

Research Article

**On the Track of Emotional Issues in the Design of Multimedia Learning Materials:
A Qualitative Approach¹**

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Abstract

The literature suggest that learners' emotions play an important role in educational processes by the means of cognition, motivation, interest, and so, learning. However, emotional design of multimedia learning materials is relatively new for the education literature. Although there are several studies on the effects of emotional design on learning, there is a theoretical gap about how to design multimedia learning tools in order to involve learners emotionally in the learning process. Therefore, this study aims to identify issues that should be taken into consideration for the emotional design of animations as multimedia learning materials. In this direction, a basic qualitative approach was adopted and inquiry was carried out in two phases. At the first phase, semi-structured interviews were conducted with five expert academicians in the field of animation with different areas of interest, in order to gain information about a variety of issues on the design of animations on the emotional base. Data was inductively analyzed and findings were categorized under seven themes. At the second phase, certain emotional issues were identified and, in order to increase the trustworthiness of the findings acquired by semi-structured interviews and obtain the opinions of the practitioners in the field on the issue, findings were restructured as a survey. This survey was conducted on an online platform with field experts working in the animation sector at various positions. A total of 79 expert participated in the survey process. Findings showed that survey results were in line with interview as well.

Keywords: *Multimedia learning, emotional design, emotional transfer in multimedia design*

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Çoklu Ortamla Öğrenme Materyallerinin Tasarımında Duygusal Unsurların İncelenmesine Yönelik Nitel Bir Çalışma

Öz

Alanyazın duygusal süreçlerin biliş, motivasyon, ilgi ve öğrenme üzerinde etkili olduğunu; bu bağlamda duyguların eğitsel etkinliklerde önemli bir rol oynadığını göstermektedir. Çoklu ortamla öğrenme materyallerinin duygusal tasarımı ise eğitim alanyazınında görece yeni bir konu olarak karşımıza çıkmaktadır. Duygusal tasarımın öğrenme üzerindeki etkisini inceleyen birkaç çalışma olsa da çoklu ortamla öğrenme uygulamalarının öğrenenleri öğrenme süreçlerine duygusal bağlamda dahil edecek şekilde nasıl tasarlanması gerektiğine ilişkin alanyazında kuramsal bir boşluk bulunmaktadır. Bu doğrultuda, bu çalışmanın amacı; bir çoklu ortamla öğrenme materyali olarak animasyonların duygusal tasarımında göz önünde bulundurulması gereken unsurları belirlemektir. Bu doğrultuda, temel nitel araştırma yaklaşımı benimsenmiş ve bu bağlamda, iki aşamalı bir süreç yürütülmüştür. Araştırmanın ilk aşamasında, animasyon alanında uzman beş öğretim üyesi ile yarı-yapılandırılmış görüşmeler gerçekleştirilmiştir. Animasyonların duygusal bağlamda tasarlanmasında farklı bakış açılarını görebilmek için farklı ilgi alanları olan uzmanlara ulaşılması hedeflenmiştir. Yarı-yapılandırılmış görüşmelerden elde edilen veriler tümevarımsal olarak çözümlenmiş ve bulgular yedi ana tema altında sınıflandırılmıştır. İkinci aşamada, ilk aşamadan elde edilen bulguların güvenilirliğini sorgulamak ve alanda çalışan uygulayıcıların görüşlerini almak amacıyla, yarı-yapılandırılmış görüşmelerde belirlenen duygusal unsurlar anket maddeleri olarak yeniden yapılandırılmıştır. Oluşturulan anket animasyon sektöründe çeşitli pozisyonlarda görev yapan toplamda 79 animasyon uzmanının katılımı ile çevrimiçi platformda uygulanmıştır. Anket sonuçlarının görüşmelerden elde edilen veriler ile büyük oranda tutarlılık gösterdiği görülmüştür.

***Anahtar Sözcükler:** Çoklu ortamla öğrenme, duygusal tasarım, çoklu ortam tasarımında duygu aktarımı*

Introduction

We live in an era that people have a tendency to trust knowledge that they emotionally connected rather than those based on scientific facts, which is so-called *post-truth society*. In the post-truth era, people may push the facts background and rely on the resources that are in line with their thoughts and personal tendencies (Rider & Peters, 2018). While the society seek emotional connection with informational resources they resort, educational practice seems to be stuck in cognitive approaches and theories for a considerable period of time. Specifically, in the design of and research on multimedia learning materials, cognitive theories such as Cognitive Load Theory (Sweller, 2008) and Cognitive Theory of Multimedia Learning (Mayer, 2009) have led the field for nearly 50 years. Meanwhile, emotional aspects were usually ignored in these practices.

Since the ancient times, philosophers and scientist discussed the precedence of rationality and emotion, and the supremacy of rationality was usually favored while emotions were seen as a negative factor on mental activities (Çakar & Arbak, 2004). Modern theories, however, suggest that emotions guide people through achievement, with their effects on thinking and decision making processes, creative problem solving, information processing, cooperation and motivation (Caruso & Salovey, 2004; Erez & Isen, 2002; Hertel, Neuhof, Theuer & Kerr, 2000; Isen & Baron, 1991; Konradt, Filip, & Hoffman, 2003). Modern cognitive approaches suggest that emotions and learning are firmly and reciprocally connected and that emotions are catalysts for rational thinking (Felten, Gilchrist, & Darby, 2006). As Kolb (1984) emphasizes, learning occurs as a holistic process of an organism, which includes thinking, feeling, perceiving and behaving. In line with these, Stein and Levine (1991) report that a new information is almost always interpreted with emotional experiences of the individual, and that learning always happens in an emotional period of time.

Emotions can foster or restrain learning in various means. Negative emotions, such as anxiety, anger, boredom, embarrassment, frustration and sadness, or positive emotions such as relaxation might cause a decrease in mental performance of an individual and hinder learning (Pekrun, Goetz, Titz & Perry, 2002; Pekrun, Goetz, Daniels, Stupnisky & Perry, 2010). On the other hand, positive

emotions, such as fun, enjoyment, hope, satisfaction, pleasure, curiosity, interest, empathy, love, appreciation, excitement and passion, might have a positive effect on mental activities and learning (Pekrun and Stephens, 2010; Rowe, Fitness, & Wood, 2005). Sansone and Harackiewicz (2000) state that positive emotions like interest, fun and satisfaction have effect on the motivation of the behaviors.

Considering the importance of emotions on educational settings, it is inevitable to make reference to multimedia learning. In line with the prevalence of information and communication technologies in learning and teaching processes, today's learners interact with multimedia learning tools and materials more than ever. Emotions begin with a cognitive evaluation about a stimulus the individual interact with (Arnold, 1960; Desmet, 2002). So, learners' emotional states could be affected by, and even determined by their interaction with a multimedia learning material in educational settings that integrate information and communication technologies in their process.

Despite that emotions play such a crucial role in learning environments, multimedia learning literature ignored emotional variables for a long time and mostly focused on cognitive processes. Yet, in the light of the knowledge on the connection between emotion, cognition, motivation and learning, Moreno (2006) proposed the Cognitive-Affective Theory of Learning with Media, which is an enhanced interpretation of Mayer's Cognitive Theory of Multimedia Learning. According to the Cognitive-Affective Theory of Learning with Media, at the process of the selection of information coming from sensory memory, attention and perception have the key role on whether this information will be transferred to working memory or not. What is crucial at this point is that motivation, affect and self-regulation that derive from the long term memory of the individual are determinative for the attention and perception of the individual at this process (Moreno & Mayer, 2007). The theory supports that affective states of an individual play an important role on what is chosen to be learned.

Recently, the concept *emotional design* has begun to be discussed in the multimedia learning literature, and a few evidence-based study adopting CATML as the theoretical framework were conducted on the effect of emotional design on learning, mood and cognitive load. Within these studies, emotional design elements of the multimedia materials used in the process were explained

to be colors, rounded shapes, anthropomorphism and background music. Um, Plass, Hayward & Homer (2011), Plass, Heidig, Hayward, Homer & Um (2014) and Park, Knörzner, Plass & Brünken (2015) used the same learning materials in their study. They utilized warm colors and rounded shapes, and put eyes and mouths on the objects for the emotional design of the multimedia learning materials. Likewise, Mayer and Estrella (2014) reported that in the learning material, emotional design included appealing colors, rounded and symmetrical face and personification by adding expressive eyes on the illustrations. In their learning material that introduces object-oriented programming, Haaranen, Ihantola, Sorva & Vihavainen (2015) took advantage of anthropomorphism and illustrations were told to be personified by adding faces and gestures to the illustrations. Königshulte's research (2015) was the only one that utilized sound as an emotional element and background sounds were used in the learning material. Although the results of these studies were discussed as the effect of so-called *emotional design*, the design elements used in these learning materials should be approached as preliminary techniques. Besides, it is important to report that Um et al. (2011), Plass et al. (2014) and Park et al. (2015) used positive mood induction before their experimental process, which could be considered to affect other educational variables in an undesired way.

Considering the design elements utilized in learning materials in the researches in the literature, it is questionable whether the use of colors, rounded shapes, sounds or personification *always* evoke positive emotions. With a psychological point of view, it is already known that certain colors may evoke different emotions in different contexts. In a similar way, depending on the context, a triangle might express a knife, which people tend to avoid, or a roof of a house, which people feel safe and happy. While sounds and music are proven to be effective on individuals' moods, incompatible or random use of them might affect individual in an undesired way. Moreover, expression of a certain emotion might not always end up with the realization of that emotion in the audience. Looking at a smiling illustration would not always make the individual smile as well. At this point, main issue in emotional design happens to be the *transfer of emotion*, not to illustrate a certain emotional state roughly.

Design elements to help individuals experience certain emotions might not be limited to those utilized in the multimedia learning literature. In this point of view, an in-depth investigation is

considered to be crucial for the use of these elements and identify further design issues for emotional design of multimedia materials. Plass and Kaplan (2016) emphasize on the advantageous power of emotional issues in digital educational materials, and also state that there is a theoretical gap in the literature about how to design these materials on an emotional base. In accordance with the current direction of multimedia learning literature, and also considering the effect of the artistic perspective of animations on individuals' emotions, this study aims to identify the design issues that could enable emotional transfer in the design of multimedia learning materials through the eyes of experts in animation field.

Method

Within the direction of the aim of this study, a qualitative approach was adopted in order to identify the emotional issues in the design of multimedia materials. Qualitative research intends to analyze, interpret and make sense of a phenomenon within its unique context through the meanings as individuals ascribe to it (Denzin & Lincoln, 2013; Patton, 2002; Van Maanen, 1979). Qualitative researches are usually employed when there is a theoretical gap explaining a certain phenomenon and aims to introduce concepts, hypothesis and even theories utilizing an inductive approach (Merriam & Tisdell, 2016). This study focuses on the emotional transfer in animations as multimedia learning materials, and in this direction, adopts basic qualitative research method. Basic qualitative researches are employed on the purpose of understanding how individuals construct and interpret their experiences and uncovering these constructs (Merriam & Tisdell, 2016).

This study was carried out in two phases. At the first phase, semi-structured interviews were conducted with five expert academicians in the field of animation with different areas of interest. At the second phase, in order to examine the trustworthiness of the findings by the means of the opinions of animation experts in practice, a survey was developed according to the findings acquired from the interviews. This survey was conducted on an online platform with 79 field experts working in the animation sector at various positions.

Participants

In order to identify the design elements that could enable emotional transfer in multimedia learning materials, it is considered to be important to refer to the knowledge and experience of the experts in animation field. It is basically because animations as art forms primarily deals with emotional issues. Besides, most forms of multimedia learning materials such as games, simulations, videos, presentations, animations themselves, and even static pictures illustrating a movement features animations inside them.

The interview process was carried out with the voluntary participation of one academician for the pilot interview and five academicians for the actual semi-structured interviews, who were working at the animation department of a state university in Turkey, in 2016-2017 academic year. The participants of the study were purposefully determined. In order to gain a holistic point of view about a variety of issues on the design of animations on the emotional base, participants with different areas of interest were sought. The participants in this phase of the study were interested in various aspects of animation field such as drawing, texture, staging, modelling, action graphics, character development, animation techniques, animation production, story design and visual expression. Professional experience of the participants in the field ranged between five to twenty-one years. For the protection of personal information, as promised to the participants, demographics are not indicated specifically for each participant in this report.

At the survey process, participants were determined according to the suggestions and with the aid of several academicians at the animation department. A total of 79 experts working in the animation sector throughout Turkey (73) and working in other countries (6) were participated in the survey. Working positions of the participants varied, including concept design (14), character design (13), character animation (12), modelling (11), stage/background design design (8), storyboard (5), 3D animation (5), composition (3), direction (3), art direction (2), technical direction (1), animation direction (1), and scriptwriting (1).

Data Collection

At the first phase of the study, data is collected through semi-structured interviews. Firstly, researchers constructed a draft interview form in accordance with the literature of emotional design in multimedia learning. The draft was presented to an animation expert to ask for his opinion. The interview form was revised on the opinions of the expert. The revised interview form included questions on the visualization of positive emotions and the role of colors, shapes, sounds and anthropomorphism in emotional design.

After the revision of the interview form, a pilot interview was conducted with an experienced academician in animation field. The participant did not give permission to record the interview. So, the interview process was carried out by taking notes by the researcher. Pilot interview showed that the term *emotional design* was not purposeful and meaningful because the idea behind the design of animations was emotions after all. This experience led to a term shift in the study from emotional design to *emotional transfer*. The pilot interview suggested that there is no certain prescription for designing animations on the emotional base because the expression of an emotion is never enough to ensure an emotional reaction from the audience, and it heavily relies on other issues such as the artistic approach of animator, story, context, target group, animation techniques and so on. What's more, interviewee emphasized that it would not be convincing for the audience if an animation consists of only positive emotions because individuals experienced both positive and negative emotions in real life. The experiences from the pilot interview required a revision of the approach to the problem, and so the interview process. After the pilot interview, instead of seeking certain principles of emotional design, the study focused on identifying the issues that might be important for the emotional transfer. Final interview form included questions seeking the importance of emotions of audience in animation field; functional visual elements that might help evoke emotions of audience; techniques of visualization of emotions on an animation character and the effect of these visualizations on audience; attributes of an animation that help audience enjoy and that could arouse curiosity and interest of them; techniques to visualize non-human characters on emotional base; issues about the usage of sounds to evoke emotions of the audience.

After finalizing the interview form, possible participants were determined and contacted via e-mail. A total of five academicians volunteered to participate in the study. Interview dates, times and places were arranged according to the availability of the participants. Interviews were conducted in offices of each participant and with their permission, interviews were recorded with voice recorder. Just before the interviews, questions were presented to the participants in order to let them ease and settle. Interviews lasted between 20 to 45 minutes.

At the second phase of the study, a survey was developed based on the findings acquired from interview process. The survey was conducted on an online platform with the participation of 79 experts in animation sector, in order to enhance the credibility and transferability of the findings. At the beginning, the survey consisted of 41 items in form of 5 level Likert-type. The survey also included two typing areas, one to ask for the participants' working position and the other one to ask if there are any other issues they consider important for the emotional transfer. The survey data was collected via an online platform, and the issues that participants stated in the given area were added into the survey in the shortest period of time while the survey process on. With the items added in the process, a 47 item survey was obtained.

Data Analysis

Data gathered from the semi-structured interviews were inductively analyzed employing content analysis. When there is not an adequate theoretical framework to explain a phenomenon, inductive approach is an effective feature of qualitative research to reveal themes, categories, typologies, concepts, hypothesis and theories based on the data gathered from interviews, observations or document analysis (Merriam & Tisdell, 2016). In order to uncover the emotional issues based on the participants' opinions, firstly, audio recordings were transcribed. Secondly, relevant phrases were detected and subtracted as direct and indirect codes. Thirdly, codes were categorized into themes. Fourthly, the codes and themes were reconstructed after a certain period of time in order to approach to the issue with a clearer mind. Lastly, themes and codes were presented to the opinion of an expert academician to ensure the reliability of the findings. In accordance with the feedbacks, some conceptual revisions were made. The final structure of the findings was descriptively explained under the following title. Data gathered from the survey, on the other hand,

was subjected to quantitative analysis and findings presented in the form of descriptive statistics. Descriptive statistics were interpreted together with the qualitative findings.

Findings

In accordance with the aim of the study, semi-structured interviews were conducted with animation experts in order to identify the issues on the emotional transfer in multimedia learning materials. Data was inductively analyzed using content analysis and findings were presented under seven themes. Each theme and their subthemes were descriptively explained. In this part, in order to protect personal information, direct quotations were presented with nicknames. While the direct quotations were translated from Turkish to English, keeping the main idea behind the scripts has been the primary concern of the researchers. Not every comment on a specific issue was reported but the key ones considering the readability of the article. In this part, findings acquired from interviews presented first, and then survey results were given.

Interviews, in line with the pilot interview, showed that emotional transfer could not be ensured only with character design and visualizing emotions of a character. *“Emotional connection could be established with a consistent and holistic use of characters, environment design, story, music, staging and editing.”* as Tuğba expressed.

Findings also show that any effort to illustrate a movement could be considered as an animation. Taner, on this issue, emphasized that *“Animation is not discrete from cinema. Animation is as well cinema; it is cinema before cinema and, somehow, the ancestor of cinema. Any effort to give the feeling of movement, films made by putting photos after another, or even the bull figure with extra legs in Altamir’s cave, which tries to show the movement in one frame, we call it cartoon, motion picture, comic, cinema, and so on”*. In this direction, it is possible to say that the findings can be applicable for any multimedia material including games, simulations, presentations, animations and even static pictures illustrating a movement.

On the way of emotional transfer, almost all of the participants emphasized on the *identification* of audience with the characters in an animation, and so the educational nature of the animations

would show up. Emotions and emotional transfer was reported to be the main concern of the animation, such that emotional involvement of the audience determined the *success* of an animation. So, audience must show empathy towards the characters and set up identification with them by means of forms, sounds, events and direction of cinematography in order to ensure emotional transfer. On the issue, participants' comments were as followings:

“Emotional transfer is important for us in animations because in visual expressions the important thing is the audience’s showing empathy towards the character. We do not want to watch anything that we do not connect emotionally, it is the same in our real lives as well.” (Tuğba)

“This (emotional transfer) is very important because, for the success of an animation film, emotions that characters evoke on audience are important. It may cause, like a real film, audience involve in the animation or move away.” (Fuat)

These findings reported above guided the researchers through the interpretation of the data. On the basis of these findings, it was understood that the main function of the emotional transfer is the ensure the voluntary participation of the audience in the animation by showing empathy towards the characters and establish identification with them. In this direction, it could be said that appeal of the animation and audience’s motivation depends on the emotional transfer. Findings were constructed in seven themes, in accordance with this approach to the problem, which can be seen in Table 1.

Table 1

Themes and Subthemes Extracted to Explain the Issues on Emotional Transfer

Main themes	Subthemes
Emotional Transfer	
<i>Believability</i>	<i>Story</i>
	<i>Character</i>
	Jests and Mimics
	Motion
	Personification
	<i>Factuality</i>
	<i>Abstractness</i>
<i>Exaggeration</i>	
<i>Shape, Size and Texture</i>	
<i>Color and Light</i>	
<i>Sound and Music</i>	
<i>Cinematography</i>	
<i>Target Group</i>	

Emotional Transfer

Findings show that identification is possible through emotional transfer. Audience might share emotions with the characters and feel inside the story emotionally connecting with them only in this way. This might motivate audience to watch and continue watching the animation or not. As Tuğba states, “This kind of expressions makes progress on the basis of empathy. Audience establishes identification with the characters and experiences emotions of those characters during the film, say two hours, five minutes, or fifteen minutes... You even talk to the characters ‘Look behind you! Look behind you!’ This is an intensive identification.”.

In order to ensure emotional transfer, several issues were identified within the study and these issues categorized under seven themes: Believability, Exaggeration, Shapes, size and texture, Color and light, Sound and music, Cinematography, and Target group. According to the findings, emotional transfer might be possible or less possible only if all these issues were used holistically and contextually.

Believability

Findings reveal that designing a believable story and believable characters on the basis of facts in real world, and designing these closer to abstract rather than reality are important issues on the way of emotional transfer. At this point, believability means designing a believable world but not represent the reality as it is. In this part, four subthemes of believability are represented: Story, Character, Factuality and Abstractness.

Story

Participants stated that story of an animation supports the emotional connection of the audience. As Fuat emphasized, “*In a good animation film, story is the most important thing*”. On the believability of the stories Tuğba stated that “*For transfer of emotions expressed by a conflict the character faced, the story must be believable and progress through a traditional story structure. So, first of all, an accurate story structure has to be designed... (In a story) we need to have*

supportive and preventive events. These are our indicators to show how much our characters comply with real life.” According to these, a story of an animation should be based on the incidents in the real world such as ambitions, problems, conflicts and dilemmas, preventing and supporting processes and side characters.

Character

As it comes to the characters, findings show that believability of the story is reciprocally connected to the believable characters which does mostly rely on the individuality of the character, which could be represented with jests and mimics, motion and personification. As Tuğba indicates, *“The design of the character is important. Good characters, bad characters, supportive characters... those are what carries the story. That depends on how believable your character is of course.”*. So, the story could be carried out by the characters successfully or less successfully depending on the believability of the character inside the animation. Audience picks up a character that they identify as the main character and chooses to share that character’s emotions. Fuat explained the issue this way: *“There are some films that all characters are monsters but you understand that one of them is the good one. How you understand this is its appeal, its facial expressions, comparatively its costume, then its motions and lastly its role in the story.”* At this point, it seems to be important to design main characters visually and mentally distinctive than others. As Tuğba states, these characters should represent connection to real world with both their positive and negative sides, if they are to be believable: *“To create a good animation character, we avoid using idealized, stylized characters and design characters with weaknesses, desires, positives and negatives, contradictions inside ... because children and people, as well, are like that in the real world.”*. In accordance with these findings, three issues on the design of characters were identified: Jest and mimics, Motion and Personification, which are explained in detail below.

Jests and Mimics: Visualization of the emotions, which support emotional transfer, are found to be mostly depending on jests and mimics of the character. As it is in real life, it is important to express emotions with holistic use of body language and changes in eyes, eyebrows, mouth and nose forms, and relatively squash and stretch on face and cheeks. On the issue, Banu expressed that, *“Here, facial expressions come to the forefront. It is important to observe and represent mimics of face well.”*. Selim, in a similar way, emphasized the holistic and universal use of jests

and mimics with these words: *“It may depend on the target group, however, there should be a shared language to express basic emotions ... parallelly and synchronously using jests and mimics. The difficult thing here is to simplify (the visualization of emotion) according to the target group.”* Tuğba, on the other hand, emphasized on the labeling of certain emotions: *“... When the character gets upset, its eye fill with tears, a couple of tears drop. Or the character is excited and happy so a star shines in its eye. Those identified visual labels are the ones to help emotional transfer.”*. Being similar to the Tuğba’s comments, Fuat put emphasis on the importance of eyes for the emotional transfer: *“Especially eyes are the organ to express the entire emotion, like in real films ... If you ask how to design to express certain emotions, the focus should be the eyes here.”*

Motion: Findings show that, along with the jests and mimics, motion as well must be believable for emotional transfer. Taner, stated that believability of the motion depended on the animators’ knowledge of the motion and ability of animator to internalize the movement, make the character move that way and understand if the character could move as desired. Besides, he emphasized on the necessary or unnecessary stops in the animations. On the other hand, Fuat discussed the fluency of the animations: *“For audience to enjoy the animation, we tell our students that movements should be as fluent as it could be. This is an important factor ... On the other hand, there are successful films produced as limited animation. So, we cannot certainly say that it has to be so.”*

Personification: In animations, characters do not always represent a human being. It is familiar that objects, non-human living things, imaginary things, and even concepts and phenomena could make a character in an animation. Findings show that personification is a powerful tool to support emotional transfer in visual representations. On the other hand, findings clarify that adding eyes on an object might not always ensure this. Beyond adding eyes on a form, humanizing forms using techniques like squash and stretch, assigning human-based characteristics, jests and mimics, or using objects’ natural parts as organs like arms, legs and mouth might better ensure the personification of an object. Below are a couple of opinions of the participants towards personification:

“It may be a cube or a sphere to be empathetic, it should perform movements close to human forms, what we call, humanlike, animatic character. How can you turn a sphere

into human form? It can be realized with movement what we call squash and stretch ... because the audience will expect it to move like a human being.” (Selim)

“For example, there was a lot of objects in Beauty and Beast, like table, sofa, teapot, tea cups, all of these, for instance, it was the teapot I think, it was smacking of an old lady. As if the tea cups were her small children. If you can imitate like this, no problem arises, audience can perceive it.” (Taner)

Factuality

Participants especially emphasized on the factuality of the elements in an animation. Here, factuality does not mean creating a perfect copy of things in the real world but a crucial reference that audience find connections with their real lives including events, difficulties, ambitions, problems and such, which would support their identification with characters in an animation. On this issue, Taner reported that *“To enjoy the audience, you need to catch them at somewhere. It is important to add things from their environment; they need to be fed from their lives as much as possible.”* Tuğba, on the same issue, states that *“The story needs to be realistic. There are supportive and preventing events (in the story) and these are the indicators of how well our character is connected to real life ... It is same for the sound effects. If I am walking here, I of course want to hear its sound. If not, it would not be realistic.”* Beyond these, Fuat referenced to this issue emphasizing the diversity of emotions people experience in their lives: *“Don’t we have any negative emotions? For grownups, only positive emotions might not be enough. They would not consider it realistic.”*

In order to ensure the factuality of characters in animations, participants suggested that *referencing* is commonly used by character designers in the field. As Banu stated *“Expressing the emotion there, is totally (depend on) the ability of analyzing and implying of animator. References are always used, if not, an accurate expression might not be implied. Real recordings, watching them again and again, and express the distinctive characteristics, it is necessary.”* Selim pointed out the importance of referencing saying that *“First, the animator must internalize these (movements) that will ensure emotional transfer. After internalizing, pre-studying on the character drawing and s/he need to make the character feel those emotions, and while doing this, s/he have to use references. We usually do this in this way. One may try to do this recording himself/herself or it may be a real film produced before.”*

Abstractness

Findings show that an important advantage of the animations is that they are able to represent what cannot be performed in real life. When design is too close to reality, this advantage could be wasted. On this issue, Banu expressed that *“Is there a meaning to make it that realistic? The reality is in front of us. ... Animation is the representation of what can't be done in real life. It contradicts with this. This is what arises the attention of audience.”*. What is more, participants touched upon the pitfalls of designing animations too realistic, which is so-called *uncanny valley*. According to this, while designs that are closer to abstract are more tolerable to the flaw in an animation, as it gets closer to the reality, even minimal defects could cause troubles, which make audience feel uneasy and threatened. On this issue, opinions of participants are given below:

“It is important not to get close to reality. There is this thing called uncanny valley. In animations close to reality, audience find it hard to like it. ... I think we need to avoid it because, like in the final fantasy example, if things are not perfect, trouble arise. Audience shy away, take themselves off and even do not watch or recommend it to others.” (Taner)

“Especially, in recent years, computer animated films that are too close to reality were produced like final fantasy and polar express. These films were unsuccessful at the box office, for instance. The biggest reason of this, there is a theory called uncanny valley, if you know, audience's feeling uncanny. It is said that audience experienced that feeling. There, audience cannot experience the emotions that characters do. It is said that something becomes scary for them. When looked alone, it is static as a picture but when it begins to move, tiniest flaw in its eyes makes the audience get away and scare them. However, in animations (that are closer to abstract), even if there happens a flaw there, because already everything is fictional, it does not become very troubling.” (Fuat)

Exaggeration

Supporting the abstractness advantage of animations, exaggeration was identified as one of the most advantageous issue in animation design. Exaggeration might be used in various manners such as extreme but believable change of forms, dramatization of movements, or exaggeration of facial expressions. Participants' comments on the issue are given below:

“Animation is a visualization from scratch. While doing this, exaggeration is the most important advantage that animation uses. There is a film The Mask, for example, when he is surprised, the mouth falls down, the tongue gets out and such.” (Fuat)

“Well, in the heart of animation there is such a thing, exaggeration. For example, I give tasks to students to make them say ‘I am an animator, I do everything by exaggerating them.’ I make them to say that they must exaggerate everything, so they do exaggerate. ... In order to visualize the emotions the characters experience, we need to exaggerate in any situation.” (Taner)

“Here, the advantage of the animation is this, it can be exaggerated. With this exaggeration, (the character) tries to establish empathy and sympathy with the audience.” (Selim)

“I can say that exaggeration is important for the enjoyment (of the audience). For example, in real life we simply run but in an animation it can be illustrated exaggeratedly. Here, of course it might be the exaggeration of the change in the form of the character.” (Banu)

Shape, size and texture

Finding show that different shapes, textures and sizes might express various emotions or characteristics depending on the context they were used. Generally, based on the findings, while rigid, sharp and cornered forms could cause negative feelings, soft, oval and rounded forms could make the object more positive and more sympathetic. Tuğba explained this as an instinct that was relevant to how these forms were coded to our subconscious in our lives and environments. About the emotional meanings of forms, she stated that *“We feel in need of protection from this kind of things (rigid, sharp objects) ... but softer things, rounded and oval things, they are cuddlier, more to be caressed, which would not hurt us, and things we prefer more.”*. Similarly, Taner expressed that *“In order to evoke positive emotions, character simply need to be lovable. That’s why it needs to be in baby-like forms. For example, why do we like a kitten? A big head, small body, huge pretty eyes... You immediately establish an empathy and sympathy and you want to caress it but when you see a bigger cat you sometimes want to put distance.”*. While these are generally acceptable reflections, participants also emphasized the contextual issues on the usage of forms. Selim, appreciating the common use of oval and soft forms in animation, he also stated that *“... this is because we people are not in cornered forms. However, cornered forms like boxes can also be*

animated but this is more about the story and subject. Here, the issue is not being cornered or sharp. It is the relation between the content and the form.”. Likewise, Fuat stated that *“It is not true to say it should have smooth lines, colors should be vivid because it can be change according to the style of the film.”*. Similarly, Tuğba stated that it might also depend on the story, exemplifying *Transformers* that even though they are made of metal and are in huge sizes, depending on the story and personal traits, the audience is able to understand whether they are good or bad.

Color and Light

All participants recognized the effects of colors on emotional transfer and importance on expression of emotions, however, they also reported that separating it as colorful and black and white would not be a proper approach emphasizing that, *including grayscales*, all colors did serve to visualize various emotions based on the context. On the issue, Banu stated that *“The effects of colors are already known. Colors make it dynamic, support the atmosphere, but black and white may also create a distinctive effect. The choice of colors changes depending on the subject.”*. Selim, also emphasizing on the light, explained the issue with these words: *“Use of colors in animation is also related to the content. You may create a very colorful thing or use a monotone color. This is, of course, is about analyzing of colors as an emotional effect. ... Light is very important to design a concept with color and content. Space is very important here. You may use vivid colors in a sunny day. You need to harmonize it with the story.”*. On the color choice and effect of grayscale toning, Fuat reported that *“Here, we can give the example, Corpse Bride. When you look at the movie, you see that all the colors are pale and in gray tones as much as it can be. Because, why, the name of the movie is Corpse Bride after all. ... In a funny scene you do not use gray tones, usually vivid colors used.”*.

Finding also show that use of colors depends on the target group as well. While, for pre-school children, designs are mostly simple, colors are vivid and mostly in base colors; the older the age, the more accent, pale and contextual colors should be used.

Sound and Music

Findings show that sounds and music are equally and maybe more effective than visual elements on emotional transfer. In order to perfect a movement or make it more realistic and believable, or strengthen the scene on the emotional base, auditory elements may have an indispensable effect on emotional transfer. However, it is essential to indicate that only consistent and tuneful use of these elements would support the desired effect. On the use of sounds and music, participants' opinions are listed below:

“Talking about sounds in an animation, I can say fifty percent is animation and fifty present is sounds. Say that, you may create a very good animation but only if you used the sounds effectively. If you couldn't, it is useless. In this manner, sound has an unbelievable effect on audience.” (Selim)

“If you ask me, on the base of emotional transfer, sound and music are equivalent, and sometimes, one step ahead of the visuals. Of course, the sound effects are the same. If I am walking here, of course I want to hear it. ... Because they are elements that support the reality, of course the use of sound effects and music are indispensable for both animation films and cinema.” (Tuğba)

Cinematography

According to the findings, cinematographic tools also play an important role for the transfer of emotions. These tools can be stage arrangements and setup, or camera movements, plans, angles and zooms, and they need to be used holistically with other issues to serve emotional transfer. On this issue, Tuğba emphasized that the effect of cinematographic techniques is more than the effect of the movement of the character. As she stated, *“Emotional transfer can be also enabled by the cinematographic tools. What are these? Camera angles, shootings... You need to handle it holistically, considering various technical elements such as zooms, shooting angles or movements of camera, stage arrangements and transitions.”*

Target Group

Audience's emotional involvement in an animation depends on the suitable design of story, visuals and sounds for the target group, as the findings reveal. As Selim reported "*Talking about the enjoyment, it differs from person to person, population to population. Here, the features and structure of the character is very important. Audience has to find a contact with these features. Only then they begin to have fun.*". Taner, on the other hand, emphasized on the use shapes and design of the story according to age of the audience: "*At the beginning, we decide on the subject. Actually, we decide on that subject considering the target group. How can I say, let's say a man is leaving home, his story might be told with different side events for adults and different for the kids... For younger ones, let's say, more simple things, for example, we do not draw a star but just draw a triangle, with less edges, I mean, to help them perceive it better... If you are trying to make it for an adult with a high knowledge and experience, you have to avoid such things, in order not to vulgarize the film.*". Besides, Tuğba touched upon the importance of cultural issues on emotional transfer. Exemplifying the Turkish society, she stated that they were more inclined to dram and it was easier to establish identification with melodramatic characters who comfortably shout, cry, and experience all disasters but still stay standing.

In order to enhance the credibility and transferability of the findings derived from semi-structured interviews, findings were restructured as a survey, which was conducted on an online platform to gather the opinions of practitioners in the field. Results of the survey are represented in Table 2. Items were sorted by the mean scores. Six items were added during the survey process according to the comments of the survey participants. Survey results showed that almost all items were considered as important for emotional transfer by the practitioners in animation field ($\bar{x} > 3.00$), which was in line with the findings derived from interviews. While the mean scores of the two items, *designing the story consistent with traditional story structure* and *Using baby-sized design to express positive emotions*, were below 3.00, they are considered to be important at some level after all.

Table 2

Survey items and descriptive statistics

Item	n	\bar{x}
Effective use of light*	47	4,81
Effective use of cinematographic tools	79	4,80
Use of sounds and sound effects consistent with rhythm and tone of scene	79	4,71
Synchronous use of mimics, jests and sounds that express certain emotions	79	4,70
Creating stage compositions that emphasize on the movement or dialogue *	78	4,69
Characters' being empathetic to audience	79	4,65
Story's being appealing	79	4,63
Temperate use of background music	79	4,63
Using references for the expression of emotions of characters	79	4,61
Expressing emotion through jests (body language)	79	4,61
Postsynching of characters being consistent with its individual traits	79	4,59
Expressing individual characteristics of the characters	79	4,56
Efficient use of depth and contrast to emphasize the object at the front	79	4,56
Using sounds and sound effects to enhance the expression of emotions	79	4,54
Simple and understandable expression of emotions in character design	79	4,44
Attributing a distinctive trait on characters (e.g. a tic, continual slipping down of eyeglasses)	47	4,38
Believable design of follow-through actions	79	4,33
Editing timing with the concern of movement aesthetic	79	4,30
Contextual use of colors in objects and stage design	79	4,29
Identifying the psychological meaning of colors to be used	79	4,28
Expressing emotions through mimics (facial expressions)	79	4,24
Proper use of colors for target group	79	4,20
Creating believable characters	79	4,19
Using <i>gestus</i> to represent the personality, status, attitudes of characters*	42	4,19
Designing characters, movements and emotions that audience find a connection with their lives	79	4,18
Designing visuals according to knowledge and experience level of target group	79	4,15
Using secondary actions that express the emotions of a character	79	4,11
Using slow in and slow out for character movements	79	4,03
Using primary actions so that audience could anticipate the following move	79	3,99
Using exaggerations visualizing emotional expressions	79	3,97
Creating appealing characters	79	3,96
Using squash and stretch techniques in character movements	79	3,96
Designing visuals simple and understandable for children audience	79	3,96
Creating a story with supportive and preventive issues	79	3,90
Designing believable movements	79	3,90
Designing average characters with weaknesses and positives, avoiding idealized designs	79	3,89
Using visual labeling that express certain emotions	79	3,86
Personification of non-human characters	79	3,80
Using comedic elements *	47	3,79
Efficient representation of good-bad character contrast*	47	3,79
Preferring detailed visual designs for the satisfaction of adult audience	79	3,73
Using cornered, sharp and rigid forms to express negative emotions	79	3,29
Characters' eye contact with audience	79	3,25
Avoid too realistic designs that might make audience feel uncanny	79	3,13
Using rounded, smooth and soft forms to express positive emotions	79	3,01
Designing the story consistent with traditional story structure	79	2,81
Using baby-sized design to express positive emotions	79	2,65

* Items that are added based on the opinions of participants during the survey process

Closing-up to the mean scores, it can be clearly seen that the highest scores were about the use of light, cinematographic tools, sounds and synchronous use of mimics jests and sounds ($\bar{x} > 4.70$). On the other hand, the items that were much lower than the others were about the emotional effects of shapes and textures, eye contact of the character, uncanny valley and traditional story structure ($\bar{x} < 3.30$). According to these findings, it can be said that, while issues that are emphasizing on the stage and character movements, such as light, sound, direction of cinematography, mimics and jests, were considered as highly important for emotional transfer by the experts, issues about visual design such as using sharp or smooth edges, rigid or soft textures, or using baby-sized measures were considered as less important.

In order to investigate whether mean score differed by positions, each item was analyzed with Kruskal Wallis test. Findings showed that there was a statistically significant difference on the items, “*Using cornered, sharp and rigid forms to express negative emotions*” and “*Using rounded, smooth and soft forms to express positive emotions*” ($\chi^2: 25.57, p < .001$; $\chi^2: 27.1, p < .001$). In order to find out which positions differed significantly. Multiple comparison tests were conducted. Mann Whitney U tests showed that mean score of the participants who heavily work on 3D animation design were significantly higher than all other positions for both items ($p < .01$). This might be because the realism is at forefront in 3D designs. It can be interpreted that shapes and textures might become more important for emotional transfer when the design gets closer to reality.

Discussion and Result

This study aimed to identify emotional issues for designing multimedia learning materials, specifically for animations. In this direction, semi-structured interviews with academicians in the field of animation, and survey with practitioners working in animation sector were conducted. In this part of the article, findings were discussed along with the literature. Although the study specifically focuses on animation design, the findings are considered to be applicable for any kind of multimedia materials at some level.

This study clarifies that, beyond all other aspects extracted within the study, using appealing or warm colors, or rounded or smooth shapes in visual design do not guarantee emotional transfer, however, using these meaningfully and contextually might help achieve it. In the literature of emotional design of multimedia, six research were identified that uses emotionally designed multimedia learning materials. Three of these were replication of their first research and used almost the same learning material in their research designs. These studies explained the emotional elements as colors, shapes and personification –or anthropomorphism-, and background sounds.

Um et al. (2011), Plass et al. (2014) and Park et al. (2015) used the same learning materials in their studies and based their emotion design on warm colors, rounded shapes and anthropomorphism. Likewise, Mayer and Estrella (2014) preferred appealing colors, rounded shapes and personification by adding eyes that express certain emotions. Haaranen et al. (2015), on the other hand, emphasized anthropomorphism on emotional design of their learning material. Sound was only used in one study as an emotional element; Königschulte (2015) investigated emotional effects of background sound in the learning material. According to the findings of this study, even though they are important at some level, emotional design of multimedia materials was based on the emotional transfer and issues on emotional design is not limited with those elements. What's more, those may only support emotional transfer when they are used meaningfully and contextually.

For each research identified in the literature, it is clearly seen that positive emotions were the main focus of the studies. In this way, findings of the study, somehow, do not comply with the direction of these studies. According to the findings, in order to ensure emotional transfer, design of the animations should be believable and should establish a bond with real life. Considering that people experience various positive and negative emotions in their lives, focusing only positive emotions might not be believable or satisfying, and emotional connection might not be established, which may cause an unsuccessful design on emotional base.

Um et al. (2011) used a warm color palette that includes yellow, orange and pink in the design of their learning materials in order to create positive emotions. Likewise, Mayer and Estrella (2014) used vivid and appealing colors. Both studies used grayscale designs for their control group,

considering to create so-called neutral designs. While findings of this study showed that color use was an important issue on emotional transfer, findings also strongly emphasized that if colors were used meaningfully and contextually, they would help emotional transfer in a desired way. Since the psychological meanings and effects of certain colors could change depending on the context, using random colors and categorizing them as simply appealing or warm, which were supposed to create positive emotions, might not be enough to establish an emotional connection. What is more, Findings showed that black and white –or grayscale- design might not specifically represent a neutral mood, and they, depending on the context and the content, they may induce various emotions.

Another emotional design element used in researches was use of shapes according to the literature. Um et al. (2011) and Mayer and Estrella (2014) used sharp and cornered shapes for their control design and smooth and rounded shapes for the emotional design of their multimedia learning materials. As the findings of this study reveals, cornered, sharp and rigid forms, as developmental reflexes, might have a negative effect on individuals and lead them move away. Similarly, oval, soft and baby-like forms are usually perceived as appealing, cuddly and lovable. In this way, it is possible to say that findings comply with the literature at some level. However, as it is on the use of colors, use of shapes and their meanings and so, the emotions they might induce could depend on the context as well. Besides, on the basis of believability, depending on the degree of reality in animation design, some objects may need to be designed based on their nature. If not, audience might not be satisfied and lost emotional connection.

Königschulte (2015) was the only design using sounds as an emotional element in the literature. In the design, background sounds were presented in the learning material as an emotional variable. Findings of this study comply with this study at some level. According to the findings, if used contextually and temperately, sounds might be one of the most effective instrument in order to enhance emotional transfer. However, excessive use of background sounds, or inconsistent and random use of sound effects might not end up as desired.

One of the most popular emotional design element in the literature was identified as personification. Um et al. (2011), Mayer and Estrella (2014), Plass et al. (2014) and Park et al.

(2015) used this technique by adding only eyes or eyes and mouth on the forms. Haaranen et al. (2015), on the other hand, used this method by adding agents that reacts with certain moves in their design. The findings of the study showed that personification was a powerful instrument for emotional transfer when the characters are non-human things. At this point, the findings comply with the literature. What does the findings of this study add on this issue is that personification might be ensured in various effective and more believable forms than only drawing face-like lines on forms, which are to be attributing personalities, human-like traits, mimics, jests, movements, sounds to them. By creating a believable character using these elements, emotional transfer might be much probable to happen. For example, drawing a smiling face inside a circle would not always mean that individuals looking at it would smile as well, unless they establish an emotional connection with the figure, which could be achieved using various techniques of personification.

Beyond the emotional elements used in the literature, this study brings out various emotional issues for the design of multimedia learning materials. These issues are, in brief, designing believable characters with personalities and human-like traits; proper use of mimics, jests and movements; designing a believable story; making connections to real life; designing visuals closer to abstract that support the flexibility and exaggeration; exaggerating emotional expressions; and using cinematographic tools, sounds, music, colors, light, shapes, texture, and the most importantly, considering all of these issues holistically and use them in harmony. While this study aimed to identify emotional issues in multimedia materials through the eyes of animation experts, and intended to serve to a theoretical gap in the literature, findings of this inquiry should not be considered as principles of emotional design but a guide for multimedia designers and researchers through an emotional perspective. Future research should address evidence-based investigations on emotional and educational effects of the issues presented in this study.

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