JTS

The Journal of Transdisciplinary Studies, 7(1): 61-77, 2023
https://doi.org/10.22685/JTS.2023.7.1.061

Relationship between VR Education Perception, Academic Stress, and Major Satisfaction among College Students majoring in Health Information Manager

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ARTICLE INFO

Article history:
Received 24 June 2022
Revised 21 November 2022
Accepted 24 November 2022

Keywords:
VR Education,
Academic Stress,
Major Satisfaction,
Health Information Manager

ABSTRACT

The purpose of this study was to examine the effects of the college students' perception of VR education on the academic stress and major satisfaction, and to identify the factors for reducing academic stress and increasing the major satisfaction considering VR experience.
In this study, a survey and analytical study were conducted through questionnaires for the college students enrolled in 5 colleges in 5 regions where departments related to health administration were opened. The final study subjects were 207, and T-test, ANOVA, and multiple regression analysis were performed to observe the relationship between VR education perception, academic stress, and major satisfaction.
As the ease of VR education increased in the whole group, academic stress was predicted to be 0.647 points (p-value: 0.047) lower. As the usefulness of VR education increased in the group with VR experience, academic stress was predicted to be 0.367 points (p-value: 0.040) lower. As the usefulness of VR education increased, the degree of major satisfaction was predicted to be high regardless of the entire group and VR experience.
The college students majoring in health administration demonstrated that the usefulness and ease of VR education had a high correlation with academic stress and major satisfaction. it is necessary to prepare educational policies for the effective introduction and development of VR education and the establishment of efficient educational methods in consideration of college students' perception of VR education, VR use experience and individual characteristics.

1. Introduction

College life is an important time to prepare for the future at the college of one's choice after passing through adolescence and grow into an independent adult, and it is a time to be qualified as a member of society and a professional (Park et al., 2018). For the college students, college life lends positive aspects, but they can face a lot of stress due to the new environment they encounter during their first independent period (Park et al., 2008). Stress also affects the occurrence of psychological symptoms such as anxiety, withdrawal, and unhappiness, physiological symptoms such as headaches, tension, and fatigue, and behavioral symptoms such as insomnia, interpersonal problems, and impulsive behavior (Omizo et al., 1988). The causes of stress experienced by college students may be largely divided into career problems and academic problems (Lee & Yu, 2008). In particular, academic stress is a concept that collectively refers to the psychological state of students who experience tension, anxiety, depression, and psychological burden due to academic work (Bak & Park, 2012). It causes a decrease in learning motivation and academic performance, and negatively affects adaptation to school life (Magnussen & Amundson, 2003). As for the factors influencing academic stress, social support (Park et al., 2018), social support (Park et al., 2018), achievement goal orientation (Lee & Kim, 2016), self-esteem (Cho, 2007), self-efficacy (Lee & Yu, 2008), emotional regulation (Moon & Jwa, 2008), among various studies, were carried out. However, additional studies on academic stress caused by various factors should be conducted.

The major program in college is determined after identifying whether the curriculum is linked to the career after graduation, along with the prospects for the major and social awareness of a particular department, and whether the student's values or characteristics are well matched. Major satisfaction is also provided by the major department It is determined by the educational component received (Han & Lee, 2013). One's satisfaction with major may be seen as a concept that evaluates one's major by comparing it with the standards of the career or job for which one has set (Shin, 2013). The students with high satisfaction with their major act more actively in their department classes, curriculum, and school life and make more efforts to achieve their learning goals (Tessema, Ready, & Yu, 2012). Furthermore, the students are more likely to graduate by actively participating in school events and achieving higher grades (Jamelske, 2009). The factors influencing major satisfaction include achievement goal orientation (Lee & Kim, 2016), values (Han & Lee, 2013), school life satisfaction and self-esteem and job esteem (Shin, 2013), ego resilience and self-efficacy (Kim & Lee, 2014), academic interest in majors and adaptation to college life (Kang, 2018), etc. The college students' satisfaction with their major is an important factor in determining the success or failure of college life (Lee & Ah, 2017), and it may be said to be a major factor in determining individual professional fields and career choices along with psychological factors about college life satisfaction. (Yang et al., 2010). Furthermore, since the college students' satisfaction with their major affects their present life and future life as a member of society (Kang, 2018), a plan to consider the factors of college students' satisfaction with their major in depth and maintain their major satisfaction level at a high level research is needed.

Virtual reality (VR) refers to an interactive environment in which a simulation is possible created by combining a three-dimensional (3D) computer-generated graphics system with various devices

(Shen et al., 2019). VR is applied in various areas such as entertainment, medical care, tourism, broadcasting and performance, including games (Joo et al., 2020). In Korea, the keyword of the 4th industrial revolution has emerged and efforts have been actively made to utilize these technologies in various new fields, among which the field of education may be said to be the most active (Park & Sohn, 2020). In particular, VR is used for education and learning activities due to its ability to fully participate in a virtual environment (Hanson & Shelton, 2008). When VR is used in education, it has the advantage of providing a safe training environment by widening the scope of learning, removing the physical risks of actual training situations, and increasing student participation and motivation (Shen et al., 2019). Furthermore, it may be said that it is an advantage that various experiential learning is possible beyond the limitations of the classroom space where classes are held (Park & Sohn, 2020). In the previous studies examining the effects of VR in the education field, learning effects (Kim & Ko, 2019), learning motivation and immersion (Choi & Won, 2018), and satisfaction with learning (Chae, 2021; Kim, 2021; So, 2016), etc. Furthermore, the previous studies were conducted that looked at the relationship between educational interest (Jung et al., 2018), problem-solving ability and critical thinking ability (Kim et al., 2019). In the previous studies examining the learning effect of VR introduction by education field, studies were conducted in various fields such as medicine (Anderson & Weng, 1999), chemistry (Geban et al., 1992), and mathematics (Pasqualotti & Freitas, 2002). While the research related to education related to the introduction of VR is in progress, it is pointed out that it is not applied to the field of college education as much as interest due to reasons such as cost or infrastructure problems, and compared to device and content dissemination, there are a few studies on cognition (Joo et al., 2020).

College students in the health field experience clinical practices and employment situations in which they have to adapt to a professional and systematic curriculum related to health care, a learning environment centered on the national examination, and an unfamiliar hospital environment (Yu, 2009). Upon enrollment, they experience a lot of academic stress due to the burden and stress of studying due to theoretical and practical education for their major and preparation for the national exam (Park et al., 2018). In particular, college students in the field of health administration tend to anticipate their preferred career path and hope for related occupations, compared to college students in other fields, and enter the school (Yun, 2018). As a result, if students enter the school without considering their aptitude or job value, their satisfaction with their major will decrease, which can lead to maladjustment to college life (Yang et al., 2012). Furthermore, in the field of health administration, interest in improving the competency and quality of college graduates is growing, but due to the lack of health care personnel, there is a sudden quantitative expansion, including excessive establishment and expansion of departments (Lee & Kim, 2016), securing the quality of college education and managing college students' academic stress and major satisfaction are important tasks. Accordingly, cognitive and behavioral changes can be expected through the introduction of VR education, a new educational method, but since it is difficult to find examples of VR education in the field of health administration, it is necessary to first look at the relationship between college students' VR education perception, academic stress, and major satisfaction. Prior studies on VR education, academic stress, and satisfaction with majors were conducted on the high school students (Jin & Kim, 2020) and the nursing students (Lim, 2021), but the studies conducted in the field

of health administration were incomplete. Hence, in order to confirm the need for the introduction of VR education, one of the new educational methods, in the education of college students majoring in health administration in the future, this study seeks to identify the effect of VR education perception on academic stress and major satisfaction, reduces academic stress and major, and provide the basic data for the establishment of measures to increase the major satisfaction and effective educational methods.

2. Methods

2.1 Study sample & design

In this study, a survey analysis was conducted through a questionnaire to find out the effect of VR education perception on academic stress and major satisfaction for students majoring in health administration. As of 2022, the study subjects were students majoring in 5 universities in Gangwon-do, Gyeonggi-do, Chungcheongnam-do, Jeollabuk-do, and Busan Metropolitan City that operate the departments of health administration, health and medical administration, and hospital management. The data collection period was from March 18 to March 28, 2022, and the purpose of the study was explained to them, and if they agreed to respond to the questionnaire, they were asked to complete the self-report questionnaire. The subjects of the collected questionnaires were 94 first years, 78 second years, 41 third years, and 16 fourth years, totaling 230 people. Of these, 207 subjects were used in the final analysis, excluding 23 insincere answers.

2.2 Independent variable

2.2.1 VR education perception

To measure VR education perception, the scale used in the research of Choi and Lee (Choi & Lee, 2018), Jung (Jung, 2017), and Jeon and Kim (Jeon & Kim, 2016) was modified and supplemented to suit the purpose of the study. A total of 37 questions were composed of the 6 factors of usefulness, immersion, influence, innovation, ease, and problem. Usefulness is the degree to which one believes that one's educational performance will be improved by using VR education, immersion is a state in which specific goals are set, focus on tasks, and self-control is achieved, influence is the degree to which people around them recognize that VR should be used for education, innovation, while gender was defined as the attitude to lead the new technology (equipment) and use the educational method changed by the new technology, the ease of use was defined as the degree of belief that it was not unreasonable to use VR education, and the problem as the degree of concern about VR motion sickness and security. Responses were composed on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The number of items for each factor and the range of total scores were as follows: usefulness 12 questions (12-60 points), immersion 9 questions (9-45 points), impact 6 questions (6-30 points), innovativeness 3 questions (3-15 points), 3 questions for ease

(3-15 points), and 4 questions for problem (4-20 points). The higher the total score, the higher the characteristics of each factor. In the study of Choi and Lee (Choi & Lee, 2018), Cronbach's α = .83 to .89, in the study of Jung (Jung, 2017), Cronbach's α = .76 to .96, and in Jeon & Kim (In the study by Jeon & Kim, 2016), Cronbach's α = .78 to .83. Reliability (Cronbach's α) in this study turned out to be usefulness .95, immersion .94, influence .87, innovation .82, ease .72, problem .72.

2.3 Dependent variables

2.3.1 Academic stress

As for academic stress, the items used in the study by Shin (Shin, 2012), which adapted the MBI-SS (Maslach burnout inventory-student survey) scale developed by Schaufeli et al. (Schaufeli et al., 2002), and Pintrich et al. (Pintrich et al., 1993), the items of the learning motivation strategy questionnaire (MSLQ) were modified and supplemented to suit the purpose of this study, and consists of a total of 16 items. Responses were composed on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Among them, questions 10, 11, 12, 13, 14, and 15 were calculated as reverse questions, and the total score ranged from 16 to 80, with higher total scores indicating higher academic stress. In the study of Shin (Shin, 2012), Cronbach's α = .87, and in the study of Pintrich et al. (Pintrich et al., 1993), Cronbach's α = .80. The reliability of this scale (Cronbach's α) was .88.

2.3.2 Major satisfaction

As for major satisfaction, the items used in the study by Kim and Ha (Kim & Ha, 2000) using the scale used by Braskamp et al. (Braskamp et al., 1979) to measure satisfaction with majors based on the Program Evalution Survey developed by the University of Illinosis for qualitative evaluation of majors in universities were modified and supplemented to suit the purpose of this study, and consisted of a total of 14 items. Responses were composed on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The total score ranges from 14 to 70, and the higher the total score, the higher the satisfaction with the major. In the study of Kim & Ha (Kim & Ha, 2000), Cronbach's α = .89. The reliability of this scale (Cronbach's α) was .90.

2.4 Control variables

The control variables of this study consisted of gender, grade, school classification, life subject learning experience, English level, information on health information managers, intention to obtain licenses, and VR experience. Gender was male and female, grade was first years, second years, third years, fourth years, and school classification was junior college and university, life subject learning experience was yes or no, level of English proficiency was low, middle, high, and the information about the health information manager was first known after admission, had heard of

the name, and knew about the job and qualifications, and the intention to obtain a license and VR experience were surveyed as yes or no.

2.5 Analytical approach and statistics

In this study, the exploratory factor analysis was conducted to secure the validity of the questionnaire items, and T-test, ANOVA, and the multiple linear regression analysis were used as statistical analysis methods. The analysis was conducted after controlling for gender, grade, school classification, life subject learning experience, English level, information on health information manager, intention to obtain a license, and VR experience. Furthermore, a detailed group analysis was conducted to examine the effect of VR education perception according to VR experience on academic stress and major satisfaction. Statistical significance was set at $p<0.05$, and all statistical analyzes were performed using the SAS statistical software package version 9.4 (SAS Institute Inc., Cary, NC, USA).

3. Results

3.1 Reliability and factor analysis of VR education perception

Table 1 demonstrates the exploratory factor analysis and reliability results for the VR education perception measurement items. The principal component analysis was used as the factor extraction method, and the varimax method was used as the factor rotation method. In the process of factor extraction, 6 factors with an Eigen value of 1.0 or more were finally extracted. Furthermore, it was determined that there were no items to be excluded as the factor loading values for each item were higher than 0.40 across all items.

Table 1. Reliability and factor analysis of VR education perception

Rotated Factor Pattern						
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
RIVRE_32	0.77862	0.18428	0.18234	0.19544	0.22631	0.00316
RIVRE_35	0.74472	0.20979	0.17598	0.21129	0.20208	0.00265
RIVRE_33	0.73872	0.19879	0.27348	0.19344	0.23003	-0.02197
RIVRE_34	0.72638	0.33137	0.32552	0.10039	0.15253	-0.05585
RIVRE_36	0.6889	0.29008	0.36399	0.03443	0.11072	0.0067
RIVRE_26	0.67807	0.36646	0.25887	-0.00293	0.20157	-0.07261
RIVRE_1	0.6595	0.37677	0.06033	0.23502	-0.01736	0.00089
RIVRE_7	0.64247	0.37166	0.09297	0.42068	-0.0414	-0.08083
RIVRE_6	0.63771	0.37482	-0.0583	0.44034	0.0378	-0.01017
RIVRE_24	0.60812	0.34463	0.28868	-0.00834	0.33643	-0.08928
RIVRE_5	0.56878	0.43306	-0.07847	0.47717	0.05649	0.01011

Rotated Factor Pattern						
	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
RIVRE_25	0.56651	0.36006	0.33419	-0.03563	0.29687	-0.11233
RIVRE_9	0.18225	0.80636	0.25335	0.07872	0.07191	0.02994
RIVRE_8	0.27046	0.75182	0.22119	0.14574	0.08168	-0.0367
RIVRE_10	0.20908	0.75058	0.3368	0.07219	0.15154	-0.01969
RIVRE_11	0.33615	0.70087	0.37191	0.06545	0.04564	-0.03235
RIVRE_15	0.47444	0.69375	0.15222	-0.00133	0.04859	-0.0267
RIVRE_16	0.52371	0.6835	0.11873	0.0136	0.03806	0.01605
RIVRE_12	0.30178	0.61551	0.20039	0.1516	0.3046	-0.04148
RIVRE_13	0.4572	0.58407	-0.01067	0.18107	0.3217	0.09225
RIVRE_14	0.439	0.56964	0.10561	0.24996	0.15019	-0.04327
RIVRE_30	0.06804	0.17327	0.83742	0.12596	-0.02052	0.021
RIVRE_31	0.20798	0.18771	0.79716	0.07524	-0.02051	0.04018
RIVRE_28	0.18172	0.23905	0.65684	0.13339	0.3026	-0.07264
RIVRE_37	0.39344	0.21512	0.65401	0.04668	0.10244	-0.00901
RIVRE_29	0.32466	0.36755	0.55163	0.19355	0.08388	-0.10479
RIVRE_27	0.39646	0.33243	0.41939	0.11963	0.3198	-0.09842
RIVRE_3	0.29583	0.09431	-0.01711	0.80601	0.21683	0.0475
RIVRE_4	0.22618	0.07342	0.17758	0.80199	0.08434	0.06807
RIVRE_2	0.03491	0.10372	0.33261	0.71673	-0.00829	0.12267
RIVRE_21	0.15581	0.18268	0.07083	0.19125	0.77544	0.06487
RIVRE_22	0.15991	0.24471	-0.01729	0.13211	0.74544	0.06515
RIVRE_23	0.33495	-0.04464	0.27318	-0.1432	0.61968	-0.01162
RIVRE_18	0.01289	-0.13663	-0.21426	0.04076	0.05784	0.78001
RIVRE_19	-0.10467	0.10046	0.10692	0.08615	-0.0519	0.76506
RIVRE_17	-0.01461	0.02289	0.08661	-0.06609	-0.08626	0.75183
RIVRE_20	-0.00236	-0.07143	-0.09148	0.17648	0.33977	0.62402

3.2 Sample characteristics

Table 2 demonstrates the results of sociodemographic characteristics of all study subjects. Academic stress, the dependent variable of all 207 students, was an average of 38.65±8.01 points, and major satisfaction was 52.40±6.89 points. Regarding academic stress and major satisfaction by gender, 162 females (78.3%) scored an average of 39.45±7.92 points and 52.02±6.92 points, and 45 males (21.7%) scored an average of 35.78±7.76 points and 53.73±6.67 points. Academic stress was higher among the females and major satisfaction was higher among the males. Academic stress and major satisfaction according to school classification were 39.26 ± 7.58 points and 51.17 ± 6.45 points for 99 students (47.8%) of junior colleges, and 108 students (52.2%) of university had averages of 38.09 ± 8.38 points and 53.51 ± 7.12 points. Academic stress was high in junior colleges, and major satisfaction was high in university. Regarding academic stress and major satisfaction according to English level, 77 students (37.2%) who said their English level was low averaged 40.96±7.81

points and 51.35±7.21 points, while 18 students (8.7%) who said their English level was high averaged 34.61±9.06 points and 55.05 points. With ±4.84 points, the lower the English level, the higher the academic stress and the lower the satisfaction with the major. Academic stress and major satisfaction according to VR experience were 38.91 ± 7.84 points and 52.72 ± 7.30 points for 112 students (54.1%) without VR experience, and 95 students (45.9%) with VR experience averaged 38.35 ± 7.35 points. With 8.24 points and 52.72±7.30 points, those who had experience using VR demonstrated low academic stress and high satisfaction with their major.

Table 2. General characteristics of participants at baseline

Variables	Total		Academic stress			Major satisfaction		
	N	%	Mean	SD	p-value[a]	Mean	SD	p-value[a]
Total	207	100.0	38.65	8.01		52.40	6.89	
Gender					0.006			0.141
Male	45	21.7	35.78	7.76		53.73	6.67	
Female	162	78.3	39.45	7.92		52.02	6.92	
Grade					0.064			0.056
1st	83	40.1	38.34	7.81		52.80	6.56	
2nd	74	35.7	40.09	8.29		52.62	7.37	
3rd	37	17.9	38.14	7.76		49.97	6.25	
4th	13	6.3	33.92	6.87		55.46	6.54	
School classification					0.295			0.014
Junior college	99	47.8	39.26	7.58		51.17	6.45	
University	108	52.2	38.09	8.38		53.52	7.12	
Life subject learning experience					0.292			0.661
Yes	104	50.2	38.07	8.32		52.61	7.33	
No	103	49.8	39.24	7.68		52.18	6.45	
Enlish level					0.002			0.097
Low	77	37.2	40.96	7.81		51.35	7.21	
Middle	112	54.1	37.71	7.59		52.69	6.85	
High	18	8.7	34.61	9.06		55.06	4.84	
Information on health information manager					0.441			0.243
First known after admission	84	40.6	38.20	7.79		52.57	6.51	
Heard of the name	77	37.2	39.57	7.55		51.48	6.98	
Know about the job and qualifications	46	22.2	37.93	9.12		53.61	7.32	
Intention to obtain license					0.436			0.084
Yes	203	98.1	38.59	8.01		52.51	6.88	
No	4	1.9	41.75	8.26		46.50	4.93	
VR experience					0.615			0.540
Yes	95	45.9	38.35	8.24		52.72	7.30	
No	112	54.1	38.91	7.84		52.13	6.54	

3.3 The Relationship between perception of VR education and academic stress

Table 3 is the result of analysis to identify the relationship between perception of VR education and academic stress. As the ease of perception of VR education of all subjects increased by one unit, academic stress was predicted to be 0.647 points lower (B: -0.647, 95% CI: -1.284 - -0.009, p-value: 0.047), and compared to the 'male' group, 'female' predicted higher academic stress by 3.004 points (B: 3.004, 95% CI: 0.334 - 5.675, p-value: 0.028), and when the English level was 'Low' compared to the 'High' group, academic stress was predicted to be 4.280 points higher (B: 4.280, 95% CI: 0.042 - 8.519, p-value: 0.048). To examine the correlation between perception of VR education and academic stress by dividing all research subjects into groups according to whether or not they have experience using VR, the academic stress in the case of 'female' was 3.797 compared to the group whose gender was 'male' in the group without VR use experience (B: 3.797, 95% CI: -0.136 − 7.729, p-value: 0.058) highly predicted, but not statistically significant. As the usefulness of VR education recognition increased by one unit in the VR experience group, academic stress was predicted to be 0.367 points lower (B: -0.367, 95% CI: -0.717 - -0.018, p-value: 0.040), and compared to the 'first years' group, 'second years' was predicted to be 3.775 points higher (B: 3.775, 95% CI: 0.014 - 7.536, p-value: 0.049).

Table 3. The Relationship between VR education perception and academic stress

Variables	Academic stress											
	Total group				Group without VR experience				Group with VR experience			
	β	95% CI		P-value	β	95% CI		P-value	β	95% CI		P-value
Factor1(usefulness)	-0.175	-0.438	0.087	0.189	0.092	-0.360	0.543	0.688	-0.367	-0.717	-0.018	0.040
Factor2(immersion)	0.107	-0.177	0.391	0.457	-0.233	-0.732	0.266	0.357	0.279	-0.088	0.645	0.134
Factor3(influence)	-0.134	-0.482	0.214	0.448	0.034	-0.492	0.560	0.898	-0.280	-0.779	0.220	0.268
Factor4(innovation)	-0.105	-0.672	0.461	0.714	-0.128	-0.946	0.689	0.756	-0.235	-1.157	0.687	0.613
Factor5(ease)	-0.647	-1.284	-0.009	0.047	-0.368	-1.300	0.563	0.434	-0.567	-1.504	0.371	0.233
Factor6(problem)	0.037	-0.402	0.475	0.870	0.520	-0.132	1.172	0.117	-0.332	-0.978	0.314	0.310
Gender												
Male	Ref.				Ref.				Ref.			
Female	3.004	0.334	5.675	0.028	3.797	-0.136	7.729	0.058	1.877	-2.300	6.055	0.374
Grade												
1st	Ref.				Ref.				Ref.			
2nd	2.086	-0.507	4.679	0.114	0.585	-3.194	4.365	0.759	3.775	0.014	7.536	0.049
3rd	0.508	-2.797	3.814	0.762	-1.101	-5.478	3.275	0.619	2.876	-2.601	8.352	0.299
4th	-3.205	-8.025	1.615	0.191	-6.140	-13.704	1.424	0.110	0.624	-5.858	7.106	0.849
School classification												
Junior college	Ref.				Ref.				Ref.			
University	0.883	-1.544	3.311	0.474	-0.659	-4.305	2.986	0.720	2.496	-1.421	6.414	0.208
Life subject learning experience												
Yes	Ref.				Ref.				Ref.			
No	1.115	-1.093	3.323	0.321	1.619	-1.621	4.859	0.324	0.700	-2.507	3.908	0.665
Enlish level												
Low	4.280	0.042	8.519	0.048	0.846	-5.773	7.466	0.800	5.649	-0.395	11.692	0.067
Middle	1.899	-2.036	5.834	0.342	-0.852	-7.089	5.386	0.787	2.084	-3.318	7.486	0.445
High	Ref.				Ref.				Ref.			

Variables	Academic stress											
	Total group				Group without VR experience				Group with VR experience			
	β	95% CI		P-value	β	95% CI		P-value	β	95% CI		P-value
Information on health information manager												
First known after admission	Ref.				Ref.				Ref.			
Heard of the name	1.219	-1.288	3.725	0.339	2.104	-1.655	5.864	0.269	1.287	-2.536	5.110	0.505
Know about the job and qualifications	-0.748	-3.756	2.260	0.624	-1.868	-6.086	2.350	0.382	1.384	-3.118	5.886	0.542
Intention to obtain license												
Yes	-0.911	-8.928	7.107	0.823	-0.545	-10.660	9.570	0.915	-2.938	-18.536	12.660	0.709
No	Ref.				Ref.				Ref.			
VR experience												
Yes	0.786	-1.445	3.018	0.488								
No	Ref.											

3.4 The Relationship between perception of VR education and major satisfaction

Table 4 is the analytical result to find out the relationship between VR education perception and major satisfaction. As the usefulness of the perception of VR education of all subjects increased by one unit, the satisfaction with the major was predicted to be 0.369 points higher (B: 0.369, 95% CI: 0.155 - 0.583, p-value: 0.001), and all subjects were predicted to have experience using VR. Examining the correlation between perception of VR education and satisfaction with major by dividing the groups according to the presence or absence of VR user experience, as the usefulness of perception of VR education increased by one unit in the group without VR experience, the satisfaction with major increased by 0.519 points (B: 0.519, 95% CI: 0.164 - 0.874, p-value: 0.005) was highly predicted, and as the usefulness of VR education perception increased by one unit in the group with VR experience, major satisfaction increased by 0.409 points (B: 0.409, 95% CI: 0.113 - 0.706, p-value: 0.007) highly predicted.

Table 4. The Relationship between VR education perception and major satisfaction

Variables	Major satisfaction											
	Total group				Group without VR experience				Group with VR experience			
	β	95% CI		P-value	β	95% CI		P-value	β	95% CI		P-value
Factor1(usefulness)	0.369	0.155	0.583	0.001	0.519	0.164	0.874	0.005	0.409	0.113	0.706	0.007
Factor2(immersion)	-0.024	-0.256	0.207	0.836	-0.091	-0.483	0.301	0.647	-0.093	-0.404	0.217	0.551
Factor3(influence)	0.041	-0.243	0.325	0.776	-0.330	-0.743	0.083	0.116	0.341	-0.083	0.764	0.113
Factor4(innovation)	0.057	-0.405	0.519	0.806	-0.097	-0.739	0.545	0.765	0.132	-0.650	0.914	0.737
Factor5(ease)	0.210	-0.309	0.730	0.426	-0.051	-0.782	0.681	0.891	0.307	-0.488	1.102	0.444
Factor6(problem)	0.342	-0.016	0.699	0.061	0.135	-0.377	0.647	0.602	0.396	-0.151	0.944	0.154
Gender												
Male	Ref.				Ref.				Ref.			
Female	-1.431	-3.608	0.746	0.197	-1.412	-4.499	1.676	0.366	-0.010	-3.552	3.532	0.996

Variables	Major satisfaction											
	Total group				Group without VR experience				Group with VR experience			
	β	95% CI		P-value	β	95% CI		P-value	β	95% CI		P-value
Grade												
1st	Ref.				Ref.				Ref.			
2nd	0.041	-2.073	2.156	0.969	-1.041	-4.009	1.926	0.488	0.936	-2.253	4.125	0.561
3rd	-2.512	-5.207	0.183	0.068	-2.689	-6.125	0.748	0.124	-3.183	-7.827	1.460	0.176
4th	1.639	-2.291	5.569	0.412	5.526	-0.413	11.464	0.068	-1.527	-7.023	3.968	0.582
School classification												
Junior college	Ref.				Ref.				Ref.			
University	0.039	-1.940	2.018	0.969	-0.648	-3.510	2.214	0.654	-0.876	-4.198	2.446	0.601
Life subject learning experience												
Yes	Ref.				Ref.				Ref.			
No	-0.701	-2.501	1.100	0.444	-1.059	-3.603	1.484	0.410	-0.113	-2.832	2.607	0.934
Enlish level												
Low	-1.420	-4.875	2.036	0.419	-1.974	-7.171	3.223	0.453	-2.134	-7.258	2.990	0.410
Middle	-1.365	-4.573	1.843	0.402	-2.560	-7.458	2.337	0.302	-0.261	-4.842	4.319	0.910
High	Ref.				Ref.				Ref.			
Information on health information manager												
First known after admission	Ref.				Ref.				Ref.			
Heard of the name	-0.589	-2.633	1.455	0.570	-1.175	-4.127	1.777	0.431	-1.326	-4.568	1.915	0.418
Know about the job and qualifications	1.585	-0.868	4.037	0.204	1.942	-1.370	5.254	0.247	1.134	-2.683	4.951	0.556
Intention to obtain license												
Yes	2.395	-4.142	8.932	0.471	2.447	-5.495	10.388	0.542	2.395	-10.829	15.620	0.719
No	Ref.				Ref.				Ref.			
VR experience												
Yes	-1.315	-3.135	0.504	0.156								
No	Ref.											

4. Discussion

This study observed the relationship between perception of VR education, academic stress, and major satisfaction in order to establish an effective educational method for college students majoring in health administration. Furthermore, by examining the relationship in consideration of the VR use experience of the research subjects, attempt was made to identify the related factors for reducing academic stress and increasing major satisfaction. As a result of the study, the ease and usefulness of VR education demonstrated a significant effect on academic stress and major satisfaction, and considering VR experience, the relationship between perception of VR education, academic stress, and major satisfaction was different. The discussion based on the results of this study is as follows.

As the ease of VR education increased, the academic stress decreased. Such results are determined to have had an effect on the reduction of academic stress due to the increase in accessibility as VR education was perceived as easy to use, and the expectation of positive results that could be obtained through a new educational method different from the existing method. Conducting a direct comparison is difficult as there is no study examining the relationship between perceptions of VR education and academic stress. However, a study by Jin and Kim (Jin & Kim, 2020) examined the effect of VR content use on academic stress, and when using VR content, The results confirmed that it had an effect on reducing academic stress. However, given that the subjects of the study were high school students and that VR contents related to mental health were used, it is necessary to reconfirm the relationship between the factors through follow-up research. Furthermore, it was found that the more female the gender, the more affected academic stress than the male. It is determined to be the result of the characteristics that women react more sensitively than men in physical, mental, and sensory areas and have a higher degree of awareness of stress (Sung & Chang, 2007). In a previous study examining the relationships (Cha, 2013), stress was higher among women than men. As for the effect of English level on academic stress, the correlation with academic stress was high when the English level proficiency was low. The lower the college student's English level, the higher the relationship with the increase in academic stress due to the difficulty in following the department's curriculum, and there may be difficulties in fulfilling the role as a future health information manager. College students in the field of health administration complete major courses such as medical terminology and anatomy and physiology while attending school, and after graduation, as health information managers, they systematically collect, classify, verify, and manage medical information including medical records in health care settings (Nam & Jung, 2020). Most of the major subjects of college students in the field of health administration are made up of medical terminology, and most of medical records are also made up of medical terminology (Kim, 1996), so English proficiency may be said to be a necessary competency. Furthermore, as a result of examining the relationship between VR education perception and academic stress in consideration of college students' VR experience, the higher the usefulness of VR education in the group with VR experience, the lower the academic stress. If there is VR experience, it is easy to form a positive attitude toward VR education, and it is determined to have an effect on reducing academic stress because the degree of belief that education performance may be improved through this is large. In the group with the experience of using VR, the correlation with academic stress was the highest when the grade was second years. Due to the nature of the health administration sector, the amount and difficulty of learning for junior colleges and universities start from the first grade and the second grade, and the group that experienced VR felt more necessary for VR education and was more related to increased academic stress than the group that did not experience VR. Hence, considering individual characteristics such as gender, English level, grade, etc., if VR education is provided to college students majoring in health administration that is easy to access and can expect positive educational outcomes, the effect of reducing academic stress may be expected.

As the usefulness of VR education increased, major satisfaction increased. Similar to the results of examining the correlation with academic stress, the higher the degree of belief that one's educational performance may be improved through VR education, the greater the degree of satisfaction with

the major. In a study by Lim (Lim, 2021), the effect of VR education on nursing process performance was examined, and it was confirmed that the use of VR education had an effect on the increase in major satisfaction. However, there is a need to examine the relationship between factors through follow-up studies in the future due to the fact that the subjects of the study are nursing students and there is no study examining the relationship between perception of VR education and major satisfaction. Furthermore, as a result of examining the relationship between VR education perception and major satisfaction considering VR use experience, it was found that as the usefulness of VR education increased, major satisfaction increased in all groups regardless of VR use experience. In particular, the effect of the usefulness of VR education on the major satisfaction in the group without VR experience was higher than that of the group with VR experience. It is determined that the usefulness of VR education was evaluated higher and a higher correlation with the increase in major satisfaction was shown because the expectations for educational outcomes that could be obtained through VR were higher. Currently, the college environment related to health administration is not unified with the environment and department names for producing health information managers, and the school system is also 2, 3, 4 years, and the large gap in the curriculum and the connection between industry and academia are not smooth. It is falling short of the goal of fostering health information managers (Nam & Jung, 2020). However, considering the situation of learners who have a tendency to use digital language and equipment freely and have a tendency to have choices in learning content, place, and method related to education, while undergoing a growth process in the era of the Internet and mobile phones being generalized (Lee & Eun, 2016), VR education can also be used as a learning method. In summary, the development of VR education considering the usefulness and ease of college students is required to relieve academic stress and increase major satisfaction in a situation where college students majoring in health administration simultaneously study, practice, and prepare for the national exam. Furthermore, by applying personalized VR education according to the personal characteristics of college students majoring in health administration, it is expected that students will realize their self-realization, reduce the gap between school education and field work, and play a role that can contribute to the quality of future health care personnel.

This study confirmed the factors that affect the academic stress and the major satisfaction by verifying the relationship between perception of VR education, academic stress, and major satisfaction for the college students related to health administration. Furthermore, a subgroup analysis was conducted considering the research subject's experience of using VR, and the relationship between perception of VR education, academic stress, and major satisfaction for each group was examined. The results of this study will be used as the basic data for the introduction and development of effective VR education that can alleviate academic stress and increase major satisfaction by exploring the causes of academic stress and major satisfaction of college students majoring in health administration and establishing an efficient educational method.

There are several limitations to be aware of when interpreting the results of this study. First, due to the limitations of the research subjects, college students of Gangwon-do, Gyeonggi-do, Chungcheongnam-do, Jeollabuk-do, and Busan Metropolitan City were analyzed. In addition, it is expected that the relationship between perception of VR education, academic stress, and major

satisfaction will be clearly identified by expanding the sample through follow-up research and generalizing the verification results. Second, there is a limit to examining the effect of VR education on perception because the researcher examined the factors that affect the VR education perception as a factor assumed by the researcher due to the limitations of survey analytical research through the questionnaires.

5. Conclusion

The college students majoring in health administration demonstrated a high correlation between the usefulness and ease of VR education and academic stress and major satisfaction. Furthermore, the relationship between the usefulness and ease of VR education, academic stress, and major satisfaction was found to be different according to the experience of using VR. Hence, it is necessary to prepare educational policies for the effective introduction and development of VR education and the establishment of efficient educational methods, taking into account the college students' perception of VR education, VR experience, and personal characteristics.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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