Research Article

The Influence of Mobile Video Advertisement Context and Consumers' Learning Style on Advertising Effects

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Consumers' learning styles influence their attitudes toward advertisements and, in turn, their purchase intention. In particular, learning styles differ in terms of visual attention when viewing static objects. However, despite the increasing popularity of mobile video advertisements, few studies have used visual attention to observe consumer cognition and purchase intention. Additionally, there is a research gap regarding the influence of the context of mobile video advertisements on purchase intentions. Based on learning style theory, this study used an eye tracker to observe and record subjects' eye movements while watching advertisements to explore whether their visual attention modulates purchase intentions because of individual learning styles. Moreover, the study investigated whether consumers possessed global or sequential learning styles in the context of mobile video advertisements. A quasiexperimental factorial 2 (mobile video advertisement: contextual/noncontextual) × 2 (learning style: sequential/global) study was conducted in Taiwan, and 32 valid subjects were recruited. We used eye tracking and questionnaire methods to gather data. The research variables were analyzed to understand their interactions and operational definitions. We found that consumers with different learning styles have varying visual attention to different mobile video advertisement contexts and different levels of purchase intentions. The results of this study can be used as a reference for future studies on mobile video marketing, learning styles, and advertising contexts. Additionally, it can be useful for advertisers when designing advertisements that enhance consumers' purchase intentions.

1. Introduction

Internet usage worldwide has increased as a result of rapid technological development. A survey on social media usage found that YouTube alone had an average of 150 million active monthly users [1]. Rapid Internet growth has also increased the penetration rate of mobile devices, with many companies gradually shifting their advertising and marketing budgets toward more personalized and customizable online media than traditional mass media. As market demand increases, more people seek to become YouTubers, with many manufacturers using the platform to match their products with YouTubers to increase public awareness. Increased Internet usage also implies an increased number of consumers using it for shopping [2] and changes the format of Internet advertising. Webpages, videos, and live streaming have attracted the attention of hundreds of millions of users worldwide. The issue of properly contextualizing products on video-based advertising platforms to increase consumers' purchase intentions has become worthy of attention. For example, Yeun Chun et al. [3] found that the Internet contextual advertisement may induce favorable attitudes toward the advertisement, and the consumers have higher recall rates and attitudes toward the brand when they are exposed to a less complex contextual advertisement or a complex, noncontextual advertisement [3]. Contextual advertising highlights the importance of the media in which advertisements are viewed [4]. The contextual relevance of an advertisement increases the involvement and motivation to process advertisement information, and consumer

responses are more favorable to the advertisement [3]. However, it is important to design advertisements appealing to consumers with different learning styles to enhance the effect of communication. Understanding consumers' learning styles is becoming increasingly important as the volume of user data increases [5].

This study used different advertising contexts to explore differences in consumers' purchase intentions when viewing advertisements. It analyzes eye-tracking data to understand the moderating effect of various learning styles on purchase intentions. This study's results can be used to help manufacturers design mobile video advertisements that influence and increase their purchase intentions.

This study explored the influence of different advertising contexts on subjects' learning styles and purchase intentions. It analyzed subjects' learning styles when receiving product information and discussed consumers' purchase intentions during the information marketing process. These results will help people understand how learning styles are affected by watching advertisements and the relationship between visual attention and learning styles. Furthermore, the results can also inform advertisers about the influence that viewers have when watching advertisements. Such information can help advertisers design content that attracts greater visual attention from consumers with various learning styles.

2. Materials and Methods

2.1. Mobile Video Advertisement Context.
Mobile video advertisements refer to those played on the Internet. Bauer and Strauss [6] found that advertisement contexts, such as the user's goal, location, or timing, and the user's behavior, interest, or preference are all factors that may affect advertising perception. Good mobile video advertisements can improve consumers' product perceptions and increase their purchase intention. Additionally, various advertisement context designs can influence the same people differently [7].

Coulter and Punj [8] divided advertising context into two types: stimulus content and viewing content. They found that consumers were mainly influenced by viewing content while watching advertisements. According to Yi [9, 10], the advertisement context can positively affect consumers' purchase intentions after generating positive emotions. Norris and Colman [11] indicated that because the overall advertisement context varies, providing the same message to the same consumers produces different advertising effects. Singh and Cole [12] compared TV commercials of different lengths and found that their durations affected emotional advertisements. However, there was no significant difference in informative advertisements. Moore et al. [13] defined the website context as the site's main product information in their study of website banner advertisements.

2.2. Learning Style.
Learning style refers to an individual's ability to translate external stimuli into information through visual, auditory, and thought processes and express them in their behavior when faced with certain situations. When people are given the same text, they interpret it differently because of dissimilar mental and sensory stimuli [14]. Individuals have different preferences of perceiving, organizing, and remembering things [15]. In addition, they possess different learning styles with specific and consistent information-processing methods [16]. In 2018, Park [17] reviewed related literature and suggested that it is necessary to properly present information based on users' cognitive profiles.

Felder and Silverman [18] proposed the Felder–Silverman learning style model in 1988, which divides learning styles into four dimensions: active-reflective, sensing-intuitive, visual-verbal, and sequential-global [18]. Sequential-global indicates that those with a sequential learning style prefer to process information in pieces, whereas those with a global learning style prefer to process information as a whole.

People with a sequential learning style logically deal with external information. Kinshuk et al. [19] found that sequential learners learn in linear steps, and their preference for logical structures means that they are more likely to follow a step-by-step approach to finding solutions and paying greater attention to details [19]. Those with a global learning style prefer to absorb external information discontinuously, focusing on the general overview of information, and using a randomized approach to process information. When sufficient accumulated knowledge exists, a global approach is suitable for processing complex content [18]. For example, Huang [20] found that sequential and global students had different requirements for instructional software. Thus, designers may rely on the types of students that will design instructional software, so that users can learn more efficiently and effectively [20].

In this study, we believe that the learning style of consumers is a likely influencing factor in the information retrieval process. Sequential learning favors rational cognition. People with a sequential learning style who intended to read or watch information followed the present sequence. They might pay more attention and more time to follow the video stream, especially when the video is interesting to them. When watching advertisements, their focus is on the information block with product pictures, with a preference toward context-free video advertisements, making it easy to process information logically.

On the other hand, people with a global learning style favor experiential cognition. They may do ad hoc reading/watching and exhibit unsystematic reading/watching behaviors. When watching advertisements, their focus is on the information block with product introductions with a preference toward contextual video advertisements, making it easy to absorb information.

2.3. Purchase Intention.
Purchase intention is a measure of consumers' propensity to purchase a product. The greater their purchase intention, the more likely they are to purchase a certain product or service [21]. Purchase intention is an important factor in consumers' decision-making process. In consumer behavior research, purchase intention is often used to measure consumers' behavioral intentions. Past

studies have found that consumers consider online reviews and word-of-mouth as important information sources when gauging a product's quality [22]. Schiffman and Kanuk [21] defined purchase intention as consumers' willingness to purchase a commodity. Consumers with positive purchase intentions demonstrate a positive commitment.

In addition to the subjective inclination of consumers toward a product, purchase intention has long been proven to be a key indicator for predicting consumer behavior and measuring the propensity of consumers to purchase products after receiving electronic word-of-mouth reviews. The greater their purchase intention, the greater their purchase propensity; in other words, consumers are more likely to buy the product [23]. Kotler and Keller [24] argued that consumers' purchase intentions are affected by the "attitude of others" and "unanticipated situational factors." "Attitude of others" refers to other people's individual preferences and compliance with their expectations.

2.4. Visual Attention and Eye Tracking. Eye tracking is a useful tool for behavioral research, which is often limited by subjects' inability to fully recall what they saw or clearly describe what they were looking at and in what order. Prior to using eye tracking, researchers faced difficulty in accurately documenting what subjects were focused on, their sequence, duration, and other relevant information. Eye tracking can directly identify human eye movements and record and analyze the information acquisition processes of subjects. Such accurate information cannot be obtained using previous methods. It is now possible to clearly understand what subjects were reading and for how long, allowing researchers to analyze data, such as visual position and duration. Moreover, it allows them to explore the information acquisition and reading processes [25]. Many scholars believe that the point of gaze is mostly affected by perceptual factors and that eye movement patterns, such as the point of gaze, gaze duration, and gaze sequence, can accurately reflect subjects' psychological processes when reading information. Based on these data, researchers can understand and identify which words were being looked at and which ones they repeatedly went back to.

Eye trackers can be used to measure focus and movement paths. They are suitable for accurately collecting data on specific images or stimuli that subjects focus on [26]. Eye trackers come in various forms, including head-mounted trackers, glasses, and desktops. They collected data on visual retention, pupil size change, gaze duration, and areas of interest. Eye-tracking technology has been used for many years in social sciences, human-computer interaction, and computer usability research, especially in system interface design or computer usability analysis. Recently, asset management research has adopted eye-tracking methods for observational purposes. For example, eye tracking was used in a cross-country study on website design to verify users' focus points [26] and in a study on human-computer interaction, which found that users considered websites with portrait photos more attractive than those without [27].

3. Research Methodology

This study adopted an experimental method supplemented with eye-tracking observations. The subjects were randomly assigned to two groups: contextual and noncontextual. Additionally, they were divided into global and sequential learning style groups according to their learning style scale results. Their purchase intentions were tested and the hypotheses were verified using a statistical test. Finally, the conclusions are presented. Figure 1 shows the research framework of this study.

H1: Does the context setting of mobile video advertisements affect consumers?

H1a: Consumers pay greater attention to contextual mobile video advertisements than to noncontextual mobile video advertisements

H1b: Consumers have greater purchase intentions for contextual mobile video advertisements than for noncontextual mobile video advertisements

H2: Consumers with different learning styles are influenced differently by mobile video advertisement contexts

H2a: Consumers with different learning styles have varying levels of visual attention to different mobile video advertisement contexts

H2b: Consumers with different learning styles have varying purchase intentions in different mobile video advertisement contexts

3.1. Variables and Measurements. In this study, mobile video advertisement contexts were set as the experimental variables. Additionally, contextual and noncontextual advertisement design frameworks were used. The subjects' visual attention was observed while viewing advertisements in different contexts. Moreover, eye movement indicators under the area of interest (AOI) were defined by discussing how purchase intention can be influenced. Further analysis identified the learning style of each subject. Purchase intention was set as the dependent variable and learning style was set as a moderating variable. The participants' learning styles and purchase intentions were analyzed in the context of different mobile video advertisements. Different advertisement content designs were used for testing to verify the existence of significant differences in the contexts chosen for this study.

In addition, the questionnaire contained items on learning styles and purchase intentions, making the test results more effective. A 5-point Likert scale was used for the questionnaire, allowing the study to objectively understand the extent to which subjects agree with each item and purchase intention for consumers. These learning style items were adapted from the sequential-global dimension of the Felder–Silverman learning style model [18]. The original 20 items were translated and back-translated by two independent Chinese researchers in the field of management information systems. Items with factor loadings less than
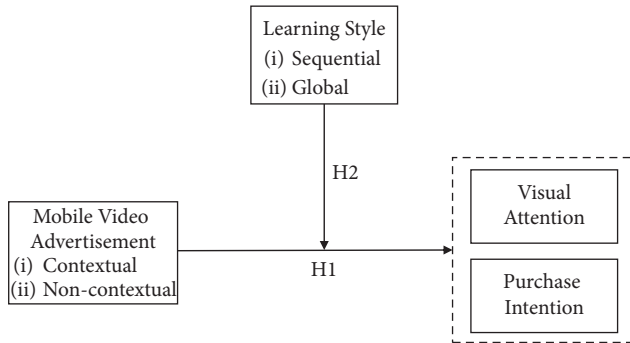
FIGURE 1: Research framework.

0.40 or loaded on two or more factors were removed. Finally, six items remained: three items for the global learning style and the others for the sequential learning style. We used another four items adapted from Dodds et al. [23] and Zeithaml [28] to capture purchase intention. A description of the variables is provided in Table 1.

Not only can the correlation strength between both variables be observed but the research hypotheses can also be verified by analyzing the influence of visual attention and the results of the questionnaire. This study had the subjects' complete physical questionnaire forms to prevent them from gathering study-related information online. The scale and questionnaire used in this study were referenced from previous related literature. Additionally, they were modified according to the study's requirements to remain valid for the study's content.

3.2. Experimental Design and Procedure. The experimental procedure was divided into five steps: introduction to the experiment, signing consent forms, recording eye movements, conducting the experiment, and completing the questionnaire. To familiarize the subjects with the experimental procedures, the experimenter briefed them before beginning the experiment. This allowed the subjects to understand the experiment's purpose and the significance of the data collected. The subjects were also informed that computers, cell phones, and other information-gathering devices were not permitted to ensure that no external factors would impact the experimental process and quality. Additionally, to gather accurate eye-tracking data, participants were instructed not to shake their heads randomly and focus on watching the video until the end of the experiment. Subsequently, the subjects were randomly assigned to an advertisement context for testing. The experiment ended when the participants finished watching the advertisement and completed the questionnaire.

We conducted the experiment in a university research laboratory to control environmental variables and reduce the probability of bias. Participants were recruited and randomly assigned to the noncontextual group (groups 1 and 2) or the contextual group (groups 3 and 4). All subjects read and signed the consent form and were told that any decision they made would not have any effect on their academic performance. All experiments were conducted by the same facilitator using the same equipment and in the same room to avoid bias. After participants finished the experiment, we calculated the scores of learning styles and identified them as sequential (in groups 1 and 3) or global (in groups 2 and 4) learning styles based on their scores.

3.3. Selection of Stimuli. In this study, an unknown cosmetic product, a sunblock moisturizer, was selected as the target of the task. We designed two cosmetics advertisement stimuli for this experiment. For the contextual group, an information block containing product specifications and usage scenarios was presented, along with the actor speaking about her personal experience. For the noncontextual group, the information block shows the image of the product along with the actor speaking about the introduction and specifications of the product.

These two advertisement videos were produced with the same actor presenting the same product in each scene. Each video was 30 seconds long and contained information blocks with the same dimensions. All stimulus materials were reviewed by two senior researchers, and a panel discussion was conducted to revise and refine the content to ensure validity. The experiment was also pilot-tested with five graduate school students majoring in information systems to improve the experiment. Screenshots of the video advertisements used in this experiment are shown in Figure 2.

4. Results

The data gathered in this study are divided into three categories: participants' personal data, questionnaire results, and eye-tracking data. These results are used as the experimental basis of this study. The experiment was conducted at a university campus in Taiwan. There were 32 valid samples collected. Based on the questionnaire items answered by the subjects regarding learning styles, we divided the samples into two groups based on their scores: sequential and global. The subject groups are listed in Table 2.

4.1. Subject Demographics. Males accounted for 78.13% of the total number of subjects, which is similar to the gender ratio of the college from where the subjects were recruited. On average, 31.25% of the subjects spent more than two to three hours a day watching videos on mobile platforms. On average, 50% of the subjects spent less than one minute watching advertisements on mobile video platforms. On average, 43.75% of the subjects shopped online less than once a week, and 40.63% shopped online once to three times a week. From this, it is clear that the participants use a mobile video platform daily to consume videos and watch advertisements. This finding aligns with this study's expectation for subjects to recently watched videos on a mobile video platform. The questionnaire results for the subjects' basic information are shown in Table 3.

TABLE 1: Description of variables.

| Type	Variable		Description
Independent	Mobile video advertisement	Contextual	The video describes how the product is used and shares user experiences. An information block containing the product introduction appears on the page. The video contains information about the product's price, manufacturer, and brand. An information block containing the product's image appears on the page.
		Noncontextual	
Moderating variable	Learning style	Sequential	A modified scale based on the one used by Felder and Silverman [18] was used. Subjects were classified as having a sequential or global learning style based on their scores.
		Global	
Dependent variable	Visual attention	Gaze frequency	Number of times the subject's gaze entered the area of interest (AOI)
		Gaze duration	The total gaze duration from when the subject's gaze entered and left the AOI
	Purchase intention		Referenced the questions used by Dodds et al. [23] and Zeithaml [28] to measure consumer purchase intention
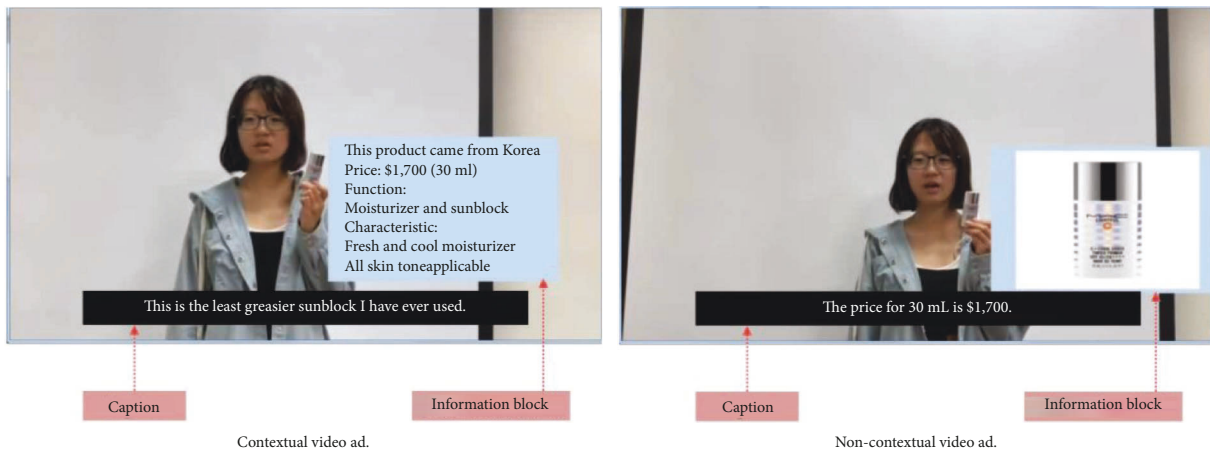
FIGURE 2: Experimental stimuli.

TABLE 2: Experiment grouping.

Group	Video ad type	Count	Learning style	Count
Group 1	Noncontextual	16	Sequential	8
Group 2			Global	8
Group 3	Contextual	16	Sequential	7
Group 4			Global	9

4.2. Hypothesis Testing. This study used Cronbach's α coefficient as an indicator to judge whether the results are consistent and reliable. The questionnaire had Cronbach's α value of 0.687, which is an acceptable level of reliability [29]. Validity refers to whether the experimental tools and methods can effectively allow the tester to measure the results and whether their presentation is correct. The scale format used in this study was based on designs proposed by domestic and international scholars. After these modifications, the scale satisfied the experimental needs of this study and remained valid.

4.3. The Impact of Mobile Video Advertisement Context on Visual Attention Testing. We used the data collected for testing. First, the differences in visual attention among different types of mobile video advertisements were explored. Noncontextual and contextual mobile video advertisement groups were compared, with the number of AOI gazes and gaze duration collected from the eye tracker subjected to independently sampled t-tests. The test results showed that the gaze frequency from the contextual group was higher than that of the noncontextual group at a significance level of $p = 0.040$, indicating that subjects gazed at contextual mobile video advertisements more than noncontextual ones. However, there was no significant difference in gaze duration. Table 4 presents the results of the statistical analyzes.

Based on the data gathered from the eye tracker, significant differences were found in the gaze frequency between different mobile video advertisement contexts. We can infer that contextual mobile video advertisements attract consumers' attention more than noncontextual ones. However, there was no significant difference in gaze duration, even when the videos presented to both groups were 30 seconds long, with roughly the same information block length. Additionally, there was no significant difference in reading times between the two groups. This shows that for the subjects, both types of advertisements had similar effects on reading attractiveness. Thus, hypothesis H1a is partially supported.

While gaze duration was not significant, the observation data showed that for the noncontextual group, gaze duration was slightly longer. However, gaze frequency was less than that in the contextual group. It is speculated that contextual

TABLE 3: Subject demographics.

		Overall		Noncontextual		Contextual	
		n	%	n	%	n	%
Gender	Male	25	78.13	11	68.75	14	87.50
	Female	7	21.88	5	31.25	2	12.50
Average time spent watching videos on a mobile video platform per day	Less than 1 hour	1	3.13	1	6.25	0	0.00
	1-2 hours	6	18.75	4	25.00	2	12.50
	2-3 hours	10	31.25	6	37.50	4	25.00
	3-5 hours	4	12.50	2	12.50	2	12.50
	5-7 hours	6	18.75	1	6.25	5	31.25
	7-9 hours	2	6.25	1	6.25	1	6.25
	More than 12 hours	3	9.38	1	6.25	2	12.50
Average time spent watching advertisements on mobile video platforms per day	Less than 1 minute	16	50.00	8	50.00	8	50.00
	1-3 minutes	7	21.88	2	12.50	5	31.25
	3-5 minutes	3	9.38	2	12.50	1	6.25
	5-10 minutes	3	9.38	2	12.50	1	6.25
	21-30 minutes	3	9.38	2	12.50	1	6.25
Average number of online shopping sessions per week	Less than 1 time	14	43.75	9	56.25	5	31.25
	1-3 times	13	40.63	5	31.25	8	50.00
	7-9 times	1	3.13	0	0.00	1	6.25
	More than 10 times	4	12.50	2	12.50	2	12.50

TABLE 4: Analysis of the impact of mobile video advertisement context on visual attention.

Dependent variable	Mobile video ad context		Significance
	Noncontextual	Contextual	
Gaze frequency	9.500 (6.703)	13.875 (4.603)	0.040**
Gaze duration	10.082 (5.148)	11.075 (4.433)	0.563

TABLE 5: Analysis of the impact of mobile video advertisement contexts on purchase intention.

Dependent variable	Mobile video ad context		Significance
	Noncontextual	Contextual	
Purchase intention	3.359 (0.741)	3.188 (0.642)	0.489

TABLE 6: Analysis of learning style results.

Dependent variable	Mobile video ad context	Learning style		Significance
		Sequential	Global	
Gaze frequency	Noncontextual	6.571 (2.225)	11.778 (8.197)	0.127
	Contextual	16.250 (4.683)	11.500 (3.251)	0.034*
Gaze duration	Noncontextual	7.260 (3.290)	12.277 (5.402)	0.049*
	Contextual	12.276 (3.495)	9.874 (5.157)	0.294
Purchase intention	Noncontextual	3.357 (0.476)	3.361 (0.928)	0.992
	Contextual	3.156 (0.778)	3.219 (0.525)	0.853

TABLE 7: Hypothesis testing results.

	Hypothesis	Results
H1	Does the context setting of mobile video advertisements affect consumers?	Partially supported
H1a	Compared with noncontextual mobile video advertisements, consumers pay greater attention to contextual mobile video advertisements.	Partially supported
H1b	Compared with noncontextual mobile video advertisements, consumers have greater purchase intentions for contextual mobile video advertisements.	Not supported
H2	Consumers with different learning styles are influenced differently by mobile video advertisement contexts.	Partially supported
H2a	Consumers with different learning styles have varying visual attention to different mobile video advertisement contexts.	Supported
H2b	Consumers with different learning styles have varying purchase intentions for different mobile video advertisement contexts.	Not supported

mobile video advertisements may be more visually attractive, which can be explored further in follow-up studies.

4.4. The Impact of Mobile Video Advertisement Context on Purchase Intention. Using a questionnaire, we examined subjects' purchase intentions and compared responses from both groups to explore how different types of video advertisements influence purchase intention. The analysis results did not reach a significant level, with $p = 0.489$, and there was no significant difference in purchase intention between the two groups. Thus, hypothesis H1b is not supported. The results of the analysis are presented in Table 5.

4.5. The Moderating Effect of Consumers' Learning Style. We compared the differences between different learning styles. The results show that visual attention had a partially

significant impact, whereas purchase intention did not. In terms of gaze frequency, there was no significant difference between subjects with either learning style in the noncontextual advertisement group. However, for those in the contextual advertisement group, gaze frequency was significantly higher among those with sequential learning styles. This implies that such a subject's eye moves in and out of the information block's AOI more frequently and is consistent with how those with a sequential learning style are defined to emphasize details and tend to process information sequentially. Their frequent focus switching between the main screen and the information block demonstrates an urge to avoid missing information.

Regarding gaze duration within the noncontextual advertisement group, subjects with a global learning style had significantly longer gaze durations than those with a sequential learning style. The opposite was true for the

contextual group, but not significantly. This indicates that subjects with a global learning style in the noncontextual advertisement group are more likely to be attracted by information blocks and stay. The statistical results are presented in Table 6.

Based on the visual responses of participants with both learning styles to different forms of mobile video advertisements, we believe that consumers with sequential learning styles are more suitable for contextual advertisements. Consumers with a sequential learning style would be easily attracted to information blocks and frequently check the content presented there, which is conducive to the communication of marketing information. For consumers with a global learning style, noncontextual advertisements are more suitable. They tend to collect wide-ranging information; therefore, their gaze duration is much longer for the information presented in the information block. As such, for consumers with a global learning style, presenting marketing information in information blocks would be conducive.

5. Conclusions

This study mainly explored whether visual attention and learning style influence consumers' purchase intention while watching advertisements and gathered relevant data through eye tracking. The results of this study are summarized in Table 7.

After data collection and analysis, we found that certain information blocks within advertisements attracted subjects' attention more than textual product introductions or pictures. As such, when people watch advertisements, their visual attention is focused on the product within the video or its picture in the information block.

Additionally, purchase intention was greater among viewers who watch noncontextual advertisements featuring product images in their information blocks than those of contextual advertisements with textual product descriptions in their information blocks. This implies that featuring product images in advertisements could increase consumers' purchase intentions. This study also found that in addition to information blocks and content introductions, factors such as layout, products, models, and sounds may affect consumers' visual attention and purchase intentions. We recommend that additional factors should be included in subsequent studies.

However, in the experiment, learning style did not demonstrate a moderating effect between advertisement context and purchase intention. This might be due to the number of experimental factors or sampling methods used. Additionally, despite adopting the learning style items in the questionnaire from a validated scale, its applicability may need to be revalidated after adapting and simplifying it for this study. The samples used in this experiment were limited in terms of time and cost. Thus, only students from a certain university were recruited for this study. Although other possible influencing factors can be quickly excluded, the nature of the sample remains homogeneous. Subsequent studies can use other possible influencing factors as references to modify the variables.

Additionally, because of the limitations of the instruments and software used for this study and to prevent subjects from searching online for study-related information, this study only used instruments and computers offline. Therefore, it was impossible to observe the subjects in a more realistic scenario in which they used online video platforms to watch advertisements. Subsequent studies can provide subjects with an Internet connection to better match the experimental scenario with real life.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Acknowledgments

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