

Higher Education Students' Stages of Aesthetic Development in Visual Text Interpretation

Judelin S. Alvarez, PhD

Camarines Norte State College, College of Education

Email: judelinalvarez@cnscc.edu.ph

Abstract—The present study identified the students' stages of aesthetic development such as accountive, constructive, classifying, interpretive, and co-creative in visual text interpretation using content analysis research design. Five teachers handling the GEC-5 Art Appreciation course and 25 students selected through purposive sampling were the study participants. The researcher collected written outputs of students' interpretations in their respective classes. Written outputs of visual text interpretation were coded and analyzed. Results revealed that almost all the participants belong to accountive stage where in readers view text literally. Significantly, this implies that teaching strategies have a big impact on how students interpret what they see, and that the stages of aesthetic development can only be reached if teachers have the knowledge and skills to teach visual literacy. Based on the findings, the study recommends the use of various visual materials not only as sources of information but also as sources of meaning-making. Teachers may match their beliefs and practices in assessing the viewing skills of students and undergo special training.

Keywords— Visual literacy, stages of aesthetic development, visual text interpretation.

I. RATIONALE

Visual literacy is an essential skill in the 21st century, as visual communication has become an integral part of our daily lives. In the educational context, visual literacy can enhance critical thinking skills, promote creativity, and improve learning outcomes (Huang, 2018). The use of visual aids, such as diagrams, images, and videos, can make abstract concepts more concrete and understandable for students. Teaching visual text interpretation in Philippine education can have various benefits for students. It helps students understand and analyze the complexities of contemporary media, which is an essential skill in the age of digital technology (Santiago, 2018). By analyzing the messages conveyed through visual media, students can become more media-literate and discerning consumers of information. Furthermore, teaching visual text interpretation can also help students understand different perspectives and cultural contexts. Visual literacy in higher education curriculum in the Philippines is an area of growing interest, as there is a growing recognition of the importance of visual communication in today's digital age. According to Amatorio and Ramboyong (2018), visual literacy is not commonly integrated into higher education curriculum in the Philippines.

Visual illiteracy can cause several impacts to tertiary students, particularly in academics, communication, and even professional development. It can hinder students' ability to engage with visual materials used in various academic

disciplines, leading to reduced comprehension and performance (Cohen & Weitzman, 2019). Inadequate visual literacy skills can impede students' ability to effectively communicate ideas using visual aids, restricting their capacity to convey complex information (Doyle, 2017). Visual illiteracy can hinder future career prospects, as many professions increasingly rely on visual communication for tasks such as data analysis, marketing, and design. Visual illiteracy is caused by insufficient education. Limited emphasis on visual literacy in the curriculum and inadequate instruction on visual analysis and interpretation contribute to students' lack of visual literacy skills (Gilliam, 2020). These challenges should be addressed immediately by integrated visual literacy in the curriculum. Incorporating visual literacy instruction across disciplines can enhance the students' ability to analyze and communicate through visual means (Cox, 2021).

Research Objective

The study delved into the stages of aesthetic development of visual texts of higher education students. Specifically, it aimed to identify the stages of students' visual text interpretation.

Introduction

In today's digital age, visual communication has become increasingly important, with images, videos, and other visual media dominating communication channels (Messaris, 2014). The need for visual literacy is further compounded by the fact that visual information can often be more persuasive and engaging than text-based information (Bucy, 2004). Additionally, research has shown that incorporating visual elements into teaching can help students retain information better than text alone (Mayer, 2001). However, teaching visual literacy can present several challenges, including limited resources, time constraints, and lack of institutionalization in the curriculum (Krakow, 2017). Moreover, teachers may not have the necessary skills and knowledge to teach visual literacy effectively (Hess, 2017).

The complexity and ambiguity of visual texts can also pose a challenge for teachers in teaching visual literacy. Kress and van Leeuwen (2006) found that visual texts can be difficult to interpret. Teachers may struggle to help students understand the various codes and conventions used in visual texts, as well as the cultural and historical contexts in which they were produced.

One problem that students often face in visual text interpretation is the lack of a clear understanding of the visual elements and how they convey meaning. According to Jenkins and Slaymaker (2013), many students struggle to analyze and interpret visual texts because they lack the necessary vocabulary and conceptual framework to describe the visual elements and their functions. Another challenge for students in visual text interpretation is the complexity and ambiguity of visual messages. As noted by Kovacs and Kipp (2014), visual texts are often open to multiple interpretations and can be influenced by factors such as cultural background, personal experience, and context. This can make it difficult for students to arrive at a clear and definitive understanding of the message being conveyed. Furthermore, students may struggle with the task of integrating visual and textual information when analyzing and interpreting a visual text.

Research Design

This study used qualitative content analysis since key themes emerged from the written outputs of participants in artwork and photo text interpretation. Guo et al. (2019) have outlined content analysis as a study tool for spotting trends in transcripts of spoken or written interactions.

Research Locale and Participants

The study was conducted in a State College in the Bicol region. The institution was purposely chosen since it offers GEC-5 Art Appreciation, a general education course offered to all freshmen students every first semester of the academic year. Art Appreciation is a three-unit course that develops learners' ability to appreciate, analyze, and critique works of art. The participants of this study were twenty-five freshmen students selected through purposive sampling.

Data Gathering Procedure

Using Housen's (2000) Stages of Aesthetic Viewing as a guide, three coders, one being the researcher and the other two coders, an Instructor and Assistant Professor teaching language and literature in the same institution where the study was conducted, analyzed, and identified the stages of students' visual interpretation. Each student participant was assigned to a particular stage based on Housen's (2000) definition of each stage of aesthetic viewing. After the three coders content analyzed the students' visual interpretation and assigned to the stage they belonged, the results underwent member checking by providing the coders with the result of their analysis to ensure credibility. However, there were some discrepancies in the coders' analysis; thus, they convened to reexamine their analysis. After careful deliberation, the coders unanimously agreed to the final coding of the students' visual interpretation stages.

Research Instrument

The rubric, which contains the description of Housen's Stages of Aesthetic Viewing, was used in assigning the stages where the visual interpretation of students belongs. It consists of five stages, namely: Accountive Stage, Constructive Stage, Classifying Stage, Interpretive Stage, and Recreative Stage.

The coding sheet is a table template which consists of three columns. The first column is for the illustration, which refers to the visual texts used for students' visual interpretation. The second column contains the visual interpretation of student participants. The third column contains the coder's assigned stage for each visual interpretation. Five visual texts, purposely selected by each of the teacher participants, were given to their respective classes. Using the rubric and coding sheet, the three coders assigned each of the written visual text interpretations of student participants. The three coders were able to meet and discuss the discrepancies before final coding.

Data Analysis

The written outputs from the six written activities in visual text interpretation of the twenty-five (25) student participants were coded using Housen's (2000) Stages of Aesthetic Development, namely: accountive, constructive, classifying, interpretive, and re-creative.

Methodological Limitations

Artworks and photos were the visual texts used in the study. But other than these, different types of visual texts such as moving pictures could have been used if face-to-face instruction was possible. The number of visual texts used in teaching visual text interpretation may vary since teachers have academic freedom in teaching a particular course. There could have been real time discussion, one to two hours, about three to five visual texts for visual texts interpretation had classes not been restricted by the lockdown.

II. RESULTS AND DISCUSSION

Stages of Students' Visual Interpretation

Table 1 presents the stages of students' visual interpretation based on the student participants' 125 written visual interpretations which were coded through Housen's description of Stages of Aesthetic Viewing. The descriptions under the column Core Ideas were lifted from the definition of De Santis and Housen (2009) Stages of Aesthetic Viewing. It can be gleaned that almost all or 91% of the written visual interpretations of the student participants belong to the Accountive Stage, while 27.2% of the written visual interpretation belongs to the Constructive Stage. The results imply that the participants belong to the Accountive and Constructive stages only which are the first and second stages in Housen's Stages of Aesthetic Viewing. In addition, no student belongs to Classifying, Interpretive and Re-Creative Stages which are the higher stages of interpretation in Housen's Stages of Aesthetic Viewing. It further implies that student participants' visual interpretation belongs to the lower order interpretation only.

These findings are similar to what Brumberger (2011), Emanuel, Baker, and Challons-Lipton (2016); Kedra and Žakevičiūtė (2019), Mbelani (2013), Rashid et al. (2013), and Rashid and Worrell (2015) mentioned that despite being tech-savvy, students lack the skills such as visual vocabulary and visual knowledge necessary for effectively interpreting,

evaluating, and using visual texts; thus, they only describe what they see.

It only implies that individually, students may have their unique and distinctive styles and approaches employed in visual interpretation. Students in the accountive stage focus on the literal aspects of visuals. Learners who employ the constructive approach master the ability to construct concepts and symbols which they can use to support the interpretation of meanings of visuals. Meanwhile, in the classifying stage,

learners prefer to be more organized and specific in the interpretation of elements. Moreover, the interpretive stage allows students to associate meanings to visual works based on personal encounters and experiences related to visual arts. Finally, the re-creative stage fosters opportunities for the students to employ creativity and innovativeness in building connections, symbolisms, and interpretation of meanings of visual works.

TABLE 1. Students' Stages of Visual Interpretation

Essential Theme	Sub-themes	Core Ideas	F	%
Accountive	Making simple, concrete observations Making personal and imaginative observations and associations Using emotions to color comments	<i>Viewers are storytellers. Using their senses, memories, and personal associations, they make concrete observations about the work of art which get woven into a narrative.</i>	91	72.8%
Constructive	Making concrete observations, but with reference point Establishing interest in the artist's intentions	<i>Viewers set about building a framework for looking at works of art, using the most logical and accessible tools: their own perceptions, their knowledge of the natural world, and the values of their social, moral and conventional world</i>	34	27.2%
Classifying	Incorporating information about the artist and work Including library of facts	<i>Viewers adopt the analytical and critical stance of the art historian. They want to identify the work as to place, school, style, time and provenance.</i>	0	0.0%
Interpretive	Seeking interactive and spontaneous encounter with a visual Appreciating subtleties and let meaning of symbols emerge	<i>Viewers seek a personal encounter with a work of art. Exploring the canvas, letting the meaning of the work slowly unfold, they appreciate the subtleties of line and shape and color.</i>	0	0.0%
Re-creative	Seeing the art as semblant, real and animated with a life of its own Combining personal and universal knowledge	<i>Viewers, having established a long history of viewing and reflecting about works of art, now 'willingly suspend disbelief.</i>	0	0.0%
TOTAL			125	100%

The Aesthetic Development Theory, having been studied for decades by Housen together with DeSantis, states that viewers have predictable patterns when interacting with visuals and these are called stages. The researcher used this theory in answering which stages of visual interpretation student-respondents belong. It was used in coding the students' written interpretation of the multimodal texts presented to them in their respective classes.

In her article, Housen (2000) presented the stages of aesthetic development which she has studied in decades. She believes that viewers have these predictable patterns she called 'stages' in understanding works of art. She and DeSantis found that when viewers are exposed to carefully arranged works of art, their ways of interpreting the images evolve predictably. For her, aesthetic development has five stages. These are accountive, constructive, classifying, interpretive and re-creative. The first stage is the Accountive Stage.

Housen (2000) described viewers at Stage I as list makers and storytellers in general. Hence, they make observations that are simple and concrete looking at the literal features of visual texts. This was seen in the interpretation of Student 1 where she focused only on what can be explicitly seen in the visual like the lines, colors, and texture. Also, viewers at this stage make associations that appear distinctive and imaginative as well as may incorporate people and objects into personal narrative reflected in the interpretation of Student 10 who narrates objects or images that can be seen in the visual, such

as the people present and describing that the man and woman seem to be lovers. Likewise, emotions color the students' interpretations by animating the image with words as observed in Student 29's interpretation which mentioned the pain suffered by the subject in the painting.

This is true to what McWilliams (2022) emphasized that the practice of introspection should be incorporated into lessons as it allows learners to use creative visualization to map out their ideas. Also, Assaiqeli (2021), Tillmann (2012) and Mikuni, et al. (2022) explained that students' feelings about the visual texts help them to comprehend and communicate with images since these texts provide wide range of emotions.

Students who are in the accountive stage of visual interpretation possess the ability to find meanings in every concrete observation that they attach with a visual text. Accountive stage relies more on the literal meanings that support concrete and personal observations. Concrete observation is used to give meaning to the literal presence of a visual element. Meanwhile, personal observation involves the initiative to associate intimate aspects related to the visual works such as personal views, feelings, and experiences of the students. On the other hand, using emotions to color comments involves the endeavor of the students to imbibe the situations depicted in the visual works in the contexts of feelings and sentiments.

Viewers at this Stage, according to Housen (2007), look at a visual using their perceptions, knowledge of the world, and the values of their social and moral world. Their concrete observations have a reference point as observed in the interpretation of Student 27 when she described the man holding a rooster and the house in the painting constructed with light materials. The reference point in that interpretation was the knowledge of the student about life in the province. Housen (2007) also described that viewers at this stage start not to include the emotions and start to distance themselves from the visual art. This is somehow similar to what was depicted in Student 17's interpretation when she started to build interest in the artist's intentions like recognizing the colors the artist use.

Batic and Haramija (2015) and Lundy et al. (2014) stated that the interaction between the verbal and the visual and understanding provides students understanding of the visual text. Rowsell et al. (2012), Haydn et al. (2015) and Pickles (2010) believed that through the historical facts that are found in visual texts, students can be drawn into a dialogue and personal meanings that can be related to other issues.

Students who are in the constructive stage of visual interpretation possess the exceptional skills to construct enhanced symbols or associated concepts in the representation of meanings. In this stage, learners become more creative in the conceptualization of symbols and ideas that can help support their search for meaning and understanding of meanings conveyed by visual works.

According to Housen (2007), at Stage III, viewers want to know more about the life of the artist and the work. It was observed in the interpretation of Student 18. The student mentioned that the artwork came from a Roman legend. Housen (2007) also described that viewers at this stage expand the information about the visuals that are known to them. Such was depicted in Student 20's interpretation where she added the name of the artist and his skills in painting. This finding is supported by Boling, Gray, Altuwajri and Jung (2014) who asserted that viewers are purposeful and aware of the author and the appearance of the text.

In the classifying level of visual interpretation, categories play integral and indispensable roles and functions in the organization of concepts and ideas related to visual analysis. Classifying is not just simply categorization of concepts of visual works but also showing the need to employ a more organized and specific approach to the interpretation and understanding of meanings of visual text. In the classifying level, it is not only the visual element that is being categorized by the learners but also the meanings conveyed by the elements.

However, it can be gleaned from the results that there were no students who belong to Classifying, Interpretive and Re-Creative Stages. It further implies that students' visual interpretations belong to the lower stages which only involve literal description of visual elements seen.

As described by Housen (2007), viewers at this stage make an interactive encounter with the art by looking into the details as depicted in the interpretation of Student 16 where she described the effect of a particular element to the visual. At

this stage, viewers start to appreciate the technicalities of the art and let the meaning of symbols found in text emerge. This was observed in Student 4's interpretation where she tried to give meaning to what each element, such as color or line, symbolizes. This finding is similar to Karchmer-Klein and Shinas (2012), Abas (2019) and Mbelani (2013) who mentioned that identifying visual elements and designing their own visual texts help students convey information than words alone. Kress and Van Leeuwen's (2006) emphasized that viewers notice important elements in the text such as fonts used, text position, and the frame of images as it is important to extract the meaning of the visual text.

The interpretive stage requires students to employ a more profound approach to interpretation of visuals. In this stage, students need to immerse themselves in the visual art itself for a more in-depth understanding of meanings. It is also the stage when students find meanings and concepts even in the subtleties of every visual element or component. In the interpretive stage, students use their insights and experiences in making comparisons, analysis and conclusions of the visual texts or works. Symbolism also supports visual interpretation by letting the depth of meanings of visual works reinforce its values.

According to Housen (2007), viewers at the last Stage, having been exposed to the visual interpretation process several times, see visuals as it has its own life to express meaning. As observed in Student 5's interpretation, she described the artwork to be similar with Filipinos having distinct characteristics such as being talkative and good 'story-makers'. Viewers at this stage also make interpretations by bringing together their personal and the universal knowledge which was displayed in the interpretation of Student 11 where in the beginning part, she provided facts and added her personal view at the latter. Liu (2013) has similar findings on this that viewers must be concerned about what they notice and analyze elements present in the images' meaning and their sociocultural meaning. Also, they determine the relationship between and among elements and on how elements interplay and coordinate with each other.

Re-creative stage of visual interpretation requires learners to be creative and innovative in associating meanings to the visual elements. To employ creativity in visual analysis, students choose to rely on the intellectual combination of elements and symbolism. This is therefore the most complex and advanced stage of visual interpretation as it demands that learners have more complex and progressive knowledge of visual elements and the skills on how to play with visuals. The re-creative stage allows students to be more playful, imaginative, and innovative in the building of connections of combined meanings and symbolism and in the representation of these symbolisms.

Findings

On the stages where students belong, the top two stages are accountive (91%) and constructive (8%). While no students' visual text interpretation belongs to classifying, interpretive and re-creative stages. It only implies that students' visual text interpretation belongs to the lower stages of interpretation.

Students in the accountive stage focus on the literal aspects of visuals. Learners who employ the constructive approach master the ability to construct concepts and symbols which they can use to support the interpretation of meanings of visuals.

III. CONCLUSION

Reaching different stages of aesthetic development depends on how the teacher teaches and how the students interpret what they see. This means that teaching strategies have a big impact on how students interpret what they see, and that the stages of aesthetic development can only be reached if teachers have the knowledge and skills to teach visual literacy. Thus, there is also a need for a pedagogical model that teachers can use in the classroom to help students learn how to read and understand pictures.

REFERENCES

- [1]. Boling, E., Gray, C. M., Modell, M. G., Altuwaijri, A., & Jung, J. (2014). Learners interpreting instructional images: Meaning-making and decision-making strategies. *Journal of Visual Literacy*, 33(2), 27-52. Retrieved from
- [2]. <https://eric.ed.gov/?id=EJ1142483>Bucy, E. P. (2004). Media effects and society. *Routledge*, 80(2), 274. <https://doi.org/10.4324/9781410600820>
- [3]. Chang, C., & Guo, C. (2017). Enhancing visual literacy education for children with mixed reality technologies. *British Journal of Educational Technology*, 48(6), 1291-1305. <https://doi.org/10.16993/bjel.108>
- [4]. Cohen, J. F., & Weitzman, E. R. (2019). Visual literacy: A neglected competency for health professionals. *Journal of Health Communication*, 24(9), 705-708. DOI: 10.1080/0140511022011837X
- [5]. Cox, M. (2021). Designing information literacy instruction: Outcomes, assessments, and methods. ACRL.
- [6]. Cutajar, M. (2020). What aspects of historical understanding feature in the analysis of moving-image sources in the history classroom? *History Education Research Journal*, 17(2), 195-213. <https://doi.org/10.14324/HERJ.17.2.05>
- [7]. Das, B. (2016). Using multimedia tools to enhance visual literacy. *International Journal of Information and Education Technology*, 6(2), 100-103.
- [8]. De Leon, G. M., & Borabo, J. (2021). Enhancing Critical Thinking through Visual Literacy. *Journal of Educational and Social Research*, 11(1), 59-64.
- [9]. de Lima, E. S. S., Correia, A. M. R., & Oliveira, M. L. V. (2022). The contribution of visual cues to high school students' comprehension of digital comics. *Journal of Graphic Novels and Comics*, 13(1), 71-86.
- [10]. Doyle, A. (2017). Visual literacy in the digital age: Visual literacy for the information age. Libraries Unlimited.
- [11]. Gilliam, M. (2020). Developing students' visual literacy skills for better research. *Reference Services Review*, 48(2), 125. DOI:10.4018/978-1-5225-4990-1.ch003
- [12]. Guo, J., Song, B., Zhang, P., Ma, M., & Luo, W. (2019). Affective video content analysis based on multimodal data fusion in heterogeneous networks. *Information Fusion*, 51, 224-232. DOI:10.1016/j.inffus.2019.02.007
- [13]. Hobbs, R. (2013). Digital and media literacy: A plan of action. The Aspen Institute. <https://www.aspeninstitute.org/publications/digital-and-media-literacy-a-plan-of-action/>
- [14]. Huang, Y. M. (2019). Developing visual literacy and digital competences: A study of e- book reading. *Computers & Education*, 123, 74-86.
- [15]. Jenkins, H., & Slaymaker, O. (2013). Visualizing texts. In R. L. Beach, C. A. Caswell, G. B. Dellinger, & A. M. O'Brien (Eds.), *The teacher's guide to media literacy: Critical thinking in a multimedia world* (pp. 71-83). Corwin Press.
- [16]. Kamal, F., Taufique, K. M. R., & Dey, T. K. (2021). Role of visual cues in e-learning: An empirical study. *Education and Information Technologies*, 26(2), 2013-2033.
- [17]. Korpi, H., & Englund, B. (2013). Teaching visual arts: Effects of visual training on upper secondary students' perception of and knowledge about art. *Nordic Studies in Education*, 33(4), 237-254.
- [18]. Kovacs, P., & Kipp, M. E. I. (2014). Exploring visual text interpretation: Towards an interdisciplinary framework. *Visual Communication*, 13(4), 427-452.
- [19]. Krakow, K. (2017). Visual literacy and the K-12 classroom: The state of the art. *The Journal of Educational Research*, 110(4), 319-331.
- [20]. Kress, G., & Van Leeuwen, T. (2006). Reading images: the grammar of visual design. London/ New York: Routledge. DOI:10.25073/2525-2445/vnufs.4217
- [21]. Lee, J. (2017). Peer collaboration in teaching visual texts to Korean EFL learners. *English Teaching*, 72(2), 53-76.
- [22]. Li, L., & Lehman, B. (2020). Peer collaboration in media literacy education: Exploring the impact of social interdependence on visual text interpretation. *Educational Technology & Society*, 23(4), 17-28. DOI:10.1186/s40561-020-00118-7
- [23]. Liu, H., & Lesaux, N. K. (2013). The contributions of print and visual cues in text for English language learners' comprehension. *Journal of Educational Psychology*, 105(1), 1-16.
- [24]. Liu, J. (2013). Visual images interpretive strategies in multimodal texts. *Journal of Language Teaching & Research*, 4(6), 1246-1253. doi:10.4304/jltr.4.6.1259-1263
- [25]. Liu, J., & Deng, L. (2017). Cognitive strategies for developing students' visual literacy: A case study in China. *Thinking Skills and Creativity*, 23, 64-74.
- [26]. Lobinger, K. (2008). Image competence: what does a person need to understand images? An empirical investigation using the example of photographs. *Wiesbaden: VS Verlag für Sozialwissenschaften*.
- [27]. Matusiak, K. K. (2020). Studying visual literacy: research methods and the use of visual evidence. *IFLA Journal*, 46(2), 172-181. <https://doi.org/10.1177/0340035219886611>
- [28]. Messaris, P. (2014). Visual literacy: Image, mind, and reality. *Westview Press*. <https://hdl.handle.net/2027/heb31831.0001.001>
- [29]. Mitchell, W. J. (2009). Visual literacy or literary visual?. In *Visual literacy* (pp. 19-38). Routledge.
- [30]. Paoletti, P., Marzocchi, G. M., & Ierardi, M. C. (2019). Visual cues in the comprehension of illustrated books: A study with primary school children. *Journal of Early Childhood Literacy*, 19(3), 376-394.
- [31]. Park, J., & Lim, Y. (2013). The effects of visual cues on consumers' decision making in online shopping. *Journal of Electronic Commerce Research*, 14(2), 145-159.
- [32]. Rouse, A., & Haas, A. (2013). Explicit instruction of visual cues in interpreting science diagrams. *Journal of Science Education and Technology*, 22(6), 815-827.
- [33]. Rusmiana, R. (2016). The use of visual response symbol to improve students' speaking fluency in summarizing reading texts of intermediate 3 class in Iblia Palembang. In *Sriwijaya University Learning and Education International Conference* 2(1), 901-910.
- [34]. Serafini, F. (2010). Reading multimodal texts: Perceptual, structural and ideological perspectives. *Children's Literature in Education*, 41(2), 85-104. DOI:10.1007/s10583-010-9100-5
- [35]. Shen, Y., & Huang, Y. (2019). The effect of visual cues on the interpretation of multimodal texts. *Journal of Visual Literacy*, 38(3), 234-253.
- [36]. Tillmann, B. (2012). Music and language perception: expectations, structural integration, and cognitive sequencing. *Topics in Cognitive Science*, 4(4), 568-584. <https://doi.org/10.1111/j.1756-8765.2012.01209.x>
- [37]. Zhang, Y., & Wildemuth, B. M. (2013). The effect of visual cues on perceptions of website credibility. *Journal of the Association for Information Science and Technology*, 64(1), 152-166.
- [38]. Zhou, J., Wang, J., & Liu, X. (2019). An empirical study of visual cues and comprehension of text-based infographics in middle school students. *Journal of Visual Literacy*, 38(1), 1-17.