

Effect of VR Advertisement Components on Advertising Effects: Focusing on the VR Presence

Yun-Seul Choi, Sang-Rock Lee, Seng-Yeob, Yu

Abstract: *The purpose of this study was to verify the effect of VR advertisement which had been growing rapidly amid development of virtual reality (VR) technology. In this study, we examined the effect that the three-dimensionality (3D), dynamicity, and novelty, which were selected as the factors of VR advertisement components, would have on advertising attention, advertising attitude, and purchase intention. Furthermore, we investigated their effect on VR advertisement components and advertising effect when the VR presence was mediated. The VR advertisement was experienced by 253 male and female subjects in their 20s. The data were collected from the survey in this study. The data were analyzed through descriptive statistical analysis, factor analysis, multiple regression analysis and Sobel test. First, all the 3 VR advertisement factors (3D, Dynamic, Novelty) had a positive (+) influence on advertising attention. Second, all the VR advertisement factors had positive (+) influence on advertising attitude. Third, all the VR advertisement factors had a positive (+) influence on purchase intention. Fourth, all the VR advertisement factors had positive (+) influence on VR presence. In addition, all the factors, excluding the relationship between dynamicity and purchase intention among the VR advertisement factors, had a significant influence on advertising effect by mediating the VR presence.*

Index Terms: VR Advertisement, Three-dimensional (3D), Dynamic, Novelty, VR Presence, Advertising Attention, Ad attitude, Purchase Intention.

I. INTRODUCTION

In this era of digital media, consumers want the advertisements to bring them both pleasure and satisfaction by providing them with new experiences, as well as the information about products [1]. As a result, many companies are developing VR and AR contents to enhance the indirect experience of products and help them to sell products. Meanwhile, there has been a growing tendency of consumers to avoid advertisements while the impact of traditional media is declining [2]. In this context, VR advertisement is effective in providing consumers with virtual reality, allowing them to experience products or brands without feeling uncomfortable.

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VR advertisements are characterized primarily by three-dimensionality and dynamicity delivered by VR technology. VR advertisement provides high-quality, clear and three-dimensional images through VR device in real time. That stimulates the synesthesia, the concomitant sensation, in users and enables dynamic and realistic experience, thus maximizing the advertisement attention, brand image and purchase experience [3], [4]. Moreover, VR technology can strengthen interaction between images and users by allowing them to perceive the directionality and distance based on 3D technology and sound [5].

Another feature of VR advertisement is novelty. VR advertisements, incorporating the IT (Information Technology), impress the consumers with their novel features, thus stimulating the curiosity of consumers. VR advertisement, which combines unique and new technology, may arouse the interests of users in advertisements and furthermore have an influence on advertising attitude [6].

In this study, therefore, the important features unique to VR advertisements were classified into 3 characteristics, i.e., three-dimensionality, dynamicity, and novelty, based on the preceding studies as mentioned above.

Finally, an important element that can explain VR advertisement is the VR presence. VR presence is an element that makes users interact with specific virtual environment, rendered by the VR technology, as if they were in real situations [7]. VR advertisement can increase the users' immersion and sense of reality towards products as it provides users with indirect experience of products in virtual space without need for direct experience of products.

According to the study by Heeter [3], VR advertisement can increase both satisfaction and pleasure of consumers when they have more intensive experience such as visual presence and sensory presence. Additionally, the studies on early VR-related advertising claimed that the concept of presence played a crucial part in understanding the media environment and verifying the advertising effect [4], [7], [8].

In this study, we drew a conclusion that the VR presence played an important role in the relationship between VR advertisement characteristics and advertising effect and intended to investigate into how the independent variables and dependent variables would be affected by the mediating effect of VR presence.

As such, VR advertising is the most effective content to enhance advertising effects in the digital media environment [9], [10]. However, unlike the forecast



of growth potential related to the VR advertising industry, there is little research done by the advertising academy. Most of the studies related to VR advertising are still case studies and exploratory researches. In this study, we intend to increase practical implication of VR advertisement and to help in actual advertisement production. This study has the following research question.

RQ 1: How does the VR advertising components(3D, Dynamic, Novelty) affect advertising attention?

RQ 2: How does the VR advertising components(3D, Dynamic, Novelty) affect ad attitude?

RQ 3: How does the VR advertising components(3D, Dynamic, Novelty) affect purchase intention?

RQ 4: How does the VR advertising components(3D, Dynamic, Novelty) affect VR presence?

RQ 5: How does the VR advertising components affect advertising attention through the VR presence?

RQ 5-1: How does the 3D affect advertising attention through the VR presence?

RQ 5-2: How does the dynamic affect advertising attention through the VR presence?

RQ 5-3: How does the novelty affect advertising attention through the VR presence?

RQ 6: How does the VR advertising components affect ad attitude through the VR presence?

RQ 6-1: How does the 3D affect ad attitude through the VR presence?

RQ 6-2: How does the dynamic affect ad attitude through the VR presence?

RQ 6-3: How does the novelty affect ad attitude through the VR presence?

RQ 7: How does the VR advertising components affect Purchase intention through the VR presence?

RQ 7-1: How does the 3D affect Purchase intention through the VR presence?

RQ 7-2: How does the dynamic affect Purchase intention through the VR presence?

RQ 7-3: How does the novelty affect Purchase intention through the VR presence?

II. MATERIAL AND METHODS

A. VR equipment and VR advertisements

In this study, we recruited the subjects who would actually experience the VR advertisement at H-University and N-University in Korea. Only those who would have direct experience with VR advertisement were selected as subjects. As shown in Figure 1, the subjects put on the VR Box 2.0 fitted with high-definition video devices and earphones under the same conditions. The selected VR advertisements in this study were the actual on-air advertisements shot by VR 360-degree camera. A total of 6 advertisements were selected by taking the users' product and brand preferences into consideration. All those advertisements were edited to a total length of about 10 minutes. A total of 260 male and female subjects participated in this study. The subjects wore the VR HMD devices at the same place during the designated time, and then experienced the advertisements at 360 degrees without restraint.

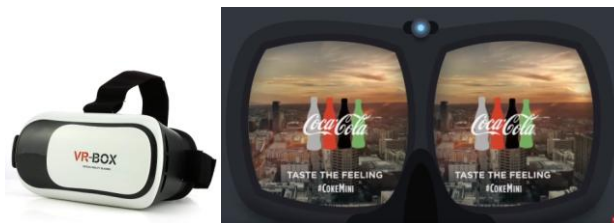


Fig 1. Used VR BOX and Ads Case in Research

B. Data Examination & Characteristics of Respondents

The investigation in this study was conducted as follows: Firstly, the subjects were given explanation from mentors on the use of the devices in individual VR experience space and were given assistance in putting those devices on. We excluded the students who felt dizzy or bespectacled students as the glasses would hinder the experience. Secondly, an explanation was provided in respect of general concept of VR advertisement, along with a short explanation on the devices and advertisements used in this study. Thirdly, the subjects were asked to answer each question contained in the survey questionnaire, a self-administered type designed to be completed by each respondent, after they experienced the selected VR advertisements. As a result, the data on a total of 253 subjects were analyzed, excluding the questionnaires that contained insincere answers. For gender distribution of respondents, the subjects consisted of 140 men(55.3%) and 113 women(44.7%), suggesting that the proportion of male subjects was slightly higher. Those subjects were 20.9 years old on average.

C. Measurement Tool

1) Three-Dimensionality(3D)

In this study, the three-dimensionality of VR advertisement was defined as visual element creating a sense of reality such as shape, outward color, texture and light of a clear and three-dimensional object in a virtual environment. For the tool used to measure the degree of three-dimensionality, a total of 4 question items were selected based on the study by Coates[11] and Steuer[12], which were revised in such a way that suited to the objective of this study.

The specific question items for the measurement were as follows: ① In VR advertisement, I distinguish the objects from the background well; ② In VR advertisement, I felt that the objects were clear as if I could grasp them with my hand; ③ In VR advertisement, I felt the three-dimensionality of the objects; and ④ In VR advertisement, I felt the perspective well.

2) Dynamicity

In this study, the dynamicity of VR advertisement was defined as the extent by which the motions of objects in the advertisement were rendered realistic, vivid and natural. For the tool used to measure the degree of dynamicity, the 5 question items were selected based on the study by Walther, Loh & Granka [13], which were revised in such a way that suited to the objective of this study. Specific question items related to the measurement were as follows: ① In the VR advertisement, I felt as if I had to move my body 360 degrees; ② When I experienced the VR



advertisement, I felt as if I could touch the objects in it; ③ Objects or people in the VR advertisement seemed to be so dynamic that they gave an impression of being present in front of me; ④ In the VR advertisement, I felt the movement of objects clearly; and ⑤ When I experienced the VR advertisement, I was given an impression that I was manipulating the real objects.

3) *Novelty*

In this study, the novelty of VR advertisement was defined as emotional reaction inducing the positive mood of the audience through unexpected stimulation provided by advertisement [14]. A total of 4 question items were selected based on the study by Fiske [6], which were revised in such a way that suited the objectives of this study. Specific question items for the measurement are as follows: ① VR advertisement was so amazing that I focused on it; ② VR advertisement provided contents that were not available before, which was pleasantly amazing; ③ VR advertisement was new to me and did not cause me to feel uncomfortable; and ④ VR advertisement was a fresh experience for me.

4) *VR presence*

In this study, the presence of VR advertisement was defined as the degree of involvement or immersion by the user, depending on the extent of feeling of presence in the virtual space rendered on the web. For the tool used to measure the degree of presence, a total of 4 question items were selected based on the study by Coates [11] and Heim[15], which were revised in such a way that suited the objectives of this study. Specific question items for the measurement are as follows: ① In VR advertisement, I felt as if I were in a virtual space; ② In VR advertisement, I felt as if I actually existed in a virtual space; ③ In the VR advertisement, I feel as if I were experiencing another world in real life; and ④ In the VR advertisement, I felt connected to the virtual world. The reliability level of the scale for aforesaid 4 question items was found to be Cronbach's $\alpha=0.913$.

5) *Advertising Attention*

In this study, advertising attention was defined as the cognitive response of the audience as manifested by their attention to and concentration on the stimuli from advertisement, which is related to whether concerned advertisement was viewed clearly by the audience.

For the tool used to measure the degree of advertising attention, a total of 4 question items were selected based on the study by Starch [16], which were revised in such a way that suited the objectives of this study. Specific question items for the measurement are as follows: ① VR advertisement caught my eyes; ② VR advertisement attracted my attention; ③ VR advertisement helped pay attention to brand or product; and ④ VR advertisement was effective in paying attention to advertisement message. The reliability level of the scale for aforesaid 4 question items was

found to be Cronbach's $\alpha = 0.891$.

6) *Advertising Attitude*

In this study, the advertising attitude was defined as a response that represents consumers' feelings such as favorable/unfavorable response to VR advertisement. For the tool used to measure the degree of advertising attitude, a total of 4 question items were selected based on the study by Larkin [17], which were revised in such a way that suited the objectives of this study. Specific question items for the measurement are as follows: ① I am fond of VR advertisement; ② I liked VR advertisement; ③ I find VR advertisement favorable; and ④ I was impressed by VR advertisement. The reliability level of the scale for aforesaid 4 question items was found to be Cronbach's $\alpha=0.944$.

7) *Purchase Intention*

In this study, the purchase intention was defined as the degree of likelihood that a consumer will purchase specific product or has any intention or plan to purchase the product presented in the advertisement. For the tool used to measure the degree of purchase intention a total of 3 question items were selected based on the study by Baumgartner at al.[18] and Yoon [19], which were revised in such a way that suited the objectives of this study. Specific question items for the measurement are as follows: ① I will purchase a brand(product) presented in VR advertisement; ② I want to purchase a brand(product) presented in VR advertisement; and ③ I am likely to purchase a VR brand (product) presented in VR advertisement. The reliability level of the scale for aforesaid 3 question items was found to be Cronbach's $\alpha=0.936$. Finally, all the question items used in this study were measured by using the Likert-type 5-point scale (1 = Not at all, 5 = Very much so).

D. *Data Analyses*

The data collected in this study were analyzed by using the statistical package SPSS/PC+ Windows 21.0 program. First, descriptive statistical analysis was carried out to determine general characteristics of the subjects. Second, exploratory factor analysis was conducted to verify the construct validity of the measurement variables used in the study. Third, Cronbach α coefficient was used to verify the reliability of each scale. Finally, the Enter-based multiple regression analysis was conducted to verify the research questions put forth in this study, along with the Sobel test performed to verify the significance of mediating effect.

III. *RESULT AND DISCUSSION*

A. *Verification of Validity and Reliability of Measurement Tools*

The reliability and validity of measurement tools were verified before proceeding with verification of research questions put forth in this study. As shown in Table 1, the exploratory factor analysis was performed on the VR advertisement components to verify the validity of the measurement tools. Principal component analysis was used for factor extraction, while the



VARIMAX rotation method was used for factor rotation. In addition, the Kaiser-Meyer-Olkin(KMO) test(.871) and Bartlett test($\chi^2=2189.650(df=91, p<.001)$) were carried out. At this time, the number of factors was used based on the Eigen value of 1.0, and initial commonality and factor loadings were selected on the basis of 0.4. Only the items exceeding such criterion were used for analysis. Hair et al.[20]. The results showed that the initial commonality value of all items was 0.5 or higher and the factor load amount was 0.7 or higher. And 3 factors(three-dimensionality, dynamicity, and novelty) with Eigen value 1.0 of higher were extracted which showed that there was no problem with the validity of the measurement tools. In addition, the reliability level for each of the extracted factor was found to be Cronbach α 0.7 or higher which exceeded the acceptance criteria proposed by Nunnally [21]. Thus, it was confirmed that there was no problem with the reliability of all the scales used in this study.

Table 1: Validity and Reliability of Measured Variables

Item	Factor 1	Factor 2	Factor 3	Extraction	Cronbach α
Dynamic 1	.864			.779	.895
Dynamic 2	.862			.783	
Dynamic 3	.853			.760	
Dynamic 4	.770			.701	
Dynamic 5	.697			.532	
Novelty 1		.887		.814	.869
Novelty 2		.876		.694	
Novelty 3		.806		.681	
Novelty 4		.805		.687	
3D 1			.792	.762	.822
3D 2			.785	.678	
3D 3			.781	.637	
3D 4			.596	.672	
Eigen value	6.071	2.457	1.337	-	-
% of Variance	43.362	17.550	9.552	-	-
Cumulative %	43.362	60.912	70.464	-	-

B. Results of Verification of Research Questions

To verify the 'research question 1' on how the VR advertisement components would influence the advertising attention, the multiple regression analysis was performed

with the 3 factors of VR advertisement components set as independent variables and with the advertising attention set as dependent variables. The results are presented in Table 2. Based on the results of the verification of the 'research question 1', all the 3 characteristics of VR advertisement, i.e., three-dimensionality($t=8.628, p=.000$), dynamicity($t=3.269, p=.001$), and novelty($t=5.186, p=.000$), were found to have a positive(+) influence on the advertising attention. Moreover, those variables had the explanatory power of 55.0% for the advertising attention.

Table 2: Regression Analysis of VR Advertising Components and Advertising Attention

model	B	S.E	β	t	Tolerance	VIF
constant	.213	.227		.938		
3D	.213	.062	.496	8.628**	.547	1.829
Dynamic	.151	.046	.177	3.269**	.606	1.650
Novelty	.269	.052	.238	5.186**	.851	1.176

Durbin-Watson's $d=1.795, R^2=.556, adj R^2=.550, F=103.805(p<.001), ***p<.001, **p<.01$

To verify the 'research question 2' on how the VR advertisement components would influence the advertising attitude, the multiple regression analysis was performed with the 3 factors of VR advertisement components set as independent variables and with the advertising attitude set as dependent variables. The results are presented in Table 3. Based on the results of the verification of the 'research question 2', all the 3 characteristics of VR advertisement, i.e., three-dimensionality($t=5.032, p=.000$), dynamicity($t=5.623, p=.000$), and novelty($t=7.445, p=.000$), were found to have a positive(+) influence on the advertising attitude. In addition, those variables had the explanatory power of 53.7% for the advertising attitude.

Table 3: Regression Analysis of VR Advertising Components and Ad Attitude

model	B	S.E	β	t	Tolerance	VIF
constant	.549	.221		2.484		
3D	.302	.060	.292	5.032**	.547	1.829
Dynamic	.253	.045	.309	5.623**	.606	1.650
Novelty	.377	.051	.346	7.445**	.851	1.176

Durbin-Watson's $d=2.037, R^2=.428, adj R^2=.476, F=77.209(p<.001), ***p<.001, *p<.05$

To verify the 'research question 3' on how the VR advertisement components would influence the purchase intention, the multiple regression analysis was performed with the 3 factors of VR advertisement components set as independent variables and with the purchase intention set as dependent variables. The results are presented in Table 4. Based on the results of the verification of the 'research question 3', all the 3 characteristics of VR



advertisement, i.e., three-dimensionality($t=6.126$, $p=.000$), dynamicity($t=5.866$, $p=.000$), and novelty($t=2.088$, $p=.038$), were found to have a positive(+) influence on the purchase intention. In addition, those variables had the explanatory power of 47.6% for the purchase intention.

Table 4: Regression Analysis of VR Advertising Components and Purchase Intention

model	B	S.E	β	t	Tolerance	VIF
constant	-.397	.299		-1.329		
3D	.497	.081	.378	6.126**	.547	1.829
Dynamic	.357	.061	.344	5.866**	.606	1.650
Novelty	.143	.068	.103	2.088*	.851	1.176

Durbin-Watson's $d=2.037$, $R^2=.428$ $adj R^2=.476$, $F=77.209(p<.001)$, *** $p<.001$, * $p<.05$

To verify the 'research question 4' on how the VR advertisement components would influence the VR presence, the multiple regression analysis was performed with the 3 factors of VR advertisement components set as independent variables and with the VR presence set as dependent variables. The results are presented in Table 5. Based on the results of the verification of the 'research question 4', all the 3 characteristics of VR advertisement, i.e., three-dimensionality($t=2.693$, $p=.008$), dynamicity($t=10.465$, $p=.000$), and novelty($t=2.538$, $p=.012$), were found to have a positive(+) influence on the VR presence. In addition, those variables had the explanatory power of 53.1% for the VR presence.

Table 5: Regression Analysis of VR Advertising Components and VR Presence

model	B	S.E	β	t	Tolerance	VIF
constant	-.128	.221		-.581		
3D	.162	.060	.157	2.693**	.547	1.829
Dynamic	.472	.045	.580	10.465**	.606	1.650
Novelty	.128	.051	.119	2.538*	.851	1.176

Durbin-Watson's $d=2.009$, $R^2=.537$, $adj R^2=.531$, $F=96.185(p<.001)$, *** $p<.001$, ** $p<.01$, * $p<.05$

To verify the 'research question 5' on whether the VR presence, a mediator variable, would have a mediating effect, the regression analysis was performed with the VR advertisement components(three-dimensionality, dynamicity, novelty) set as independent variables and with the VR presence set as mediator variable, and with the advertising attention set as dependent variable. The results are presented in Table 6. Based on the results of the verification of 5-1, 5-2, and 5-3, all the three-dimensionality, dynamicity, novelty, the independent variables, were found to have a significant influence on the advertising attention and VR presence, the dependent variables, in the first stage and second stage analyses. Finally, the influence of VR advertisement components on the advertising attention was

found to be $\beta=.699$ for three-dimensionality, $\beta=.546$ for dynamicity, and $\beta=.472$ for novelty in the first stage. While the influence was decreased to $\beta=.626$ for three-dimensionality, $\beta=.407$ for dynamicity, and $\beta=.354$ for novelty in the third stage, thus resulting in the mediating effect. Moreover, the Sobel test was conducted to verify the statistical significance of mediating effect. The results showed that all were statistically significant and therefore the partial mediation effect arose finally.

Table 6: Mediating Effect on VR Presence in the Relationship between VR Advertising Components and Advertising Attention

RQ	Independent Variable	Dependent Variable	β	t	R ²
Step 1	3D	Ad Attention	.699	15.494**	.489
Step 2	3D	VR Presence	.567	10.905**	.321
Step 3	3D VR Presence	Ad Attention	.626	11.535**	.500
			.129	2.372*	
RQ	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Dynamic	Ad Attention	.546	10.317**	.298
Step 2	Dynamic	VR Presence	.707	15.835**	.500
Step 3	Dynamic VR Presence	Ad Attention	.407	5.509***	.317
			.196	2.652***	
RQ	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Novelty	Ad Attention	.472	8.478***	.223
Step 2	Novelty	VR Presence	.318	5.322***	.101
Step 3	Novelty VR Presence	Ad Attention	.354	6.557***	.346
			.371	6.882***	

*** $p<.001$, * $p<.05$

To verify the 'research question 6' on whether the VR presence, a mediator variable, would have a mediating effect, the regression analysis was performed with the VR advertisement components(three-dimensionality, dynamicity, novelty) set as independent variable and with the VR presence set as mediator variable, and with the advertising attitude set as dependent variable. For that, the multiple regression analysis and Sobel test were carried out. The results are presented in Table 7. Based on the results of the verification of 6-1, 6-2, and 6-3, all the three-dimensionality, dynamicity, novelty, the independent variables, were found to have a significant influence on the advertising attitude and VR presence, the dependent variables, in the first stage and second stage analyses. Finally, the influence of VR advertisement components on the advertising attitude was found to be $\beta=.620$ for



three-dimensionality, $\beta=.575$ for dynamicity, and $\beta=.533$ for novelty in the first stage. While the influence was decreased to $\beta=.486$ for three-dimensionality, $\beta=.429$ for dynamicity, and $\beta=.412$ for novelty in the third stage, which suggests that the mediating effect was manifested. Moreover, the Sobel test was conducted to verify the statistical significance of mediating effect. The results showed that all were statistically significant and therefore the partial mediation effect arose finally.

Table 7: Mediating Effect on VR Presence in the Relationship between VR Advertising Components and Ad Attitude

RQ 6-1	Independent Variable	Dependent Variable	β	t	R ²
Step 1	3D	Ad Attitude	.620	12.504**	.384
Step 2	3D	VR Presence	.567	10.905**	.321
Step 3	3D VR Presence	Ad Attitude	.486	8.328***	.421
			.235	4.017***	
RQ 6-2	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Dynamic	Ad Attitude	.575	11.146**	.330
Step 2	Dynamic	VR Presence	.707	15.835**	.500
Step 3	Dynamic VR Presence	Ad Attitude	.429	5.960***	.353
			.207	2.882***	
RQ 6-3	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Novelty	Ad Attitude	.533	9.974***	.284
Step 2	Novelty	VR Presence	.318	5.322***	.101
Step 3	Novelty VR Presence	Ad Attitude	.412	8.060***	.413
			.379	7.421***	

*** $p<.001$

Based on the results of the verification of 7-1, 7-2, and 7-3, all the three-dimensionality, dynamicity, novelty, the independent variables, were found to have a significant influence on the purchase intention and VR presence, the dependent variables, in the first stage and second stage analyses. Finally, the influence of VR advertisement components on the purchase intention, however, was found to be $\beta=.634$ for three-dimensionality, $\beta=.606$ for dynamicity, and $\beta=.332$ for novelty in the first stage. While the influence was decreased to $\beta=.537$ for three-dimensionality and $\beta=.201$ for novelty, except for dynamicity, in the third stage, which suggests that the mediating effect was manifested. Furthermore, the Sobel test was performed to verify the statistical significance of mediating effect. The results showed that only the three-dimensionality and novelty, except for the dynamicity, among the VR advertisement components were statistically significant and the partial mediation effect arose finally as a result.

Table 8: Mediating Effect on VR Presence in the

Relationship between VR Advertising Components and Purchase Intention

RQ 7-1	Independent Variable	Dependent Variable	β	t	R ²
Step 1	3D	Purchase Intention	.634	12.976**	.401
Step 2	3D	VR Presence	.567	10.905**	.321
Step 3	3D VR Presence	Purchase Intention	.537	9.197***	.421
			.170	2.907**	
RQ 7-2	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Dynamic	Purchase Intention	.606	12.061**	.367
Step 2	Dynamic	VR Presence	.707	15.835**	.500
Step 3	Dynamic VR Presence	Purchase Intention	.540	7.620***	.371
			.093	1.305	
RQ 7-3	Independent Variable	Dependent Variable	β	t	R ²
Step 1	Novelty	Purchase Intention	.332	5.572***	.110
Step 2	Novelty	VR Presence	.318	5.322***	.101
Step 3	Novelty VR Presence	Purchase Intention	.201	3.507***	.261
			.410	7.159***	

*** $p<.001$

IV. CONCLUSION

This study examined the influence that the factors of VR advertisement characteristics would have on the VR presence and advertising effect. Based on such perspective, the results of this study were below: First, all VR advertisement factors had a positive(+) influence on the advertising attention. Factors were found to have higher explanatory power in the order of three-dimensionality, novelty, and dynamicity. Those results may be interpreted to imply that the three-dimensional advertisement, which can increase visual, auditory and other relevant stimulation of the person experiencing the VR advertisement, was effective for advertising attention. Second, all VR advertisement factors had a positive(+) influence on advertising attitude. Factors were found to have higher explanatory power in the order of novelty, dynamicity, and three-dimensionality. Those results can be interpreted to imply that fresh creativity, which broke from, was the most important for VR advertising attitude. Thus, the advertisement stories or the rendering methods, which cannot be found in existing advertisements, would be important in VR advertisement. Third, all VR advertisement factors had a positive(+) influence on purchase intention. Factors were found to have higher explanatory power in the order of three-dimensionality, dynamicity, and novelty. Those results can be interpreted to imply that that indirect experience induced by VR advertisement influence the actual purchase intention. Fourth, all VR advertisement factors had a positive(+) influence on VR presence. Factors



were found to have higher explanatory power in the order dynamicity, three-dimensionality, novelty. Fifth, partial mediation effect was manifested when the VR presence was mediated in the relationship between VR components and advertising attention. Sixth, partial mediation effect was manifested when the VR presence was mediated in the relationship between VR components and advertising attitude. Seventh, partial mediation effect was manifested in the three-dimensionality and novelty, except for dynamicity, when the VR presence was mediated in the relationship between VR components and purchase intention. Those results suggest that the VR advertisement was more likely to have a positive influence on advertising effect when the VR presence increased. That may be interpreted to suggest that VR advertisement can have a positive influence on advertising effect through vivid experience and sensible experience which are provided to consumers.

The implications of this study were as follows: Although the VR advertisement market has been expanding gradually, there has been little study that investigates the empirical effects in the advertisement field. The recent rapid distribution of digital devices will help spur popularization of VR devices. Along with that, many changes will be brought to the advertisement industry. Thus, it would be necessary to conduct more in-depth studies that provide basis for production and planning of advertisement based on quantitative research necessary to understand the effect process of VR advertisement. Thus, this study is significant as an empirical research on advertisement, which aims to promote VR advertisement and provide basic data for mapping out effective advertisement strategies. However, this study has some limitations. First, it did not consider various external variables in identifying the VR advertisement components and analyzing the causal relationship to the advertising effect. Therefore, succeeding studies should be conducted by taking the characteristics of the audience and environmental factors of VR advertisement into consideration. Second, it would be necessary to conduct experimental research based on experiment or production. The VR advertisements in this study were reused by modifying the actual on-air advertisements in such a way that suited the study due to the difficulty with the production of VR advertisements. Thus, the advertising effect would need to be verified through the experimental research to obtain more accurate results in the succeeding studies. Despite those limitations, the results of this study would provide a basis for survival of advertisement industry amid the demands and expectations of the times for the new type of advertisement. In addition, the results of this study would provide new ideas to underpin the development of succeeding studies and contribute to advancement of the studies on advertisement based on application of new technologies.

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