ratio of lectures conducted by faculty	61.66	16.54
Number of students per one faculty member	32.59	5.39
Educational expenses per student[*]	4.12	0.08
Research fund&service expenditure		
Research fund benefits records[*]	3.28	1.22
Service expenditure per student[*]	7.53	0.37
School finance		
Status of tuition fees[*]	3.82	0.07
Total number of dental hygiene students enrolled	161.26	117.06
Status of student loans (%)	8.23	3.05
Status of scholarship benefits (%)[*]	3.61	0.07

[*]log 10 (1,000 KRW)

The differences in the dropout rates according to school characteristics were illustrated in <Table 2>. No statistically significant differences were observed in the graduation system, the region, and the eligible for the support program. However, a higher dropout rate was noted for schools with 2,500 student (10.63%) compared to schools with more than 5,000 students (5.35%).

Table 2. Dropout rates by school characteristics

Characteristics	Division	Dropout rates			
		N	Mean	SD	p^*
Graduation system	College	45	8.32	4.91	0.134
	University	27	6.48	5.12	
Region	Metropolitan city	27	6.61	4.80	0.188
	City	45	8.24	5.13	
Total number of enrolled students	≥5,000	22	5.35	3.33[a]	0.002
	≥2,500	30	7.30	5.10[ab]	
	<2,500	20	10.63	5.20[b]	
Eligible for the support program	Benefit	59	7.11	5.07	0.061
	Not benefiting	13	9.99	4.28	

[*]by t-test or one-way ANOVA
[ab]The same characters are not significant by Scheffe test.

2. Correlation between dropout rates and school characteristics

<Table 3> presents the results of the correlation analysis between dropout rates and school characteristics. The results demonstrate a robust negative correlation between the rate of graduate employment (r=-0.361, $p<0.01$) and research fund performance (r=-0.378, $p<0.01$) with dropout rates. This suggests that enhanced employment outcomes and augmented research funding are associated with a reduction in dropouts. Furthermore, the tuition fee (r=-0.265, $p<0.05$) and the number of dental hygiene students (r=-0.328, $p<0.01$) also demonstrate negative correlations, indicating that lower fees and larger program may potentially reduce dropout rates. Furthermore, the student loan (r=-0.314, $p<0.01$) is negatively correlated, indicating that limited loan availability is associated with

higher dropout rates. Other factors, such as educational expenses and service expenditure, demonstrate weaker or less consistent correlations.

Table 3. Correlation between dropout rate and variables

	1	2	3	4	5	6	7	8	9	10	11
1	1.000										
2	-0.361**	1.000									
3	0.147	-0.117	1.000								
4	-0.220	-0.044	-0.350**	1.000							
5	-0.118	-0.194	0.167	-0.366**	1.000						
6	-0.378**	0.251*	0.210	0.045	0.439**	1.000					
7	-0.227	0.085	-0.049	0.046	0.109	0.396**	1.000				
8	-0.265*	0.168	-0.087	0.301*	-0.008	0.350**	0.343**	1.000			
9	-0.328**	0.249*	-0.144	0.463**	-0.155	0.080	0.212	0.219	1.000		
10	-0.314**	-0.011	-0.161	0.294*	-0.145	0.013	0.110	0.566**	0.389**	1.000	
11	0.091	-0.094	0.201	0.039	0.137	0.054	0.134	0.226	-0.236*	-0.090	1.000

*$p<0.05$, **$p<0.01$, by Pearson's correlation coefficient
1: Status of dropout students, 2: Status of graduates' employment, 3: Ratio of lectures conducted by faculty, 4: Number of students per one faculty member, 5: Educational expenses per student, 6: Research fund benefits records, 7: Service expenditure per student, 8: Status of tuition fees, 9: Total number of dental hygiene students enrolled, 10: Status of student loans, 11: Status of scholarship benefits

3. Factors associated with the status of dropout students

The variables affecting the dropout rate were shown in <Table 4>. In the four-stage hierarchical regression analysis, the research fund & service expenditure (model 3) and the school finance (model 4) did not have a statistically significant effect. The schools with less than 2,500 students had a higher dropout rate in model 1, but when controlling for the characteristics of the schools in model 2, only the status of graduates' employment had a statistically insignificant effect, and the lower the employment status, the higher the dropout rate (β=-0.252, $p<0.05$).

Table 4. Factors associated with the status of dropout students (%)

Variables	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Characteristics of the schools												
(Constant)	19.439	6.236		62.538	35.770		48.526	41.781		40.181	66.697	
College	-0.441	1.314	-.043	-0.700	1.436	-0.068	-2.308	1.666	-0.223	-2.269	2.131	-0.220
City	0.355	1.186	0.034	-0.012	1.219	-0.001	-0.363	1.224	-0.035	-0.381	1.202	-0.037
≥2,500	3.886	1.820	0.348	3.413	1.824	0.306	2.958	2.198	0.265	3.377	2.243	0.302
<2,500	1.828	1.426	0.180*	1.869	1.431	0.184	1.666	1.629	0.164	1.838	1.647	0.181
Not benefiting	1.327	1.548	0.102	1.116	1.567	0.086	0.743	1.564	0.057	0.841	1.565	0.065
Rate of graduates' employment	-0.167	0.071	-0.275*	-0.154	0.072	-0.252*	-0.140	0.072	-0.229	-0.141	0.075	-0.232
Conditions of education												
Ratio of lectures				0.021	0.037	0.068	0.033	0.037	0.107	0.027	0.038	0.090
Number of students				-0.200	0.124	-0.213	-0.166	0.125	-0.178	-0.091	0.142	-0.097
Educational expenses				-9.344	8.155	-0.157	-6.204	8.307	-0.104	-6.734	8.367	-0.113
Research fund & service expenditure												
Fund benefits							-1.322	0.716	-0.319	-1.293	0.731	-0.313
Service expenditure							0.526	1.948	0.039	1.118	2.077	0.082
School finance												
Tuition fees										1.636	13.608	0.023
Total number of dental hygiene students										-0.001	0.006	-0.013
Student loans										-0.502	0.251	-0.304
Scholarship benefits										0.479	9.203	0.007
F value	3.402**			2.783**			2.639**			2.541**		
adjusted R²	0.169			0.184			0.203			0.246		
Δ R²	0.239			0.049			0.038			0.079		

*$p<0.05$, **$p<0.01$

Discussion

In this study, we empolyed publicly available data from the Higher Education in Korea database to examine the impact of various factors on student dropout rates. This data represents an accurate and transparent available source of key university and college indicators, offering convenience and accessibility, and high reliability and validity.

The data demonstrated that smaller universities with an enrollment of less than 2,500 students exhibited a higher dropout rate than their larger counterparts. Furthermore, prior research has also demonstrated that larger universities tend to exhibit lower dropout rates [9,10]. And financial aid status and universities situated in metropolitan areas (Seoul, Gyeonggi-do, Incheon) exhibited reduced dropout rates as well. However, no statistically significant differences were identified between colleges and universities, location, and whether they received financial aid. This discrepancy is likely attributable to the proportion of dental hygiene students, rather than the overall university dropout rate, and other factors such as competition among first-year students, the availability of dormitories, academic performance, and satisfaction with the major, rather than location or financial aid [7,10,11].

The findings of this study indicate a positive correlation between dropout rates and graduate employment rates, research fund benefits, tuition fees, the total number of dental hygiene students. In a study conducted by Hwang & Jeon [9], a reduction in dropout rates was observed in correlation with an increase in the ratio of lectures conducted by faculty, student loan ratios, expenditure per student, and educational expenses per student. In the study by Hwang et al [10], a negative correlation was observed between dropout rates and higher employment rates, higher grades and lower tuition fees. In contrast, this study found that higher tuition fees and student loan rates were associated with lower dropout rates. These discrepancies may be attributed to several factors, including higher expectations of future earnings, parental support, loan deferment and long-term repayment schemes, and the social stigma associated dropping out.

A hierarchical regression analysis was conducted to investigate the factors influencing dropout rates. The analysis yielded the the result that only the graduate employment rate exhibited a significant predictive effect. In a previous study [9], the number of students, the financial aid, the ratio of lectures conducted by faculty, the number of students per faculty member, the research fund benefits, and the rate of student loans were identified as factors affecting the dropout rate. In the study conducted by Hwang et al. [10], the employment rate of graduates, the rate of scholarship benefits, and in the study conducted by Chung et al [7], the location of the university, the status of financial aid, the number of students per faculty member, and research fund benefits were identified as factors affecting dropout rates. These discrepancies are likely attributable to the fact that dental hygiene students' expectations of employment are a significant factor in their school choice and retention [12-14]. In contrast to the findings of previous studies, our analysis did not identify any variables as significantly influential when moving from Model 2 to Model 4. This raises the question of whether this is due to the presence of correlations between variables, the specific institutions included in study, or differences in the influence of certain variables. While not a significant change, the progression to next model did contribute to a slight increase in explanatory power.

Despite tuition fees representing over 70% of the operating income of universities, the government's policy of freezing tuition fees has prevented universities from raising tuition fees for the past 15 years. In recent times, a small number of universities, including those situated in metropolitan areas, have initiated an increase in tuition fees. Nevertheless, the financial pressures remain considerable, particularly for private universities, which rely heavily on tuition fees. In light of these circumstances, state support, such as the support program for university or college development, has become a crucial aspect of university operations. The decline in the school-age population is already occurring at an accelerated rate, which will present an even more significant challenge for universities. Consequently, there will be a greater focus on state-funded initiatives to address the shortfall in funding [15,16]. The nature of government-led financial support projects presents a challenge for universities seeking to diversify their financial sources in a short period of time. It is therefore essential to reinforce and sustain collaborative relationships with pivotal employers in the local community. This may entail initiatives such as on-the-job training and work placements, with the objective

of enhancing employability and student retention, while concurrently reducing dropout rates.

This study utilized publicly accessible data on the academic environments of colleges and universities in South Korea, where dental hygiene departments are offered as a basis for analysis. The relationship between key indicators of school environment and dropout rates was subjected to analysis, and factors affecting dropout rates were identified. However, the analysis was unable to determine whether there were any changes in dropout rates change over time. Hierarchical regression analyses were conducted in order to control for moderating variables that alter the strength or direction of the relationship between variables. Nevertheless, no significant interactions were identified in the subsequent analyses conducted at the second stage. It is recommended that future studies analyze not only analyze the relationship between other publicly available indicators of the school environment and dropout rates but also examine longitudinal data in order to capture changes in dropout rates over time. It is recommended that future research consider the application of time-series or survival analyses, with a view to gaining a deeper understanding of the manner in which factors influencing dropout rates evolve and vary over time. Morever, an exploration of the range of potential moderators, including faculty-to-student ratios, academic support resources and student satisfaction, could facilitate the acquisition of insights into the specific factors influencing dropout rates.

Conclusions

The factors that influence the attrition rates of students enrolled in the dental hygiene department, as well as the correlations between the variables, were as follows:

1. The college with an enrollment of fewer than 2,500 students exhibited demonstrated a higher dropout rate than the other educational institutions, as evidenced by the data. However, no statistically significant differences were identified with regard to graduation system, region, or financial aid status.

2. The dropout rate was found to decrease as a result of an increase in the employment rate, research funding, tuition fees and the total number of dental hygiene students.

3. The graduate employment rate was identified as the sole significant predictor of the dropout rate.

It is therefore imperative that measures be taken to enhance the employability of students who complete their dental hygiene studies, with the objective of reducing the number of students who drop out before completing their studies.

Notes

Author Contributions

The author fully participated in the work performed and documented truthfully.

Conflicts of Interest

SH Lee has been a member of editorial committee of the Journal of Korean Society of Dental Hygiene. He is not involved in the review process of this manuscript. Otherwise, there was no conflicts of interest.

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Ethical Statement

Research related to normal educational practice at schools under Article 2 of the Elementary and Secondary Education Act and Article 2 of the Higher Education Act, and at educational institutions as prescribed and notified by the Minister of Health and Welfare, is not subject to IRB review.

Data availability

Data can be obtained from the corresponding author.

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대학 환경이 중도 탈락률에 미치는 영향: 치위생과를 중심으로

초록

연구목적: 대학 환경이 치위생과 재학생의 중도 탈락률에 어떤 영향을 미치는지 분석하는 것이다. **연구방법:** 조사 대상은 2024년 한국 고등교육 정보공시 사이트에 치위생과가 개설된 총 72개 학교이다. 수집된 자료는 기술통계와 상관관계 분석을 하고, 주요 지표들이 중도 탈락률에 어떤 영향을 미치는지 위계적 회귀분석을 했다. **연구결과:** 재학생 수가 적은 대학는 많은 대학보다 중도 탈락률이 더 높았다. 취업률, 연구비, 등록금, 총 치위생과 학생 수가 클수록 중도 탈락률이 감소했다. 졸업생 취업률이 중도 탈락률에 유일하게 유의미한 영향을 미치는 요인이었다. **결론:** 치위생과 학생의 중도 탈락률을 낮추기 위해서 학생의 취업역량을 높이고 취업을 위한 협력을 강화해야 한다.

색인: 치위생, 중도 탈락률, 취업, 회귀분석, 학교, 학생