Original Article

Presenting a Model for Perception of Spatial Relationships in Setting for Narrative Fiction Illustration

Hajar Salimi Namin[1], Mostafa Goudarzi[2]

[1]Faculty Member, School of Art, Al-Zahra Univercity, [2]Professor of Visual Arts School, University of Tehran

Abstract

This research aims at presenting a model for evaluating and enhancing training materials on setting in illustration for narrative fictions for undergraduate graphic design students. The research methodology at the phase of designing the model for perception of spatial relationships was based on library studies, while survey studies (questionnaire) were used to employ experts' opinions in a subsequent phase. The designed model was submitted to seven experts, and their comments were used to adjust and improve the model. Notes, materials in text books, papers, and related websites, as well as questionnaires were used as research instruments. Our results indicate that, by evaluating sub-indexes of "the perception of the spatial relationships", one can evaluate students' setting in illustration for narrative fictions. Accordingly, it is recommended to design training packages to enhance these sub-indexes and hence improve the setting for narrative illustration.

Key words: Lllustration, Lllustration for narrative fiction, Setting, Perception of spatial relationships

INTRODUCTION

The present research is the result of educating narrative illustration to undergraduate students of graphic design. In students' works within the scope of setting, the issue of inability to create appropriate setting in illustration for narrative fictions is well exposed. In other words, when it comes to setting, students either just fail to use appropriate locative and temporal factors to set the fiction space, or use these factors inappropriately or inadequately; i.e. they present inappropriate setting.

In the modern world of today, the subject matter of illustration has been increasingly regarded by illustrators, publishers, audience, etc. This is while Iranian illustrators either neglect to present any setting in their art works or just copy those originally created by non-Iranian illustrators.

Investigations have revealed that, failure to understand or weakling perception of spatial relationships is the general cause of the problem of lack of appropriate setting for illustrating narrative fictions by undergraduate students of graphic design. As such, generally speaking, the present research looks forward to answer the following question:

What are sub-indexes of perception of spatial relationships in setting for narrative fiction illustration?

Investigating various references, no model was found for the evaluation of perception of spatial relationships in setting for narrative fiction illustration.

In the field of engineering design, ideas or solutions are defined as the results and outputs of solving design problems. In this domain, design is studied through considering its broad sections using the terms, the design problem/task, the design process, the design type/output/proposal/solution/idea, the design activity/move/action, and the design organization/team/personnel (Pahl and Beitz, 1984; Ulrich and Eppinger,1995; Ullman, 2002). Therefore, ideas or proposals are the output of a design process respect to the design problem or task by a design

Corresponding Author: Farshid Kheirollahi, Assistant Professor, Department of Accounting, Razi University, Kermanshah, Iran, E-mail: mohammadsadegh24592@gmail.com

team. To assess design process, first, the characteristics of required design proposals and ideas are defined.

Some common criteria for assessing the generated ideas and design proposals are discussed in the literature. In most research, the group performance is defined by evaluating the proposals regarding the number of ideas (Nijstad et al. 2002; Shah et al. 2003; Perttula and Sipila 2007) and Quality of ideas (Wierenga, 1998, Shah et al. 2003). Consequently, the Quality of an idea is determined by appropriateness and originality on the target task (Massetti, 1996; Runco and Jaeger, 2012) and some situations unexpectedness (Gero, 1996) and Non-obviousness (Howard et al. 2006; Howard et al., 2008). Some examinations in engineering characterize these criteria by the level of meeting goals (Shah et al., 2003).

However, such a model was not found in illustration. Therefore, the main objective of the present research is to propose a model for evaluating and enhancing training materials on setting in illustration for narrative fictions for undergraduate students of graphic design who are weak in setting appropriately.

To this end, as a first step, available information in the literature were investigated via library studies, and an initial model was developed by considering sub-indexes of perception of spatial relationships. Afterwards, a questionnaire was prepared on the proposed model and distributed among seven experts in the field of illustration. Once the questionnaire was collected, a final model was designed according to their opinions.

In Section 1 a review is given on basic concepts of illustration, narrative illustration, setting, and perception of spatial relationships followed by presenting a background for the research. Section 2 delivers the research question and methodology. In Section 3, the research results are reported, followed by discussion, conclusion and some recommendations.

LITERATURE REVIEW

Basic Concepts
Illustration
Illustration isn't art and it isn't graphic design, so what exactly is it? As a discipline, illustration sits somewhere between art and graphic design. Of course, for many practitioners it can feel closer to end of this spectrum than the other (Zeegen, 2009: 6). However, there is a distinct core that is unlike anything else and it is this that defines its 'raison d'être'. Illustration is about communicating a specific contextualized message to an audience. It is rooted

in an objective need, which has either been generated by the illustrator or a commercial based client to fulfil a particular task. It is the measure and variety of these different tasks that makes the discipline of illustration such an influential visual language (Male, 2007:10).

Today, illustration is no more worried about its distance to pure art, and this is an issue we were not face 30 years ago, and the number of pure arts further resembling illustration is ever increasing (Wiedemann, 2009:10-11).

Illustration for narrative fiction
Storytelling is often considered a prerequisite to provide visual representation of narrative fiction. Today, narrative fictional illustration is mainly encountered in children's books, graphic novels and comic strips, and specialist publications such as thematic compilations, containing mythology, gothic tales and fantasy (Male, 2007:138).

The factors of illustration for narrative fiction are character, plot, setting, theme, style, structure, form, genre, narration, tense and other related like audience, author, idea, creativity, imagination, fiction writing, storytelling, storyboard, technique, drawing, composition, color, space, book cover, layout,… but essential one's are idea, character[1], setting, storyboard[2], composition[3], technique and color.

Setting
The setting is both the time and geographic location within an illustration for narrative fiction. The setting helps initiate the main backdrop and mood for a story. Setting has been referred to as story world (Truby, 2007: 145) or milieu to include a context (especially society) beyond the immediate surroundings of the story. Elements of setting may include geography, culture, historical period, hour and the passage of time, which may be static in some stories or dynamic in others with, for example, changing seasons. Along with the plot, character, theme, and style, setting is considered one of the fundamental components of fiction (Obstfeld, 2002: 1,65,115,171). Setting is an important element in a narrative and in some works the setting becomes a character itself (Lodge, 1992: 58-60).

Recently, setting has gained larger deals of attention and focused from illustrators, making it introduced into a new stage of growth, maturity, and diversification.

Perception of spatial relationships
Spatial relationships refer to the perception of the position of an object within space. In analyzing the concept of space, it can be perceived as a world which is composed of various elements such as humans, animals, natural phenomena, and objects, each of which is characterized by a set of features. Even though these elements and phenomena are related

to one another, those are separated by empty spaces which are referred to as spatial relationships (Lacomb, 1996). According to Sternberg, spatial ability refers to the ability to decrypt, transmit, and memorize representations of objects in space and their relationships with other objects and spatial positions (Asli-Azad, 2015:115). On the other hand, spatial awareness represents a more comprehensive term which refers to the ability to learn concepts of laterality, directionality, position in space, and spatial relationships. Therefore, it is evident that spatial ability and spatial awareness are fundamentally in relation to one another (Werner, 1997). By visualizing his/her spatial perception, an individual can move or rotate different forms within his/her mind. He/she also can simply generate and control various forms, distinguish similar instances of a part, visualize and change a subjective image, and generate a graphical resemblance from spatial information. These abilities are important and necessary for setting. Spatial perception grows by directly observing the visual world, but still is not solely dependent on visual channels (Haji Hossein Nejad, 2002).

Research Background
According to the investigations at www.intellectbooks. co.uk, www.thomsonreuters.com, and www.elsevier.com/ solutions/scopus, we ended up with four books and two papers. These research works were studied, with their results presented in the following.

Illustration: A Theoretical & Contextual Perspective (2007) presents a brief discussion on setting in a section entitled as *Illustration for children's narrative fiction*. Moreover, the title *Illustrating Children's Books: Creating Pictures for Publication* (2004) also provides a brief introduction on setting in a section entitled as *Setting the scene*. In the present research, these two titles are reviewed and investigated.

Published in 2009, *Sketchbook: Conceptual Drawings from the World's Most Influential Designers* presents advantages of sketching in the process of creating artworks. In this section, spatial perception problems faced by the students grown up at computer desks are elaborated. This section of the book was reviewed by the authors.

Published in 2009, the title *Strengthening Mental Skills and Eliminating Learning Barriers with an Emphasis on Enhancing Children's Ability to Perceive Spatial Relationships* looks to answer the questions of what is spatial perception? And how can it be strengthened? It refers to numerous alternatives as effective measures for enhancing children's ability to perceive spatial relationships. Given that this title investigates the factors affecting enhanced perception of spatial relationships, it was investigated in the present research, with the factors employed to design the model to be proposed.

The itinerant illustration: Creating story worlds in the reader's space paper in Journal of Illustration in 2015 explores the storytelling potential of direct address within illustration as moments where fictional characters look out from their still-image worlds into ours. It considers the possibility of creating fictional worlds by employing direct address to generate narrative in the real time and space of the reader/viewer. As such, considering its direct address potential in setting, this paper was investigated in the present research.

Published in 2014, a research entitled as *Effectiveness of Training the Perception of Spatial Relationships on Mathematical Performance of Boy Pupils Engaged with Math Learning Disabilities* shows that, educating the perception of spatial relationships could help improve math education performance of boy pupils engaged with math learning disabilities in elementary school at post-test stage. As such, this research was considered in the present study as it investigated effectiveness of perception of spatial relationships.

Despite the attempt made, no further book, paper or research activity was found where the subject matter of the present research was particularly discussed. That is to say, an investigation of the influence of perception of spatial relationship on setting in illustration for narrative fictions seems to be a new topic in art studies throughout the world.

RESEARCH METHODOLOGY

Research Question
What are sub-indexes of perception of spatial relationships in setting for narrative fiction illustration?

Data Collection Method
Research terms, concepts, and literature were collected by investigating available material on virtual and physical spaces in combination with such methods as text-reading, note-taking, and picture-reading, and the model structure was developed based on field surveys.

Data Collection Instrument
In the present research, notes, materials published in text books, papers, journals, and related websites, and also questionnaires were used to collect the required data.

Research Method
1. As a first step, relying on practical experience of illustration and training illustration courses by the researcher, lack of setting in narrative illustration was evaluated to be because of the following reasons:
- No or inadequate deal of care, attention, and focus;

- No or inadequate ability to perceive and distinguish micro issues from macro features;
- No or inadequate deal of attention to macro patterns and pay full attention to micro features only;
- No or inadequate ability to recognize and perceive geometric shapes and forms and their relationships to one another;
- No or inadequate ability to distinguish similar shapes and forms;
- No or inadequate ability to distinguish a shape among a variety of shapes;
- No or inadequate ability to distinguish overlapping shapes;
- No or inadequate ability to distinguish between far and close;
- No or inadequate ability to distinguish between top and bottom;
- No or inadequate ability to distinguish between front and back;
- No or inadequate ability to distinguish between inside and outside;
- No or inadequate ability to distinguish depth; and
- No or inadequate ability to reproduce a master design, etc.

In his book published in 2009 (*Strengthening Mental Skills and Eliminating Learning Barriers with an Emphasis on Enhancing Children's Ability to Perceive Spatial Relationships*) Ayazi introduces the above-mentioned factors as factors affecting the perception of spatial relationships. As such, no or inadequate ability to perceive spatial relationships, in general, was evaluated as the root cause of the problem of lack of appropriate setting for illustrating narrative fictions by undergraduate students of graphic design.

On this basis, sub-indexes of setting in narrative fiction illustration were designed by the researcher as follows:
1. Demonstrating general space of this part of the fiction
2. Demonstrating generalities of location
3. Demonstrating details of the location
4. Demonstrating location character
5. Presenting viewpoint
6. Presenting perspective
7. Presenting appropriate ratios for spatial elements with respect to one another (door, window, buildings, etc.)
8. Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (yards, etc.)
9. Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (alleys, streets, etc.)
10. Properly demonstrating the spaces in front of and behind the volumes of houses, etc.
11. Properly arranging the volumes of house next to each other
12. Converting three-dimensional volume of houses, etc. to virtual three-dimensional or two-dimensional images when undertaking the simplification operation

13. Presenting characters' appropriate access from alley to house, and vice versa.

OBSERVATIONS AND RESULTS

A questionnaire themed by the proposed model was developed using structured method with "close-ended" questions. It was then submitted to seven Iranian experts in the field of illustration. Morteza Esmaeili Sohi, Effat-al-Sadat Afzal Toosi, Mohsen Hasanpoor, Mohammad Reza Doost Mohammadi, Khashayar Ghazi Zadeh, Mehran Kashti Ara, and Mohammad Ali Bani Asadi were the experts participated in this research. They were selected based on their educations (MA and PhD) and teaching experiences in Illustration. At the end of the questionnaire, the experts were asked to mention any index other than those incorporated into the model, if necessary (Table 1).

The experts' responses to each of the sub-indexes mentioned in the model are presented in Table 2.

As such, due to lack of attaining a majority of experts' opinions, the following items were eliminated:
- Index 1 was eliminated because it is related to setting index.
- Index 4 was eliminated because it is related to setting index.
- Index 5 was eliminated because it is related to setting index.
- Index 12 was eliminated because it is related to simplification index.
- Index 13 was eliminated because it the same as Index 11.

In addition to the "close-ended" questions in the questionnaire, the experts gave some recommendations toward enhancing and improving the model, as follows.

Therefore, based on the recommendations, the following items were modified accordingly:
- Index 8 and Index 9 were combined, due to overlapping, to form *presenting appropriate ratios among positive spaces and negative ones.*
- Index 6 was converted to *distinguishing depth of space.*
- Indexes 2 and 3 were converted to *distinguishing between macro and micro spaces.*

And the following items were added to the model:
- Distinguishing a shape or volume in space among various shapes and volumes
- Distinguishing between top and bottom of the space
- Distinguishing the volumes embedded into other volumes in the space

Table 1: Questionnaire submitted to the experts

	Model of effective sub-indexes of perception of spatial relationships on setting	Agree	Neutral	Disagree	Comments
1	Demonstrating general space of this part of the fiction				
2	Demonstrating generalities of location				
3	Demonstrating details of the location				
4	Demonstrating location character				
5	Presenting viewpoint				
6	Presenting perspective				
7	Presenting appropriate ratios for spatial elements with respect to one another (door, window, buildings, etc.)				
8	Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (yards, etc.)				
9	Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (alleys, streets, etc.)				
10	Properly demonstrating the spaces in front of and behind the volumes of houses, etc.				
11	Properly arranging the volumes of house next to each other				
12	Converting three-dimensional volume of houses, etc., to virtual three-dimensional or two-dimensional images when undertaking the simplification operation				
13	Presenting characters' appropriate access from alley to house, and vice versa				

Table 2: Summary of the experts' opinions

	Model of effective sub-indexes of perception of spatial relationships on setting	Agree	Neutral	Disagree	Comments
1	Demonstrating general space of this part of the fiction	2	1	4	
2	Demonstrating generalities of location	7	0	0	
3	Demonstrating details of the location	5	1	1	
4	Demonstrating location character	1	1	5	
5	Presenting viewpoint	2	1	4	
6	Presenting perspective	5	1	1	
7	Presenting appropriate ratios for spatial elements with respect to one another (door, window, buildings, etc.)	4	2	1	
8	Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (yards, etc.)	5	1	1	
9	Presenting appropriate ratios among positive spaces (houses, etc.) and negative ones (alleys, streets, etc.)	4	2	1	
10	Properly demonstrating the spaces in front of and behind the volumes of houses, etc.	7	0	0	
11	Properly arranging the volumes of house next to each other	7	0	0	
12	Converting three-dimensional volume of houses, etc., to virtual three-dimensional or two-dimensional images when undertaking the simplification operation	2	2	3	
13	Presenting characters' appropriate access from alley to house, and vice versa	1	2	4	

- Recognition of the way the space is repeated from a sample
- Distinguishing similar shapes and forms in the space
- Distinguishing spatial shapes, forms, and their relationships
- Distinguishing between inside and outside volumes in the space
- Distinguishing with care, attention, and focus

3.4. Once the questionnaires were collected and the experts' responses were processed, the model was modified and improved according to their opinions, and the final model was designed (Table 3).

1. Distinguishing between macro and micro spaces: for example, it shows that whether a student can distinguish between the door of a house with the house itself.
2. Recognition of the way the space is repeated from a sample: for example, it shows whether a student can set a scene from a real house
3. Distinguishing the proportions between positive and negative spaces: for example, it shows whether a student can distinguish proper proportion between a yard and a house
4. Distinguishing the proportions between spatial elements: for example, it shows whether a student can distinguish proper proportion between a door, a window, and a house
5. Distinguishing spatial shapes, forms, and their relationship: for example, it shows whether a student can recognize the relationship between a house and a tree inside the yard of the house
6. Distinguishing similar shapes and forms in the space: for example, it shows whether a student can recognize similarity in the forms of the houses along an alley
7. Distinguishing a shape or volume in space among various shapes and volumes: for example, it shows whether a student can recognize that the house of the fiction's character is situated among a group of houses

Table 3: Model of effective sub-indexes of perception of spatial relationships on setting

Model of effective sub-indexes of perception of spatial relationships on setting	Not recognized	Limited recognition	Equal deficiency and recognition	Recognition with deficiency	Full recognition
1 Distinguishing between macro and micro spaces					
2 Recognition of the way the space is repeated from a sample					
3 Distinguishing the proportions between positive and negative spaces					
4 Distinguishing the proportions between spatial elements					
5 Distinguishing spatial shapes, forms, and their relationship					
6 Distinguishing similar shapes and forms in space					
7 Distinguishing a shape or volume in space among various shapes and volumes					
8 Distinguishing the volumes embedded into other volumes in the space					
9 Distinguishing between front and back of space					
10 Distinguishing between top and bottom of space					
11 Distinguishing between inside and outside volumes in space					
12 Distinguishing spatial volumes when those are next to one another					
13 Distinguishing depth of space					
14 Distinguishing with care, attention, and focus					

8. Distinguishing the volumes embedded into other volumes in the space: for example, it shows whether a student can recognize that a chair is a volume embedded into the volume of the house

9. Distinguishing between the front and the back of the space: for example, it shows whether a student can recognize that the houses in the back-alley are in fact behind the houses in the current alley

10. Distinguishing between the top and the bottom of the space: for example, it shows whether a student can recognize that the roof is situated on top of the house

11. Distinguishing between inside and outside volumes in the space: for example, it shows whether a student can recognize that the fiction's character is situated inside the house volume

12. Distinguishing spatial volumes when those are next to one another: for example, it shows whether a student can recognize how houses are situated next to one another

13. Distinguishing the depth of the space: for example, it shows whether a student can recognize the perspective of the space

14. Distinguishing with care, attention, and focus: it shows whether the student has enough concentration in his/her recognition practices

DISCUSSION AND CONCLUSION

The present research aimed at presenting a model for evaluating and enhancing training materials on setting in illustration for narrative fictions for undergraduate students of graphic design who were weak in setting appropriately.

To this end, the sub-indexes of perception of spatial relationships affecting setting in narrative illustration were recognized.

In describing this finding, it can be stipulated that, the perception of spatial relationships is one of the most important and complicated factors affecting the extent to which illustration, and setting in particular, can be learnt.

In one hand, one of the main problems of the students in creating proper setting was failure to attain fundamental skills related to the perception of spatial relationships in the course of prerequisite courses to be passed before proceeding to illustration at universities. Since failure to learn setting skill in Narrative Fiction Illustration course will end up with no or inadequate use of setting by Iranian illustrators at a higher level, then the perception of spatial relationships represents one of the fundamental prerequisites before setting can be educated.

On the other hand, another basic problem with which the students who suffer setting learning disabilities engage is failure to learn basic skills related to the perception of spatial relationships which are supposed to be learned in younger ages (pre-elementary, elementary, middle, and art schools). It should be noted that, the students who failed to well learn the skills related to the perception of spatial relationships in younger ages will suffer more setting-associated problems at university, as compared to other students.

One of the best approaches to enhance this perception is to pay attention to the subject matter of motion. Because

while moving, people can well strengthen their abilities in relation with learning setting, including directionality on the move, perception of position of the body in space, perception of the relationships between distances between object and oneself, and regularizing them, spatial occupation, recognition of spatial concepts, and finally, perception of spatial relationships. Many of these skills and concepts (e.g. up-down, front-back, upon-below, etc.) are well learnt as one undertakes movement activities. And since, similar to previous generations, the current generation is still engaged with the consequences of inappropriate "memory-oriented" rather than "experience-oriented" education system across Iranian schools, in one hand, and they experience more presence in virtual cyber space rather than presenting and moving through real spaces, on the other hand, the problem can have contributions from no effective presence and failure to adequately experience real spaces. As Timothy O'Donnell stipulated in his *Sketchbook* (quoting from Woodie Flowers, a Professor of Mechanical Engineering at MIT): *"One of the problems in MIT is that, a large number of the students grown up at computer desks have problems with real aspects of problem solving… That is, they have no external sense telling them that cutting a tree is more difficult than cutting a fence stick, and there is no source of experience in their real life by referring to which they can guess a solution. Indeed, they are very bad in making guesses!"* (O'Donnell, 2001:180). He continues *"The method they currently teach the students to make guesses is that, they provide the students with a set of hammers, saws, screws, and nuts and force them to build things"* (Ibid) and further stipulates *"The students perform similarly at Engineering department of Colorado University; that is, remedial classes are held for all fresh students and dispatch them for constructing houses for poor people, where they can perceive how objects are sit, stand and remain unfallen next to one another, because they never have had such an experience"* (Ibid).

It is recommended that:

1. Considering the proposed model, training packages shall be designed and provided to the students. Effectiveness of these packages and efficiency of the model can define topics for future research.

2. In order to enhance spatial perception of the students, they need to pass some course on the perception of spatial relationships before they can proceed to setting. Given that the students take drawing courses, in general, and Perspective Geometry, in particular, for this purpose, the rise of this problem in the subject matter of setting either indicate improper learning or failure to implement what is learnt. Therefore, failure to learn or failure to implement what is once learnt about spatial relationships can be seen as a topic for future research.

3. Universities shall pay further attention to the subject matter of motion and try to get the students familiar with the concept of space, with movement through space, as a real model for setting, be recognized as an effective part of training the setting in Illustration course.

4. As referred to by Asli Azad as the findings of his research in 2014, pre-elementary schools, schools, and art schools shall pay further attention to the subject matter of motion and try to get their students further familiar with the concept of space and incorporate activities associated with these perceptions into their educational programs.

REFERENCES

Books

- Ayazi, Zakie Sadat (2009), Strengthening Mental Skills and Eliminating Learning Barriers with an Emphasis on Enhancing Children's Ability to Perceive Spatial Relationships, Fara-Angizesh Pub.
- Haji Hossein Nejad, Gh. (2002), Gardner's Theory of Multiple Intelligences and Its Application in Education, Tehran, University Jihad Pub.
- Lacombe, J. (1996), Le développement de l'enfant, De Boeck, Brux.
- Lodge, David (1992), The Art of Fiction, London: Martin, Secker & Warburg Ltd.
- Male, Alan, (2007), Illustration A Theoretical & Contextual Perspective, Switzerland: AVA Publishing SA.
- Obstfeld, Raymond (2002), Fiction First Aid: Instant Remedies for Novels, Stories and Scripts, Cincinnati, OH: Writer's Digest Books.
- O'Donnell, Timothy, (2011), Sketchbook: Conceptual Drawings from the World's Most Influential Designers, Reprint edition, Massachusettes, Rockport Publishers.
- Salisbury, Martin, (2004), Illustrating Children's Books: Creating Pictures for Publication, Allen & Unwin.
- Truby, John (2007), Anatomy of a Story: 22 Steps to Becoming a Master Storyteller, New York, NY: Faber and Faber.
- Wiedemann, Julius (2009) Illustration Now, Translated by Hana Dabzad, Tehran, Aban-Ketab Pub.
- Werner, R. (1997) Growth and Strengthening of Perceptual-Motional Skills in Children, Translated by Sazamand, A, Tabatabaei Nia, M. (1997) Tehran, Danjeh Pub.
- Zeegen, Lawrence (2009), What is illustration? Switzerland: Roto Vision SA.

Websites

- www.intellectbooks.co.uk
- www.thomsonreuters.com
- www.elsevier.com/solutions/scopus

Papers

- Asli Azad, Moslem; Abedi, Ahmad; Yar Mohamadian, Ahmad (2014), Effectiveness of Training the Perception of Spatial Relationships on Mathematical Performance of Boy Pupils Engaged with Math Learning Disabilities, Journal of Exceptional People's Psychology, Vol. 5, No. 17 PP. 113-131.
- Braund, Steve, The itinerant illustration: Creating storyworlds in the reader's space, Journal of Illustration, Volume 2, Number 2, 1 December 2015, pp. 267-285(19).
- Gero, J. S. (1996). Creativity, emergence and evolution in design. Knowledge-Based Systems, 9(7), 435-448.
- Howard, T. J., Culley, S. J., & Dekoninck, E. (2006). Information as an input into the creative process. In DS 36: Proceedings DESIGN 2006, the 9th International Design Conference, Dubrovnik, Croatia.
- Howard, T., Culley, S., & Dekoninck, E. (2008, January). Creative stimulation in conceptual design: An analysis of industrial case studies. In ASME 2008 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (pp. 161-170).

American Society of Mechanical Engineers.

- Massetti, B. (1996). An empirical examination of the value of creativity support systems on idea generation. MIS quarterly, 83-97.
- Nijstad, B. A., Stroebe, W., & Lodewijkx, H. F. (2002). Cognitive stimulation and interference in groups: Exposure effects in an idea generation task. Journal of experimental social psychology, 38(6), 535-544.
- Pahl, G., & Beitz, W. (1984). Engineering design, The design council. London, Springer, 12, 221- 226.
- Perttula, M., & Sipilä, P. (2007). The idea exposure paradigm in design idea generation. Journal of Engineering Design, 18(1), 93-102.
- Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. Creativity Research Journal, 24(1), 92-96.
- Shah, J. J., Smith, S. M., & Vargas-Hernandez, N. (2003). Metrics for measuring ideation effectiveness. Design studies, 24(2), 111-134.
- Ulrich, K. T., & Eppinger, S. D. (1995). Product Design and Development. New York: Mc.
- Ullman, D. G. (2002). The mechanical design process. McGraw-Hill Science/Engineering/Math.
- Wierenga, B., & Van Bruggen, G. H. (1998). The dependent variable in research into the effects of creativity support systems: Quality and Quantity of ideas. MIS quarterly, 81-87.

Endnotes

1. A character (sometimes known as a fictional character) is a person or other being in a narrative work of art.
2. . A storyboard is a graphic organizer in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing a motion picture, animation, motion graphic or interactive media sequence.
3. In the visual arts, composition is the placement or arrangement of visual elements or ingredients in a work of art, as distinct from the subject. It can also be thought of as the organization of the elements of art according to the principles of art.