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PhD Dissertation Proposal

VIRTUAL WELL-BEING: EMOTIONAL AND BEHAVIORAL APPRAISAL PATTERNS OF AN IMMERSIVE EXPERIENCE

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APPROVAL PAGE

PhD Dissertation

Virtual Well-Being: Emotional and Behavioral Appraisal Patterns of an Immersive Experience

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To my parents Fotis and Penelope,

to my sisters Yiola and Kiki

and to their families

ABSTRACT

Virtual Worlds continue to promote improvements in real life, combining the visual appearance and the human behavior with each successive generation of hardware. Virtual environments are used with critical implications for business, education, social sciences and in the society at large. It is not an exaggeration to say that 3D spaces are treated as a parallel or alternative reality, cultivating and even shaping the individual's personality. As a consequence, the evolution of virtual environments depends on individuals' presence (interaction, behavior, attitude etc.), which is determined, partly, by the emotional elicitation. Emotional impact has a significant role in an immersive experience, in that it regulates and influences the in-world beings, hence producing the need for an in-depth investigation. However the impact of virtual experience on well-being remains unexplored (Riva et al., 2012). Limited evidence exists on the effectiveness of well-being in virtual environments (Gaggoli & Riva, 2013) which is complex and challenging task (Coyle et al., 2014).

With this in mind, the current dissertation offers an in-depth analysis of the well-being before, during and after the virtual experience. The primary goal is to combine the emotional and the behavioral patterns, identifying the virtual well-being throughout a comprehensive perspective of an immersive positive behavioral experience. Specifically, the current research includes nine research questions that help to shape the emotional profile during the process of avatar design and 3D experience, underlying the related behaviors and attitudes based on three theoretical models: (1) Hedonic Research Framework for User Acceptance of Virtual Worlds (Holsapple and Wu, 2007), which identifies the emotional engagement of individuals in VWs, throughout their behavior, clarifying the virtual worlds acceptance, (2) Dispositional Theory of Mood (Siemer, 2009) that responds to a wide variety of situations with the emotional experi-

ences, identifying the cognition and the appraisal procedure, and (3) Lazarus Theoretical Framework of Appraisal (1991), which presents the behavioral responses of the individual's particular action.

Based on the theoretical frameworks, the main research question of the dissertation thesis is:

How is virtual well-being identified through the emotional and behavioral appraisal patterns in a virtual world?

Throughout the main research question, is achieved a concentration on a detailed understanding of virtual emotional and behavioral involvement, areas that are limited in the existing research, offering a basis for improving the design, management, and evaluation of these environments.

The methodological research consisted of three studies that implements appraisal methods, including 1) diaries, 2) interviews), 3) online questionnaires and 4) retrospective observations. The outcome is an amalgam of quantitative and qualitative results providing an integrated synopsis of the essential emotional and behavioral ingredients.

As a result, the findings of this study provide an interpretation of the elicited emotions, moods and satisfied needs before, during and after an immersive experience, determining their impact on users' behavioral patterns. Moreover, throughout the current research is emerged a new area that offers insights for further exploration and application in real-life, beneficial and valuable for practitioners, multimedia designers, media psychologists, sociologists and gamers.

The contribution of the current research lies in the expansion of knowledge regarding the relationship between human behavior and emotional status in virtual worlds. The emotional status is not limited only to emotions but extends to a combination of emotions, moods and needs related items offering a comprehensive outcome of the individual's emotional and behavioural profile. Simultaneously, the methodological research can be applied and interpreted in different environments, worlds or spaces, examining the individuals' well-being.

The value of the current research, with the combination of the three theoretical frameworks explores the importance of the immersive experience, since the presented indications offer a new avenue for the researchers, designers, and practitioners to identify the individuals' intentions via virtual worlds.

Keywords: Emotions, Moods, Needs, Virtual Worlds, Human Behavior, User Experience, HCI, Media Psychology

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ABBREVIATIONS

VWB	Virtual Well-Being
HCI	Human-Computer Interaction
VEs	Virtual Environments
SL	Second Life
UX	User Experience
VWs	Virtual Worlds
LTFP	Lazarus Theoretical Framework of Appraisal
DTM	Dispositional Theory of Moods

1. Introduction

Virtual worlds (VWs) and modern games, lack of research investigation on affective quality, on positive emotional and behavioral involvement, and in general on human well-being. Thousands of people can interact and behave simultaneously in virtual environments (VEs), including them in different areas of their real life: education, culture, design, business etc. enhance with additional advantages. However, the human factors, and particularly the emotional factors during the virtual interaction, play a significant role to the overall understanding and acceptance of this kind of experiences.

The impact of emotions has a significant role into various real life stages of human beings, operates as a motivator underlying the mechanisms of the stimuli assessment. Moreover, emotional ingredients are more than just desirable endpoints, they affect a broad diversity of cognitive, social, and biological processes and contribute to individual's resources. Emotions are one of the most central and pervasive aspects of human experience, giving a form, meaning and, most importantly, value to everything we are and everything we do. Without emotions, life would be shapeless, meaningless and a colorless series of sensations, events and behaviors (Hagman, 2005).

The association between emotional and behavioral patterns was perceived and interpreted in the literature in contrasting ways and has been critiqued and defined through different tests; controversially, at the same time due to its subjectivity. The investigation of emotions has been conducted in different fields like art, social sciences, psychology, HCI, UX etc., addressing plethora of definitions, frameworks, methodologies and measurements. However, there are research areas where the analysis of emotional impact is limited, e.g. VEs, which is the scope of the current study.

The combination of the emotional and behavioral patterns through the virtual experience is the central topic of the current research, including: a range of three rudiments, emotions, needs and mood items to address virtual well-being (VWB); the call for understanding and the interpretation of how emotions and behaviors are associated; the implementation of appraisal methods as a methodological tool for the identification of well-being, the rise of new research areas of positive behavior experience in VWs, and the unresolved impact of positive virtual participation. In response to these factors, the general research area for this study was based on three theoretical frameworks, (1) Hedonic Research Framework for User Acceptance of VWs (Holsapple and Wu, 2007), (2) Dispositional Theory of Mood (Siemer, 2009) and (3) Lazarus Theoretical Framework of Appraisal (Lazarus, 1991), to propose foundations and applications of the emotional behavior and their degree to which they contribute to well-being.

In other words, the current study sets off to identify well-being in VEs, for the purpose of providing designers, psychologists, researchers and practitioners with a better understanding of the affordances of the current spaces, leading to a new perspective of their use. Since the major question is to identify well-being in VWs, this research study intends to examine the emotional and behavioral patterns of immersion in a 3D world; investigating the configuration of the emotions, moods and needs before, during and after the virtual experience. The outcome of the current study is a set of knowledge that informs the exploration, the research and the utilization of the VEs, providing new knowledge for future implementations.

1.1. Research purpose

The current dissertation focuses on the identification of the virtual well-being throughout the immersive experience, determining the emotional profile of the individuals before, during and after the virtual participation. This is achieved with the embodiment of three theoretical frameworks (Holsapple and Wu, 2007; Siemer, 2009; Lazarus, 1991), following specific appraisal methodologies: questionnaires, diaries, in depth semi-structured interviews and retrospective observations.

The significance of the thesis lies in the fact that a limited number of research studies have explored how well-being is influenced the involvement in 3D spaces, by the association of emotional and behavioral patterns. Moreover, there is no other research studies that investigate the immersive experience combing the included theoretical frameworks, which offer comprehensive overview of emotional experience in VWs. The gained knowledge and the understanding of the emotional behavior in 3D worlds may provide insights or motivations for further research in similar environments, or can act as the basis for designing hybrid environments, enhancing the positivity of virtual immersion.

1.2. Research questions

The main research question which has guided this study is:

How is Virtual Well-Being identified through the Emotional and Behavioral Appraisal Patterns in a Virtual World?

In order to address the aim of this research, as well as the applied methodological procedure, the main research question is broken down into a list of sub-questions which are divided into two methodological phases:

The first phase of the methodological proposal separates questions according to a) 3D design procedure, and b) 3D interaction procedure (Figure 1):

1.2.1. Avatar Design Procedure

- Sub-RQ1: What emotions and moods elements are elicited throughout the correlation of the pre- and post- avatar design procedure?
- Sub-RQ2: How satisfaction quality is identified before and after virtual human development?
- Sub-RQ3: How does avatar existence influence, emotionally and behaviorally, the virtual experience?

1.2.2. Unrestricted Virtual Experience

- Sub-RQ4: What are the aroused emotional ingredients (emotions and moods) of an unrestricted virtual experience and how are they alternated between the comparison of pre- and post- immersive experience?

- Sub-RQ5: How is satisfaction quality identified before and after the unrestricted virtual experience and how its ingredients are determined through their comparison?
- Sub-RQ6: How are individuals influenced emotionally during the unrestricted virtual experience and what kind of stimuli has an impact on their behavioral reactions?

The second phase of the methodology is formulated by sub-questions which are concentrated on the 3D experience (Figure 1):

1.2.3. Targeted Virtual Experience

- Sub-RQ7: What are the aroused mood-state ingredients in each targeted virtual experience and how are they classified?
- Sub-RQ8: How is satisfaction quality identified throughout the virtual tasks and how are the composed elements modified separately?
- Sub-RQ9: What are the emotional and behavioral patterns throughout the immersive task-participation and how are their correlations molded between them?

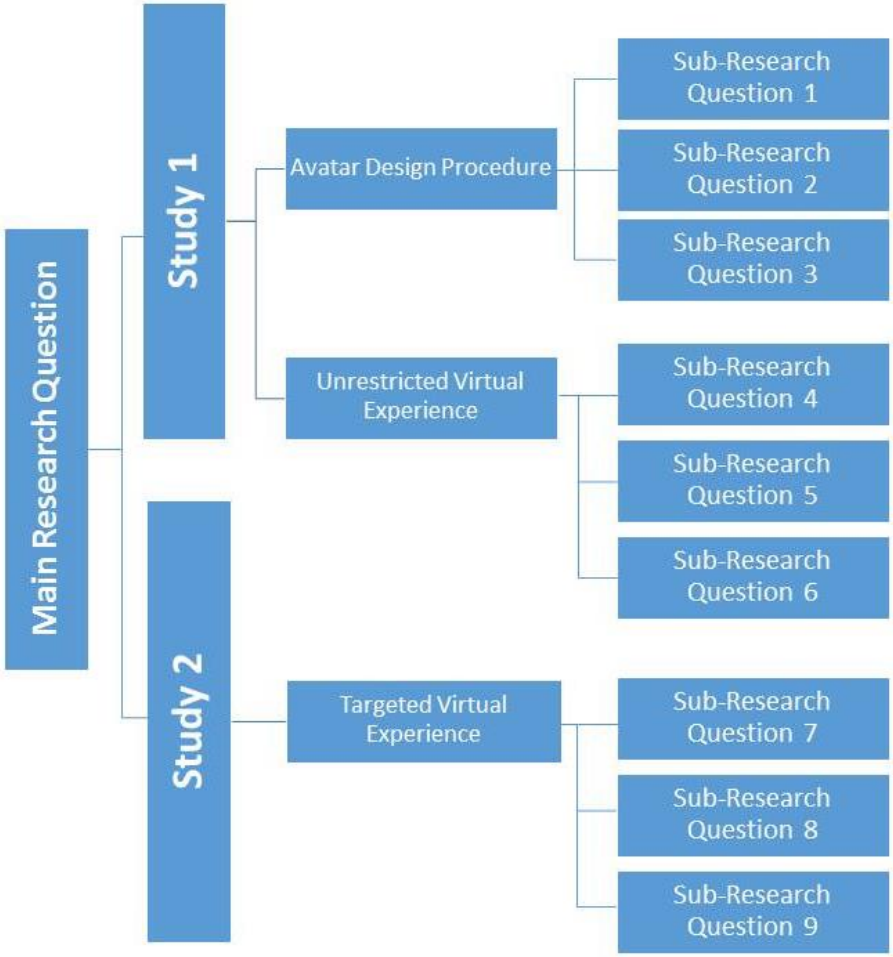

Figure 1. The Structure of the Research Questions According to the Methodological Phases

1.2.4. The Importance of the current study

The dissertation findings provide an in-depth understanding of the individual's well-being in VWs, identifying the influential associations of the emotional and behavioral ingredients before, during and after an immersive experience. The outcome is expected to supply designers, researchers, instructors and practitioners, with additional and in-depth understanding of individuals' virtual acceptance and of the affordances of the positive behavioral virtual experience.

Initially, the current research provides a significant contribution since it looks into the relationship and the correlation of the emotions and behaviors/actions in a virtual experience, offering a guidance and unique perspective for supporting, accepting and enriching the existence and the quality of 3D environments.

Additionally, the current thesis delivers a further understanding of the emotional and behavioral engagement in VWs, through their impact on determination of the well-being. This type of experiential perspective can be utilized across multiple fields such as HCI, media psychology, positive technology, positive computing and well-being technology. The rich description of the emotional and behavioral patterns adds to the body of knowledge on engagement of VWs in real life awareness structure.

Moreover, the research study is not limited on the investigation of the elicited emotions due to virtual experience, but contains and analyzes the mood-state and the need-items, generating an integrated and in-depth overview of the individual's experience in immersive environments, that can be utilized to improve the design, management, and evaluation of 3D experience.

The combination of the three theoretical models, Hedonic Research Framework for User Acceptance of VWs (Holsapple and Wu, 2007), the Dispositional Theory of Moods (Siemer, 2009) and the Lazarus Theoretical Framework of Appraisal (Lazarus 1991) into investigation of an immersive experience offers new knowledge for further exploration of individual's emotional and behavioral profile in different spaces.

The methodological sequence of the present research is an additional contribution, since other researchers can use it for the investigation of different VEs, aiming to the identification of human well-being. Also, the current methodology can be utilized on the design and on evaluation of several technological applications, exploring and enhancing the connection between positivity and technology.

Furthermore, the incorporation of emotions, moods and needs in SL environment offers a new awareness of additional investigation and possible implementations of such environments in areas like business, education, academia, product design, market research, advertising, general marketing, retailing and services, organizational management, management information systems and organizational collaboration.

Generally, the outcome of this dissertation highlights the important role of the emotional and behavioral patterns under particular circumstances and effects due to virtual experiences.

1.2.5. Theoretical models

1.2.5.1. Hedonic Research Framework for User Acceptance of VWs

The theoretical framework on which the current thesis is based is the Hedonic Theoretical Model for User Acceptance of VWs, proposed by Holsapple and Wu (2007). The theoretical framework captures the relationship between hedonic human factors and the user acceptance of VWs. Hedonic human factors focus on imaginal responses that include role projection, fantasy and escapism. Moreover, it concentrates on the emotional responses that contain emotional involvement, arousal and enjoyment, which are both key human factors, explaining behaviors and actions. Based on the above factors, the current theoretical framework investigates the entertaining nature of the technology of interest, helping researchers understand why individuals use VEs, what the motivations of individuals' engagement in VWs are, and what the potential of VEs acceptance is.

1.2.5.2. Dispositional Theory of Moods (DTM)

DTM proposes that moods are temporary dispositions that generate particular kinds of emotions – appraisals. These appraisals are considered to be in line with tenets of appraisal theories of emotion (Ellsworth & Scherer, 2003) causing the mood experience. In other words, DTM responds to a wide variety of situations with emotional reactions (subjective experiences), underlying mental processes, distinguishing between the mood per se and the mood-caused cognitions and emotions. DTM explains the lack of object specificity of mood experiences in the following way: mood experiences, in contrast to emotions, have many different objects that are appraised either in succession or in parallel (Reinsnzein and Schonpflup, 1992). Because, as a consequence, the person's mood experience is directed at multiple stimuli, the person has the subjective

impression that no clear stimuli exist in contrast to emotions that are elicited from specific stimuli, and that are already influenced by the mood state.

1.2.5.3. Lazarus Theoretical Framework of Appraisal (LTFP)

The latter theoretical framework deals with behavioral intentions from different emotional responses throughout an appraisal procedure, resulting to satisfaction, derived from Lazarus (1991). Appraisal procedure, except from the emotional-state, is followed by satisfaction quality, which is directly influenced by the behavioral intentions. The current theoretical framework helps to explain how attitudes might be linked to behavioral purposes, leading to a desired outcome. Individuals try to achieve planned outcomes by developing specific behavioral patterns to maintain or increase the level of satisfaction.

The Lazarus Theoretical Framework consists of three basic steps: appraisal -> emotional response -> coping. Coping response is defined as an effort to achieve the desired outcome, throughout user's behavioral intentions, maintaining or increasing the level of satisfaction.

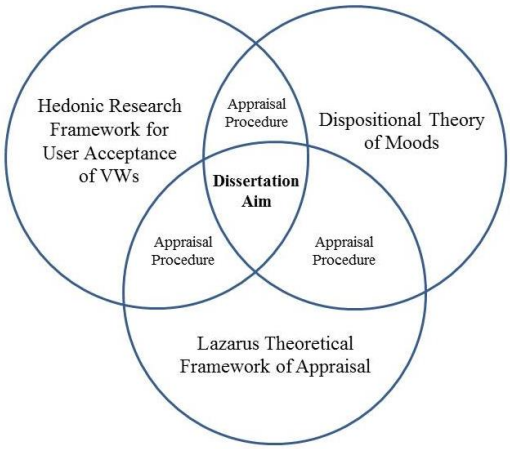

Figure 2. The Included Three Theoretical Frameworks that are Associated through the Appraisal Procedures (Emotional Evaluation of an Experience)

1.2.6. Classification of Theoretical Terms

1.2.6.1. Subjective User Experience

Subjective User Experience represents the mental procedure through an instant interaction with a stimulus, emphasizes the emotional behavior and determines the meaning and the quality of the stimulated experience.

1.2.6.2. Emotions

Emotions are considered as the essential elements of human existence, enriching positively and negatively a moment-by-moment situation with meaningful influential outcome.

1.2.6.3. Needs

Needs are characterized as a guidance of the attention to a particular stimulus, aiming at their fulfillment/satisfaction.

1.2.6.4. Moods

Moods are global and have general emotional consequences that are more lasting and have less intensity than emotions, affecting positively and negatively the provoked emotions.

1.2.6.5. Well-Being

WB is a combination of a conscious and unconscious procedure, assessing the aroused emotions, moods and the satisfied needs, through a momentary experience with a stimulus.

1.2.6.6. Appraisal Procedure

Appraisal procedure operates as a bridge between the emotions and a stimulus throughout the interpretation and the evaluation of an experience, containing emotional, mood items and satisfied needs.

1.2.6.7. Second Life

SL is a digital, continuous streaming world, offering a wide amount of fruitful experiences like: interaction, gaming, public or private communication and design procedure, enriching emotionally the immersive experience.

1.2.6.8. Avatars

Avatars reflect the transformation of an individual to an immersive inhabitant, generate the sense of ‘being there’, provide and express an ideal persona consisting of emotional and behavioral ingredients.

1.2.7. Thesis Outline

The current dissertation is structured into five chapters, in addition to the introduction:

- *Chapter 2*: Literature Review: This chapter presents a literature review of the relevant research areas. The chapter begins with the terminology of user experience in relation to HCI and continues with a sub-section on subjective user experience. The next section concentrates on the literature of social psychology on the issue of emotional elicitation, and includes a sub-section which describes emotions and their role in human behavioral experience. Memory is inextricably connected with emotional patterns, operating as a retrieval mechanism of different experiences, and is another element described in this subsection. The next two sub-sections deal with mood-state and the needs. The third section of the literature review describes the appraisal patterns and methods. This continues with VWs, describing 3D design and interaction. The literature review is completed with an overview of the methods and tools that measure and investigate emotions.
- *Chapter 3:* Summary of the literature review: This chapter summarizes the findings of the literature review, specifying the scope of the current dissertation.
- *Chapter 4:* Methodology: This chapter presents the three methodological studies of the current thesis and is separated into three sub-sections that include the related work and a short discussion with regards to each.
- *Chapter 5:* Discussion: This chapter builds upon the research outcome, brings together findings from all the previous chapters, reflecting back to the original research questions and the objectives of the current dissertation.

1.2.8. Summary

The first chapter presented the key rationale, a description of the theoretical background and the basic structure of the current thesis, concentrating on the research gap in the field, on the research questions, on the importance of the current investigation, on the theoretical frameworks that it is based on, concluding with an outline of the following chapters.

Chapter 2: Literature Review

This chapter presents a literature review of the previously outlined research in user experience, social psychology, and VWs. Section one summarizes the literature on user experience in relation to HCI. Section two focuses on social psychology, exploring the emotional behavior of human beings in a stimulated environment describing, at the same time, the terms of needs and goals, appraisal patterns and subjective well-being, according to emotional behavior. The third part of the chapter presents and defines the establishment of VWs, with an emphasis on SL environment, and on different virtual procedures and behaviors (avatar design). The chapter concludes with an overview of the implemented methods and tools of emotional research, and the identification of the involved terms.

2 Literature Review

2.1 User Experience in relation to HCI

The term ‘experience’ is defined as an ongoing self-talk progress by human-stimulus interactions (product, system, object, and situation) (Forlizzi & Battarbee, 2004), separated into three categories (Photiadis & Souleles, 2015):

- ‘Experience’ which is happening under the conscious flow of self-talks, through the evaluation process with an environmental stimulus, without any influences of the spendable time.
- ‘An Experience’ which is obtained during the interaction with stimuli, having a beginning and an end, concluding into emotional and behavioral alternations throughout the experience.
- ‘A co-experience’, which emerges from the experience in a social environment and is shared with others, improving the social acceptance.

‘Experience’ contains two kinds of characteristics: individual characteristics (personality, skills, background, culture, values etc.) and product characteristics (shape, texture, color, and behavior) (Desmet & Hekkert, 2007). Individual experiences are influenced by the physical or virtual presence of others, separated emotionally into passive and active experiences, distributing the emotions into three basic functions (Pine & Gilmore, 1998):

- Shaped individual strategies and intentions
- Organization of the procedures based on the strategies and intentions
- Outcome Evaluation

In a plethora of research studies, the term ‘experience’ was defined as ‘user experience’, resulting in a large amount of research explorations (definitions, methodologies etc.) in many different areas (HCI, psychology, social science and so forth) (Hassenzahl, 2008). One given definition of ‘user experience’ derives from the emerged episode of a ‘dialogue’ between the person and the surrounded environment through a variety of particular actions, perceptions, motivations, and cognitions. In other words, it is a track of time via sights and sounds, emotions and thoughts, motives and actions interrelated and stored in the memory, relieved and communicated to others (Hassenzahl, 2008; Hassenzhal, Eckoldt, Diefenbach, Laschke, Len & Kim, 2013). Forlizzi and Battarbee (2004) pointed out that ‘user experience’ is a kind of mental process like a sensation, emotional bonding or attitude, which depends on how a momentary experience is interpreted and how it influences the emerged behavior. For instance, admiring a sunset is an ‘experience’, not a ‘user experience’ but eating a cake is a ‘user experience’ on account of the emerged action of tasting, touching and feeling (Forlizzi & Battarbee, 2004).

According to Law et.al. (2009), there are three divisions of ‘user experience’: before interaction, during interaction and after interaction with a stimulus (Law, Roto, Hassenzahl, Vermeeren & Kort, 2008). The ‘before interaction’ describes the preparation of pre- ‘user experience’, called ‘an experience’ (until it gets started) and contains expectations, the retrieving of previous experience and preparation for the upcoming experience (Lallemand, Gronier & Koenig, 2015). Using the experience of the cake as an example, the smell, the look and the neighbor’s description of the cake gives a first idea about it, recalling previous similar memories, generating expectations about the new ‘experience’. With the beginning of interaction, cognitive procedure and memory are enriched with new feedback through the emerged behavior, and this is therefore

called ‘user experience’. After the interaction procedure, ‘user experience’ is altered, improved, formed and garnered with the new knowledge of the current situation; else as ‘overall user experience’ (Law, Vermeeren, Hassenzhal & Blythe 2007).

Malone (1981) identified three basic characteristics that operate as motivators of ‘user experience’: challenge, fantasy and curiosity designate the quality of the experience (Alben, 1996; Hassenzahl, Beu & Burmester, 2001; Overbeeke, Djajadiningrat, Hummels & Wensveen, 2002), which is separated into moments that are analyzed by 3 elements: context, motivations and actions (Zimmermann, 2008).

The evaluation of ‘user experience’ is considered as an essential factor for understanding the connection between stimulus and the user, which is labeled by the emotional impact (Laurel, 1991).

Over the last decades, an amount of research has been published, focusing on areas beyond the classical way of ‘user experience’ (Logan, 1994; Jordan, 2000; Hassenzahl, 2001; Mäkelä & Fulton Suri, 2001; Garrett, 2002; Battarbee, 2004; Mahlke, 2008), concentrating on emotional behavior (Buxton, 2007), which is characterized by the momentary assessment of the interaction, moving from objective to subjective perspectives (Hassenzahl, 2008).

2.1.1 Subjective User Experience

Subjective user experience (SUX) concept focuses on the psychological impact of ‘user experience’ (Hassenzahl, Law & Hvannberg, 2006), and has kindled the interest of many researchers and practitioners from different areas like design, psychology, HCI, marketing or philosophy, who try to have a comprehensive understanding of the SUX (Zimmermann, 2008).

The subjective perspective of ‘user experience’ emphasizes on the emotional aspect of the interaction, concentrating on expressions, attitudes, values. As Hassenzahl and Tractinsky (2006) pointed out, the effects of interaction have two ways of handling emotions in ‘user experience’: one line of assignment emphasizes emotions as effects of a product usage and the second focuses on the recalled previous product utilization and evaluation judgment (Hassenzahl & Tractinsky, 2006).

Subjective User Experience has a positive tendency in a social interaction, (Battarbee & Koskinen, 2005) mostly noticeable through the technology, and enriches the experience emotionally, influencing the behavioral patterns. (Zimmermann, 2008).

2.2 Social Psychology through Conscious and Unconscious Process

An area that is associated with SUX and investigates the impact of social content of human emotional behavior is social psychology. The essence of the social psychology approach relies on emotions that are considered to be the main factor of how a person should accept something positively or negatively, through the social experience (Raja, Bowman, Lucas & North, 2004).

Jacobsen (2006) suggested an illustration of a psychological framework on subjectivity in a social environment, consisting of seven different aspects: diachronia, ipsichronia, mind, body, content, person and situation:

- Diachronia: The stimuli choices depend on time.
- Ipsichronia: The cultural and social life of a person affects the person’s opinions.
- Mind: Evaluation is influenced by mental procedures, resulting into emotional elicitation.

- Body: Brain activities may have an effect on the evaluation processes.
- Content: The assessment of a stimulus can be influenced by convenience of use.
- Person: The background of a person may play a role in stimulus preference.
- Situation: The time, the place and in general the surrounding conditions are factors which influence the choices.

The aforementioned aspects of social psychology are not mutually exclusive, but they should be considered as guidelines in determining of the emotional behavior in the surrounded environment (Jacobsen, Schubotz, Hofel & Cramon, 2006).

In 1960, Berlyne proposed the arousal theory by presenting the way an individual should respond to a social stimulus subjectively, including three sets of variables (Jacobsen, Schubotz, Hofel & Cramon, 2006):

- Psychophysical variables: The physical properties of the object are presentable, e.g. color, size, brightness and so forth.
- Ecological variables: These variables portray the meanings of an object or the connections with a person's life.
- Collative variables: This subcategory concerns the extent of the visual elements all at once or separately, similar or different.

The positive and the negative evaluation of a social interaction, and the determination of the way of acting, depend on the emerged emotional patterns.

2.3 Emotions and their Role in Human Behavioral Experience

The role of emotions and their impact on human behavior goes back to ancient Greece, in the classical Greek dramas, in Aristotle's philosophy and continues in Freud's work (Oatley, Keltner & Jenkins, 2006). Emotions are considered as an essential constituents of being human. If emotions are ignored in human experience, an essential part of the experience is automatically lost, and this can lead to a misunderstanding of the emotional position of human being in a given situation (Huang & Alessi, 1999).

Ninety definitions of emotions were collected by Kleinginna and Kleinginna (2005), concluding that emotions are conditions of sensual effects, having a positive and negative influential valence during the behavior dispositions (Johnson-Laird & Oatley, 1989; Ortony et al., 1988; Schachter & Singer, 1962; Frijda, 1986). At the same time, the beneficial or harmful evaluation of emotions determines the individual's position in an environment, and the association with certain objects, actions and ideas (Arnold 1960; Scherer, Schorr & Johnstone, 2001; Desmet & Hekkert, 2002).

According to Brave and Nass (2003), emotions are presented as the reactions to an event, encompassing physiological, affective, behavioral and cognitive components, enrich positively or negatively each moment, and influence the general experience of human beings (Desmet, 2003). Humans do not have an experience with emotions as such but through the stimuli that provokes them. Emotions can be classified through a series of terms like: antecedent events, event coding, appraisal, physiological reaction patterns, action readiness, emotional behavior, regulation (Mesquita & Frijda, 1992; Ellsworth, 1991; Frijda, 1986; Lazarus, 1991; Lewis, Sullivan & Michalson, 1989; Lutz, 1985; Russell, 1991; Stein & Levine, 1987).

Table 1 presents some definitions of theorists' conceptions on emotions, and their role in human life experience.

Table 1. Theorists' Conceptions of Emotion

Darwin, 1872	*"Emotions are considered the important factor of the presence perspective"*
James, 1884	*"Bodily changes follow directly the perception of the exciting fact, and these occurred senses of the changes are considered the emotions"*
Arnold & Gasson, 1954	*" An emotion or an effect can be considered as the felt tendency towards an object judged suitable, or away from an object judged unsuitable, reinforced by specific bodily changes"*
Plutchik, 1980	*"That an emotional response can be automatic, which relies on unconscious processing; this is referred to as autonomic arousal"*
Lutz & White, 1986	*"Emotions are a primary idiom for defining and negotiating social relation of the self in a moral order"*
Tooby & Cosmides, 1990	*"An emotion corresponds to a distinctive system of coordination among the mechanisms that regulate each controllable biological process. That is, an emotional state manifests design features "designed" to solve particular families of adaptive problems, whereby psychological mechanisms assume unique configuration"*

Ortony et al., 1990	*"Some emotions have visible indicators which are referred to as physiological effects"*
Lazarus, 1991	*"Emotions are organized psychophysiological reactions to news about ongoing relationships with the environment"*
Ekman, 1992	*"Emotions are viewed as having evolved through their adaptive value with fundamental life-tasks. Each emotion has unique features: signal, physiology and antecedent events. Each emotion also has characteristics common with other emotions: rapid onset, short duration, unbidden occurrence, automatic appraisal, and coherence among responses"*
Frijda & Mesquita, 1994	*"Emotions are first and foremost, modes of relating to the environment states of readiness for engaging or not engaging in interaction with the environment"*
Shweder, 1994	*"An investigation of emotion scripts into components such as "self-involving conditions of the world", "somatic feelings", "affective feelings", "expressive modes" and "plans for self-management".*
Power et al., 1997	*"Emotions are appraised"*

Damasio et.al., 2000	*"Emotions are the realization of bodily changes brought about by the activation of an emotion and, when questioned, individuals can sometimes report on their emotional state".*
Izard et.al., 2010	*"Function of emotion: 1. Interrupts/changes processing and focuses on attendance of responses. 2. Motivates cognition and action and provides emotion information (including evolutionarily conserved communication signals) to guide and coordinate the engagement of the individual in the physical and social environment for coping, adaptation, affiliation and well-being"*
Campos, Walle, Dahl & Mai, 2011	*"Emotion: 1. Registration that an event is important. 2. An attempt by the person to establish, maintain, change or terminate the relation between the self and the environment on those matters that are important for the person"*

Researchers, over the past couple of decades, have focused on the association of emotional elicitations with memory (Lewis, Haviland-Jones & Barrett, 2010), through cross-cultural and primate studies, pointing out a typical list of basic emotions: fear, anger, sadness, joy, disgust and sometimes also, interest and surprise (Ekman, 1992; Oatley & Johnson-Laird, 1987; Panksepp, 1992). From the combination of these basic emotions emerged unique emotional items like: agony, grief, guilty and loneliness (Bower, 1992). The differences between one emotion and another are characterized by subjectivity and are influenced by perceptions, evaluations and desires (Arnold, 1960; Lazarus, 1966; De Rivera, 1977; Frijda, 1984, 1986; Roseman, 1984; Scherer, 1986; Solomon, 1976; Weiner, 1985). The effect of emotional multiformity on the evaluation and the automatic responses has consequences on the heart rate and respiration.

The impact of the emotional evaluation process can be conscious or unconscious in the attempt of understanding the world, through the appropriate reactions (Darwin, 1872; Cannon, 1996; Huang, 1999) including two major perspectives: emotions as consequences of product usage (cognitive appraisal) and as the evaluative judgment (Desmet & Hekkert, 2002; Hassenzahl, 2003; Tractinsky & Zmiri, 2006; Mahlke, 2008, Zhang & Li, 2004; Norman, 2004; Tractinsky, 1997).

Another two viewpoints of emotions, which are related to human experience is the cognitive appraisal that explains the subjective aspect (emotional) of an experience and can be conscious and unconscious, intentional and unintentional, generating and increasing human well-being throughout the evaluation process of the stimuli (Folkman et al., 1986; Kleinginna & Kleinginna, 2005; Arapakis, Jose & Gray, 2008). The second viewpoint of emotions is associated with somatic theories and bodily responses, which derive from the emotional reactions during a situation (Zajonc, 1984;

Arapakis, Jose & Gray, 2008). Emotions, throughout the cognitive and bodily reactions, are based on the following general factors:

- Goals: describe what the agent wants to achieve
- Standards: these are applied to actions as a basis of morality
- Attitudes: objects (including agents) can be liked (love) or disliked (hate)

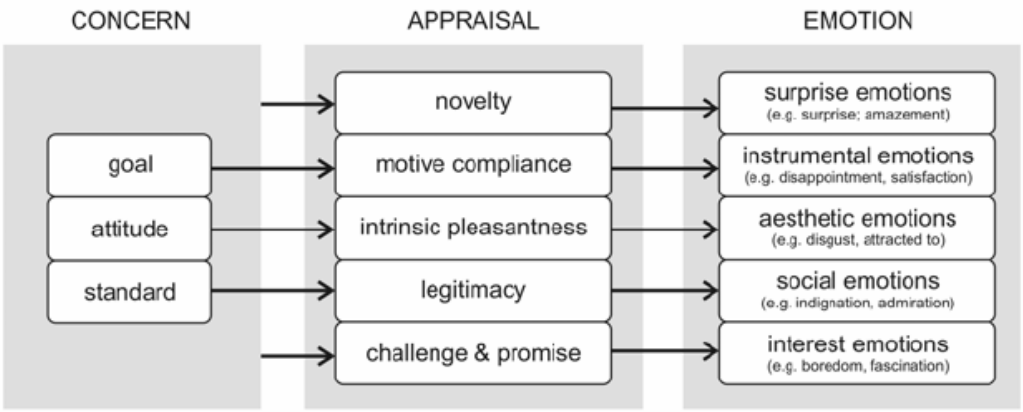

Figure 3. The Categorization of Emotional Diversified Layers (Desmet, & Hekkert, 2002)

Attitudes represent the liking or disliking disposition which derives from the standards and operate as connectors with the stimulus (Ortony et al, 1988). Standards regulate the way of the humans expect things to be and how they should act (Ortony et al, 1988). In most cases, standards are placed in an experienced social context and operate as evaluation factors to reveal the individual beliefs and separate the appraised products according to emotional elicitation (Desmet, 2003).

Emotions offer the ability of surviving a situation with the appropriate motivated behavior (Clore et al 2000; Damasio et.al., 2000), turn on the attention and the cognition, evoke memorable thoughts and shape the positive or negative outcome of the current stimulus. Negative events are typically memorized better than positive ones, tending to be highly arousing (Crawford & Cacioppo 2002).

2.3.1 Memory as a retrieval mechanism of previous emotional experiences

Memory is like a machine that evolves, encodes and retrieves the information about emotional experiences that is most relevant of individual's goals and concerns (Lazarus, 1991; LeDoux, 1996). The installation of memorable emotional events depends on the intensive stimulation during an experience (Conway, 1990; Rubin & Kozin, 1984) and is recalled more easily during a similar situation (Buchanan & Adolphs, 2002; Hamann, 2001). Negative experience retrieval is related mostly to case of survival and well-being on account of recalling of the appropriate information that will be helpful for any avoidance of undesirable consequences (LeDoux, 1996). Consequently, memory retrieval is related to stimulated positive and negative evaluation (Riemann & McNally, 1995) through the retrospective approaches and self-reports studies (Parkinson, Finscher & Manstead, 2004). In other words, memorable emotional experiences derive from:

- Imagination: the thinking process of elicited emotions in an experience
- Talking about past emotional experiences: the development of manifestation of the emotions through the discussion of the previous stimulated similar experience
- Empathy: the 'relationship' of someone with specific emotional patterns, which is associated with a particular experience
- Others' instructions on how be emotionally connected with something (Slater, 2010; Ekman & Stenstrom, 2004)

People mostly remember the positive or the negative impact of an experience rather than the actual experience itself, adapting to the relevant behaviour (Oishi et al., 1999).

2.3.2 The Association of Emotions and Stimulus

Emotional items are evoked by specific stimuli that belong to the present or the past (remembered) or by fictional stimulation. Fictional stimulation is related to events, objects and situations with specific meanings that are associated with particular emotions (Lazarus, 1995; Desmet, 2003).

A stimulus has two different dimensions: do-goals and be-goals. The do-goals dimension considers the usability aspect of the product related to tasks (make a phone call, find a book etc.). Be-goals focus on the self, why someone uses something, the meaning of a product-usage (being competent, being related to others etc.) (Hassenzahl, 2008). The be-goal dimension concentrates mostly on the fulfilling of human needs, and on how easily or difficultly needs are satisfied by the do-goals perspective.

The reaction to a stimulus has been characterized by some theorists in different ways such as 'judgment' or 'evaluative judgment' (Solomon, 1976, 2003; Nussbaum, 2003), or 'thoughts' (Spinoza, 1982; Neu, 1977). In social sciences, psychologists determine it as 'appraisal procedure', covering all the states of the emotional experience. Emotional experiences are not constituted only from emotion-items but also from moods and needs, integrating the human well-being. The mood state has a fundamental role in the stimulated experience, regulating the elicitation of the emotions (Prinz, 2004; Solomon, 1993; Derbaix & Pecheux, 1999). In other words, mood is the background of an emotional situation which determines the appropriated elicitation of the emotion.

2.4 Mood-state throughout Appraisal Experience

Mood has an impact on memory, evaluation process, seeking strategy, judgment, expectations, opinions and motivated behavior. Additionally, it can be considered as the background of the emotional judgment, with the internal and external filtering of an event (Derbaix & Pecheux, 1999). According to Lenderman (2006), mood-state plays a significant role in the measurable aspects of the SUX that determines the positive or negative impact (Prentice, 1987; Wicklund & Gollwitzer, 1982).

The difference between emotions and moods is that emotions represent the quality of a reaction, which has short, intense duration, in contrast to mood which lasts longer, is less intense and is in the background, affecting positively or negatively the individual (Zimmermann, 2008; Davidson, 1994). Moreover, mood is non-intentional and is not related to a particular object/action/environment, it is experienced more broadly, and is influenced by the experienced goal. Gwizdka and Lopatovska (2009) reported that better mood before and during the individual experience, results to the same better mood-state after the experience (Gwizdka & Lopatovska, 2009; Lopatovska, & Arapakis, 2011). Furthermore, moods have an influence on decision making, (Clore et al., 2001; Erber & Erber, 2001; Niedenthal, Setterlund & Jones, 1994, Brave & Nass, 2003); as a result, to determine the kind of the association between the stimulus and the emotion (Laurans, Desmet & Hekkert, 2009).

Memory retrieval and the encoding of thoughts are the determinants of mood-state; hence, they are associated more with mood items than with emotions. Accordingly, the recalling process of an experience is more consistent with the currently provoked mood-state, despite of the aroused emotions (Ellis & Moore, 1999; Thorson & Friestad, 1985; Bower, Gilligan & Monteiro, 1981).

In general, moods are the human state of being tuned with the world (Heidegger, 1993), tending to bias the experienced emotions (i.e. good mood → positive emotions) (Brave & Nass, 2003).

2.5 Needs and Goals throughout the Situational Experience

Emotions are depicted as the originators of the reactions in a situation, considering the satisfied needs, goals or concerns (Brave, & Nass, 2003). How an event is encountered, depends on the achievement of the subjective goals and on the satisfaction of specific needs, determining emotional elicitation (Stein et. al. 1994; Brave & Nass, 2003). The determining of the goals and needs generates the motivation of the experience of achievement, leading to a positive or negative impact (Desmet, 2003).

Maslow (1968) structured the needs into a hierarchy of eight groups:

- Physiological: hunger, thirst, bodily comforts, etc.
- Safety/security: being out of danger
- Social: to affiliate with others, to be accepted by others
- Esteem: to achieve, be competent, to gain approval and recognition
- Cognitive: to know, to understand, and explore
- Aesthetic: symmetry, order, and beauty
- Self-actualization: to find self-fulfillment and realize one's potential
- Transcendence: to help others find self-fulfillment and realize their potential (Maslow, 1968)

Through this well-known hierarchy, Maslow explains that the fulfillment of the needs results into satisfaction, distinguishing needs into (a) functionality level, (b) usability level and (c) pleasure level (Maslow, 1943).

Needs are relevant to the stimulus content consisting of excitement, appeal, fun, novelty and change (Logan, 1994), from the challenge, curiosity and emotional connection (Malone, 1981), and from the surprise, diversion, mystery, intimacy, influencing the experience and the interpretation of inner-self (Gaver & Martin, 2000).

Needs shape the instrumental and non-instrumental qualities of a stimulus, providing the correlation of the stimulus' attributes with needs and expectations (Zimmermann, 2008). Moreover, goals and needs depend on and are influenced by knowledge, life cycle and biological factors, determining the effort of achievement (Emmons, 1986; Ryan, Sheldon, Kasser & Deci, 1996).

Goal achievement and need fulfillment are included into the general frame of satisfaction level, which is considered as a part of the appraisal procedure (Schwab & Cummings, 1970).

2.6 Appraisal Patterns via Emotional Experience

Emotions are the experienced components which tend to be unified into a symbolic package. This package is restored when an individual has a similar experience, which is enriched with new components (somatic experience, affective phenomenology, environmental determinants, appraisals of significance, normative social appraisals, self-management, communication and symbolization, social management (Lewis, Haviland-Jones & Barrett, 2010). Each experience is recognized by metaphors, characteristics, and symbolic significances that describe the meaning of an experience, eliciting the appropriated emotions throughout the appraisal procedure (Lazarus, 1991).

Appraisal is mostly implemented in a variety of processes such as: evaluation, automatic evaluation, affective judgment, affective reaction, and primitive emotion (Chen & Bargh, 1997; Cacioppo, Gardner & Berntson, 1999; Zajonc, 1980).

Appraisal theories argue that emotions do not emerge from an event per se, but through the interpretation of the current event, giving an explanation beyond the experience, associated with the satisfied needs (Desmet, & Hekkert, 2002). Appraisal procedures operate as interventions between stimulus and emotions, present the reflections of the stimulus attributes on individual character (Smith & Lazarus, 1990), and determine the significance of a situation through the SWB (Desmet & Hekkert, 2002; Frijda, 1986).

There are two kinds of appraisals that trigger the human nervous system. The first is the organizational (primary appraisal), which positions the individual in a direct, automatic and unconscious activation mode of preparation, and which includes the basic emotions (joy, anger, sadness, fear etc.). The second kind of appraisal is the informational (secondary appraisal), which concentrates on the cognitive process and approaches under the related behavior. Both kinds of appraisals answer the questions of how someone feels throughout an experience.

Le Doux et.al. (1998) came up with another two kinds of appraisals. The first is known as ‘the low road’ (fast appraisal), in which the individual is prepared quickly for ‘fight or flight’ responses. The second kind of appraisal is more complicated, concerns the result of the stimulus evaluation which is filtered through a number of parameters:

- Is the current stimulus emotionally important?

- Is the stimulus useful for my goals/needs or action?
- How does a stimulus affect emotions negatively, consequently influencing my cognitive process and general well-being (Le Doux, 1998)

Except from the above parameters, Ekman (2004) suggested nine categories of appraisal procedures:

- Automatic Appraisal – meddling with specific goals that produce automatic emotions.
- Reflective Appraisal – the direct decisions or emotional state when something currently happens.
- The memory of a previous emotional experience- retrieving the appropriate emotional alternations.
- Imagination – the thinking procedure, connecting a stimulus with an elicited emotion.
- Talking about past emotional experiences – the expression of emotions can result in the manifestation of emotional consequences.
- Empathy – the evoking of emotions felt by someone else who is in a particular emotional state.
- Guidance from others to create specific emotions about something.
- Violation of social norms – could result in anger.
- Voluntarily assuming the appearance of emotions –theories suggested that facial expressions of one can generate similar emotion to another, for example smiling can make another one happy.

According to Desmet (2002), appraisal theory is based on the traditional definition presented in a basic model about the positive and negative consequences of human interaction, constituting of three variables: concerns, product, and emotions (Desmet, 2002).

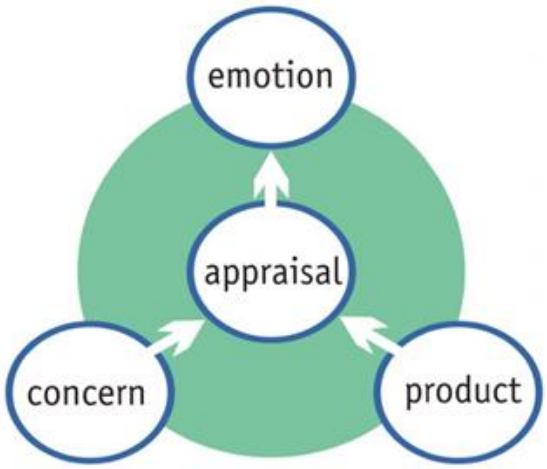

Figure 4. Three General Key Elements Present in the Emotional Arousal Process (Desmet, 2002)

Concerns are described towards the included dispositions of the emotional procedure and correspond to the related stimuli (one concern corresponds to one product) (Lazarus, 1991). Different types of concerns are defined in the research literature like: needs, motives, goals, values, drives, instincts (Scherer, 2001). Concerns are regarded as references of stimulus attitude through the appraisal procedure that determine the well-being (Desmet, 2002).

Appraisal patterns emerge via self-reports, open-ended questions and more structured implementations (Lazarus, 1995; Laurans, Desmet & Hekkert, 2009). One implementation of appraisal procedure is verbal sharing, where individuals share and discuss their emotions with others. Bernard Rime and his colleagues (1991) argued that emotional experience tends to be easier when it is expressed to others, a process called social sharing. In their studies, they concluded that 88-96% of remembered emotions

were verbally shared with others. When the emotions are shared with others, there is an effort to define, categorize, and conceptualize the emotional elements of a specific experience, without any decrease of their intensity; contrariwise, the emotional sharing process enhances and extends the meaning of the experience. Therefore, by communicating the emotion to another person, the relationship between the individuals lasts longer and is characterized by an in-depth sense (Rime, 2009). Pennebaker (2012) found that expressing the emotions of an experience via writing or talking, works as a therapeutic treatment for humanity (Pennebaker, 2012).

According to Bradburn (1969), appraisal patterns are not polar opposites, but separable, associated with different aspects of an individual's characteristics (Bradburn, 1969). They emerge from a conscious and unconscious procedure and determine subjective well-being through the understanding and interpreting relationship with the surrounded stimulus (Folkman et al., 1986; Kleinginna & Kleinginna, 2005; Arapakis, Jose & Gray, 2008)

2.7 The Well-Being Impact in the Emotional Evaluation Procedure

Subjective Well-Being (SWB) is defined as the self-evaluation of the moment by moment experience, divided into positive or negative influences (Kahneman, 1999; Diener, Lucas & Oishi, 2002). People evaluate their lives using memorable experiences throughout a retrospective cognition (Diener, Lucas & Oishi, 2002), aiming at mental and emotional judgment of life satisfaction, concluding into SWB (McGillivray & Clarke, 2006).

SWB is determined through three processes: evaluation, experience and eudemonic. The evaluation approach deals with the assessment of real life in general, or of a spe-

cific situation, generating knowledge for a subjective evaluation of the experience. The eudemonic approach describes from a psychological perspective the assessment of the inner-self, self-effectiveness, sense of purpose etc. (Conceição & Bandura, 2008).

SWB is defined as the vital procedure of the sensory cognition through the reactions with different stimuli (traits, activities and mental resources), resulting in a specific achievement (Conceição & Bandura, 2008); in other words it is viewed as a description of the state of people's life situation (McGillivray, 2007).

Dodge and his colleagues (2012) associated the SWB with the resources and challenges emerging from the balance between the correspondence of necessary psychological, social and physical items (Dodge et.al., 2012). When challenges are more than resources or vice versa, SWB is unbalanced, influencing the quality of life (Conceição & Bandura, 2008).

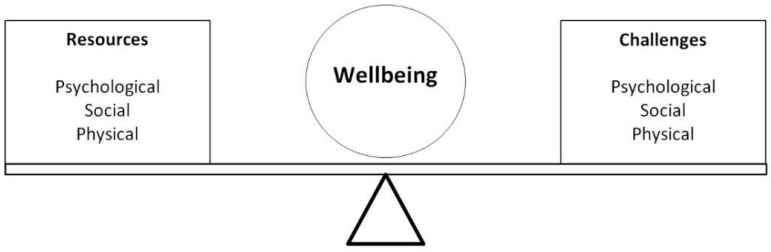

Figure 5. The Balance Between Personal Resources and the Faced Challenges (Dodge et al 2012).

There are four components that make up SWB (Conceição & Bandura, 2008): (a) pleasant emotions, (b) unpleasant emotions, (c) global life judgment, and (d) realm satisfaction.

The measurement tools of SWB are divided into objective and subjective. Objective measurements concentrate on individual requirements and how these can be achieved. Subjective measurements focus on the evaluation of the aroused emotions by asking each individual personally how he feels, gathering different responses from participant to participant. The level of SWB is based on standards (Michalos, 1985) and on previous memorable experiences. If the verification of the emotional impact is positive, this is associated with a high level of SWB. If not, then the level is low. This has an essential role in social experiences where the flow is consecutive through the mental procedure (Wood, Taylor, & Lichtman, 1985; Diener, Lucas & Oishi, 2002). SWB is measured mostly by self-reports consisting of single or multiple item scales, clarifying the experiential emotional consequences (Diener, Lucas & Oishi, 2002).

A number of theories consider that SWB is high when an action reaches an end state. This end state represents the satisfaction of biological drives, psychological needs or motives (Maslow, 1954), or of conscious goals (Murray, 1938; Emmons, 1986), which depend on the context of the environment (Diener, Lucas & Oishi, 2002).

2.8 Virtual Experience in Immersive Worlds

Virtual experience has a strong impact on emotional and behavioral alternation. VWs are sets of programs run on computers, where residents can interact and exchange information, and gain more awareness about new lifestyles in a virtual manner (Lynch, 2011).

The most famous types of VWs are massive, online multiplayer role-playing games (MMORPGs) like World of Warcraft, and the more creativity-oriented VEs (COVEs) like SL (Bainbridge, 2007; Ducheneaut, Wen, Yee & Wadley, 2009). The first clues

of VEs date back to pre-historic years, and are to be found in paintings in caves depicting scenes similar to theater, opera or novel, where a person is immersed in a "different world". There is an intense feeling of fiction, symbolized as a heaven or Dionysian ecstasy, escaping from real life rules (Boellstorff, 2015).

The broadness of VEs is evident in the many different options and opportunities, allowing them to be widely used by businesses and other international organizations (Google, Microsoft etc.). Moreover, VEs are investigated by scholars in disciplines as diverse as law, sociology, psychology, math and, more recently, information systems (Durlach et.al. 2000). In research, immersive worlds are utilized to examine the subjective behavior, social issues, economic and political factors, and a variety of topics related to collaboration, presence, embodiment, and similar aspects of 'user experience' (Knoll, 2007; Durlach et al. 2000; Turner & Turner 2006).

Virtual behavior is identified somewhat differently than physical behavior, providing insights to people's experiences. The observations and theories about virtual behavior can be informed, but not be characterized by the real-life behaviors. In other words, virtual behavior takes place behind a computer screen, so it cannot be characterized by the physical attributes that are used to identify traditional behavior (Blanchard, 2004). Weick (1979) pointed out that virtual behavior operates as the exchange of messages, causing two major effects: same time communication (at least between two persons) and the consideration of the outcome content: information, support, sense making, coercion, or request for help.

Virtual behavior through the design and interaction process led researchers carry out studies on psychological aspects, concluding that positive approval by others produces positive effects, improving the immersive experience (Koda, 2007). Caroll (2004)

identified the immersive worlds as something fun, which attracts, captures and holds the individuals attention, offers surprises and challenges affecting the emotional state. The fun elements consist of attractive metaphors, irresistible content, graphics, animated and satisfied sounds and images (Shneiderman, 2004; Carroll, 2004; Scollan, 2007).

In other words, virtual behavior depends on three basic factors, (a) time, since anyone has access to the VW anytime (b) place, which depends on presence and social interaction between the participants and (c) objects, through their relationship with the users. Moreover, the usage of computer and its characteristics with the access capability influence, too, the immersive behavior (Blanchard, 2004).

VWs are designed as a continuous streaming worlds, imitating real life, and combining, at the same time, fictional places in an attempt to increase the sense of freedom. There are three aspects of freedom in VWs:

- Freedom to play: the freedom of the player to interact and communicate with others through the avatar representations.
- Freedom to design: the resident is free to plan, create and continue the VW existence.
- Freedom to design together: describes the freedom that designers and players have to design and increase the game capacity.

Several authors have classified the reasons of immersive attractiveness, as follows: 3D graphics, animations, different types of communication and collaboration approaches, features for the personalization and customization of new objects (Photiadis

& Zaphiris, 2014; Koutsabasis et.al. 2012); concluding in three basic traits that make VWs so unique:

- Inhabitants have the opportunity to communicate with each other in real time.
- Inhabitants have the flexibility to customize from scratch their virtual representations, concluding to an avatar similar to their own appearance or very different.
- Inhabitants can explore the VE gaining a familiarity with the content and with the handling of the tools (Kaplan & Haenlein, 2009).

One of the VWs that is popular and widely used, is Second Life (SL), which includes many principles of behavior and where everyone can interact and act freely (Kaplan & Haenlein, 2009).

2.8.1. Second Life

SL is a well-known, virtual social environment, founded and managed by the company of Linden Research in San Francisco. SL users have a broad range of types of interaction including, gaming, communication and designing, separated into public and private participation (closed group, where someone has to be a member) (Conners, 2009). The characteristic of SL provide the opportunity to citizens to create content, activities, and to collaborate with each other (Jennings & Collins, 2007), and thus investing a significant amount of emotions through the virtual experience, trying to keep their virtual presence positive (Lynch, 2011).

SL is used by over 200 educational institutions throughout the world and is estimated to have over 15 million users (Baker, Wentz & Woods, 2009). It is considered as a supportive tool for enhancing the quality of education, as it offers features which help

students increase the sense of reality in the context of learning (Jarmon, Traphagan, & Mayrath, 2008; Riedl, Bronack & Tashner, 2005; Squire & Jenkins, 2003; Erlandson, Nelson & Wilhelmina, 2010)

SL participants can install it for free, and have the opportunity to design more than one avatar. Furthermore, the existence of virtual money - Linden Dollars (L$) (Kaplan & Haenlein, 2009) offers a more advanced quality of participation (Conners, 2009).

Except of the avatars, SL citizens can design their places and objects, to shape their "relationships" with the environment and with others, providing, at the same time, their cultural background and their personal desires and beliefs. (Heinrich, 2007).

A number of researchers focused on virtual participation in SL, exploring the emerged behavior by dividing the interaction into: interaction between users, interaction between participants and technology, the rational interaction-choices in the environment, and the contextual impact on communication practices (Baym, 1995; Hollingshead & McGrath, 1995; Markus, 1994; Walther, 1992; Wellman & Gulia, 1999). Moreover, there are studies of group virtual experiences into (a) collaboration and participation of the attempt of groups maintenance (Kollock & Smith, 1994; McLaughlin, Osborne, & Smith, 1995; Smith, McLaughlin, & Osborne, 1998), (b) determination of virtual communities (Q. Jones, 1997; Liu, 1999), (c) identification of members (Myers, 1987), (d) experimentation with different online personas (Turkle, 1995), impression of the establishment and management (Douglas & McGarthy, 2002; Hancock & Dunham, 2001;Walther, Shorack & Tidwell, 2001), (f) creation of online friendships (Utz, 2000) and (g) the movement of the relationships from computer mediated communication to other media (Parks & Floyd, 1996).

The broad acceptance and participation in SL explains their existence in a variety of actions that influence several areas of actual life such as: education, work, leisure developing, at the same time, many different forms of communication (Barker 1978a; Wicker 1987, 1992). The common features of these actions are the emotional attachments, belongings, influences, integrations and satisfied needs, elements that describe each community separately (Mann, 1978; Schuler, 1996).

'Emotional attachments' describe the role of emotions in VWs that are important factors of 'human-immersion engagement' where several emotional relationships (marriage, friendship and even divorce) can develop, and psychological diseases can be treated (Turner, Grube, & Meyers, 2001; Baym, 1995; Rheingold, 1993a, 1993b; Finholt & Sproull, 1990; Pickering & King, 1995).

This variety of emotional associations between human and virtual interaction leads to the determination of a specific, predicted sequence of behavioral patterns (Wicker, 1992) that depend on the time and place; which are constituted by the interaction between individuals and stimuli. Emotional engagement focused on positivity, through the achievement of specific goals and satisfaction of needs, tending to generate a concrete relationship between human and stimulus (Blanchard, 2004).

The association of between an individual and the immersive experience is begun through the chosen or customized avatars (3D illustrations), allowing users to create a virtual human in any desirable way (Schroeder & Axelsson 2006; Photiadis & Zaphiris, 2014; Dillenbourg, Schneider & Syneta, 2002). Avatars customization is based on humanoid forms, animals, inanimate objects or hybrids (Bell, Castranova & Wagner, 2009; Gottschalk, 2010).

2.8.2. Avatar Design

Avatars are considered as central to the experiences in VWs. However, few research studies have investigated their impact on individual cognitions, behaviors and well-being. Contemporary research investigated the impact of avatar on communication skills on task performance (Yee & Bailenson, 2007), on gender approach (Behm-Morawitz & Mastro, 2009) and on health behavior (Fox & Bailenson, 2009b; Fox et al., 2009).

The expression "Avatar" originates from the Hindu ‘avatara’, meaning the descendant of God or incarnation. An avatar is not just a label or a name, it represents the desired personality of its owner (Martin, 2005). In other words, avatars can be considered as user-controlled manikins (Date, 2010).

The view of an avatar operates as an indicator of its owner’s self-perception (Vasalou, Joinson & Pitt, 2007). This 'need of positive recognition' derives, mostly, from the social perspective (Hjelle & Ziegler, 1976), and the aim for community acceptance. Markus and Nurius (1986) expressed the belief that 3D environments are places where individuals present and investigate themselves through the avatar design procedure and interaction (Markus & Nurius, 1986).

Avatar design or selection tends to balance the mirrored actual appearance and behaviors with the imaginative ones, embodying a message through the appearance and the act of roleplaying in the VW (Vasalou et al. 2008). Jin (2009) concluded that avatars are choices with subjective meanings in a socio-cultural world that enhance the rooted relations with their creators (Wolfendale, 2007; Kafai et al. 2010).

The impact of avatar appearance in VWs has been examined in relation to the social framework (Garau, 2003, Jacobson, 2006; Wan & Chiou 2006; Turkle, 1995; Banakou, Chorianopoulos, & Anagnostou, 2009). Social science research confirms that individuals associate the physical appearance of a product with its attributes (Gladwell, 2005). This is applied in immersive worlds, where the attractiveness of an avatar is indirectly connected with its owner's character and behaviour, enhancing the motivation to increase the virtual communication skills. Social interaction is a principal characteristic in VWs, since residents can communicate and share their knowledge verbally and non-verbally through text, graphical icons, visual gesture and sounds (Jone, 1968).

Similar research studies agree that avatar design experience from the social perspective can be helpful in the exploration of the individual attitudes, beliefs and behaviors (psychological state, emotional state and identity), increasing the meaningful relationship between the avatar and its owner (Behm-Morawitz & Mastro, 2009; Fox & Bailenson, 2009a; Fox & Bailenson, 2009b; Chandler, Konrath, & Schwarz, 2009). The emerged relationship can provide positive emotions, affecting the mental and physical health, creating a connection between the avatar body with physical body (Gilbert, Murphy, & Clementina Ávalos, 2011; Biocca 1997).

Anthropomorphic virtual humans with a clear gender were more attractive, credible and homophilous, characteristics which determine the social settings (Nowak & Rauh 2005). Large pupils and slow eye-blink are considered more attractive and sociable (Weibel, Stricker, Wissmath, & Mast, 2010), while older avatars are perceived more intelligent and trustworthy (Marin, Jo, & Lee, 2013). The more attractive and elaborated avatars are, the more socially acceptable they are, thus receiving more favorable

ratings in VEs (Banakou, Chorianopoulos, & Anagnostou, 2009; Behrend, Toaddy, Thompson, & Sharek, 2012; Hasler, Tuchman, & Friedman, 2013).

Commercial VEs like SL, provide menus of choices for selecting different, standard types of avatar and for their customization such as clothes, hair and several other characteristics. A high level of immersion in these worlds is facilitated by user interfaces that provide better performance and experience (Blascovich, 2002).

During the immersion, the external appearance of an avatar can be changed, allowing their owners to achieve a higher comfort level in the social environment. There are four reasons that avatar appearance changes: for events (seasons, occasions), affiliations (sports-group, company), social reasons (awareness, national reasons) and status (points, color, demonstrations of beauty or wealth) (Danzico, 2010).

One significant factor that influences the avatar design procedure, is the determination of role-playing, embedding the individual-self in the environmental rules. Schultze and Leahy (2009) characterized the virtual role as: (Schultze & Leahy, 2009):

- Bodies that have a form (human, animal, and machine) and features (shape, skin, eyes, hair) and that are available to be customized.
- Bodies that can use objects like clothes, furniture, weapons and currency.
- Virtual interaction, receiving messages and vice versa.
- A personality which includes a name, group affiliations and interest.
- A changeable camera changing the virtual eyes of the user.
- A voice, an open and private chat, a note card and textures.

Avatar presence is measured as either objective or subjective. Objective measurements include the investigation of the impact of VWs, without the inclusion of the

psychological aspect. Subjective measures involve direct and indirect questions about elicited emotions during 3D experience (Darwin, 1872; Cannon, 1996; Huang, 1999). A large part of the emotional impact in VWs is influenced by the 'right' being that is, social acceptance and how well the personality is expressed (Taylor, 2002).

Vasalou, Joinson, and Pitt (2007), suggested that there are different aspects of avatars, classifying them into the private aspect of the self and the public expression. Private aspect originates from the interpersonal, conscious communication revealing the inner-self. Public expression instigates the way of avatar existence as a social entity (Vasalou, Joinson & Pitt, 2007; Vasalou & Joinson, 2002).

However, the impact of avatar experience on the emotional and behavioral state is missing from recent research leading to the aim of the current dissertation that sets off to identify the virtual well-being for better a understanding of the affordances of the immersive spaces, providing new knowledge of designing, management and evaluating virtual experiences.

2.9 The Tools/Methods of the Emotional Measurement

The numerous definitions of emotions resulted in a broad range of experimental studies and methodologies that investigate the role of the emotional impact in different fields. Throughout the psychological perspective, emotions were firstly examined through the observation of the galvanic skin and pupil response, the quantity of salivation, stomach pressure, pulse, cardiac output and electro-physiological parameters (Lader, 1975; Konzett, 1975; Shagass, 1975). Due to the nature of emotions, the ideal way to investigate emotions is to measure (Scherer, 2005):

- All the nervous levels of emotional changes

- All the caused reactions which are produced in the neuroendocrine, autonomic and somatic nervous system
- The alternated motivations which derive from an appraisal procedure
- The facial, vocal and bodily clues
- The subjective experience, according to the above elements

The accurate implementation of the above methodological stages has not been achieved yet, and especially in the area of immersive environments (Larsen & Fredrickson, 1999). The following section provides an overview of the methods that have been implemented to examine the emotional effect from different perspectives (neuro-physiological signal processing, observer and self-report methods).

2.9.1 Neuro-Physiological Signal Processing Methods

This approach includes the bodily reactions to emotional stimuli, by collecting data from brain activity images, pulse rates, blood pressure or skin transmission readings. The data collection is achieved from simple sensors (finger monitoring pulse) to more invasive sensors (electrocardiograph, blood pressure and electroencephalogram). The advantage of this method is that it can collect data that cannot be captured through another sensor channel (Bamidis, Papadelis, Kourtidou-Papadeli, Pappas & Vivas, 2004).

2.9.2 Observing Methods

The current method proposes a way of gathering emotions through facial, vocal and gesture signals as a result of the emotional elicitation. Ekman and Freisen (1975) argued that the first medium which expresses and projects the influential emotional stimulation is the facial nerves. Facial nerves offer and receive attendance especially

throughout a social experience (Ekman & Friesen, 1975; Russell et al., 2003). Charlies Darwin and Paul Ekman (Darwin, 2005) are the two researchers who have studied emotional recognition through the facial expressions using the observation methods.

2.9.3 Self-Report Methods

These methods concentrate on the description of the emotional experience through the questioning method. The self-report methods rely on the ability of identification and sharing of the aroused emotional elements (Kahneman, 2000). Self-report methods are efficient and easy techniques used to collect emotional data and, in combination with retrospective approaches, are considered the most accurate methodology (Klein et al., 1999).

There are two types of self-report methods: the discrete and the dimensional approach. The discrete approach is based on linguistic categories, lists of emotions that can describe the experience. Research studies on discrete approaches were carried out by Stephane Klein (1999) and by Joselyn Scheirer (2002) (Klein et al., 1999; Scheirer et al., 2002). With regards to ensuring the efficiency and standardization of the data collection, the discrete approach has several disadvantages: (a) the possibility that one or several response alternatives may bias the respondent selections, (b) the situation when a respondent wishes to refer to a category that is not provided in the list, and (c) the situation when a respondent may be unfamiliar with the labels chosen by a researcher (Scherer, 2005). The second type of self-report methods is the dimensional, which was used in HCI research by Peter and Herbon (2006), examining emotions in two dimensional areas: arousal and valence. This method is accurate and useful, obtaining a high level of precision. However, the disadvantage is that it is difficult to collect and analyze qualitative data from the quantitative statistical responses (Scher-

er, 2005). To avoid this disadvantage, this method is often combined with additional techniques like interviews and thinking aloud protocol methods (Lopatovska & Arapakis, 2011). Interviews are conducted after the experimental process, implementing different types: one-by-one interviews or group interviews to gather a more comprehensive view of the experience of participation (Wilson et al., 2002).

Another self-report technique is the responding to questionnaires before and after the study, including open-ended questions where the participants describe freely their thoughts and opinions, while retrieving the memorable emotional episodes (Kuhlthau, 1991).

In previous research assorted questionnaires of emotions have been established:

- Self-Assessment Manikin (SAM), which is a non-verbal scale, but includes schematic manikins, which describe the different states of emotions (Bradley & Lang 1994).
- Geneva Emotion Wheel, verbal-self report, including 20 emotional elements which are available in different languages (Scherer, 2005; Laurans, & Desmet, 2008).
- PrEmo tool, which measures non-rhetorical emotions, representing them as animations describing the user experience (Desmet, 2005; Desmet & Dijkhuis, 2003).
- LEM measurement tool, which is based on related principles focusing on websites (Huisman & Van Hout, 2008).

Bartneck (2002) applied the cognitive structure of emotions (OCC model) adapted from Ortony, Clore and Collins (1988), focusing on 5 stages of an emotional experience:

- Classification: describes the categorization of an event, object, or action based on its emotional impact
- Quantification: how high to low the intensity of an emotion is
- Interaction: this focuses on the interaction between classification and quantification, and the different elicited emotions
- Mapping: expression mapping with 22 categories
- Expression: considers facial expressions

Another popular measurement tool is the PANAS (Positive Affect and Negative Affect Scale), which consists of 10-time scales measuring the positive and negative impact throughout an experience (Lopatovska, 2009b; Watson et al., 1988; Lopatovska, & Arapakis, 2011).

2.10 Theoretical frameworks

2.10.1 Hedonic Research Framework for User Acceptance of VWs

The hedonic framework is implemented in explaining user acceptance of VWs, recognizing the potential of the emotional and the imaginal responses based on hedonic theory. Hedonic theory is established to investigate consumer behavior, to understand and interpret the reasons why an individual forms the intention to consume a product, from aesthetic perspective. This is driven by two classes of ingredients, the imaginal and the emotional responses. The imaginal responses refer to fantasy, role-projection and escapism (Hirschman, 1983) and the emotional respectively, to enjoyment, emo-

tional involvement, and arousal (Titz, Andrus & Miller, 2002; Holsapple & Wu, 2007).

Fantasy can be considered as the imagined events, places, stimuli in general, combining fictional and reality components (Conrad, 1966), role projection regards on individuals' attend to project themselves through a particular roles or characters, escaping from real life (escapism), fulfilling their desire to distract from problems and pressure. Enjoyment is determined through an activity, behaviour, performance which provides pleasure and joy consequences. An important part of the emotional responses is the emotional involvement, which is defined as the degree to which a person is emotionally engaged in a specific behaviour or action. Lastly, the arousal ingredient refers on the emotional and mental activation by an external sensory stimulation.

The hedonic framework helps to identify the human factors, focusing on positive behavioural experiences according to emotional and imaginal responses, concluding to the individual acceptance of VWs. Following the current framework leads on underlying of individual's intention to utilize the VWs, offering a unique perspective of the VWs development, management or evaluation (Holsapple & Wu, 2007).

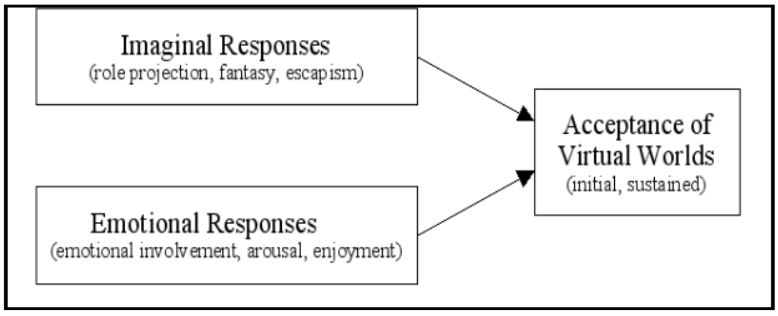

Figure 6. Hedonic Research Framework for User Acceptance of VWs

2.10.2 Dispositional Theory of Moods (DTM)

There are several different theoretical approaches that explain mood experience, but the current study draws from the dispositional theory of mood. DTM provides the mood-state as a temporary disposition to respond to a wide variety of situations with emotional experiences that correspond to the mood (Siemer, 2009). DTM describes the response tendencies, to have or to generate particular kinds of cognitions, specifically to make particular kinds of emotion-relevant appraisals. These appraisal theories cause or constitute the mood experience.

DTM distinguishes between (a) mood per se, which it identifies with the temporary appraisal disposition and (b) the mood-caused cognitions and emotional experiences, following that mood experiences are derived from different appraised stimuli in parallel or in succession (Reisenzein & Schönpflug, 1992). In other words, a person's mood experience is directed at multiple stimuli to appraise, having a more general impression. The relation of mood-experiences to their multiple stimuli also differs in a number of other significant perspectives in relation of emotion experience and their stimuli.

The amount of DTM's implications is interesting, for example, some cognitional consequences, are considered as the features of mood-experiences. Moreover DTM proposes that moods give reasons for emotions in specific experiences, creating two cases (a) the cause of an emotion and (b) the justification of an emotion (Frida, 1993), regarded as mood-experience.

DTM is a resourceful theoretical model that is able to explain mood-experience in different situations explains the relation between moods and emotions and makes a

number of novel predictions (Clore et al., 1994). In general, this theory assumes that moods consist of temporary dispositions with the relevant emotions, and in contrast with emotions that concentrate on specific stimuli, moods are elicited from a multiplicity of factors that influence the whole emotional and behavioral progression.

2.10.3 Lazarus Theoretical Framework of Appraisal (LTFA)

Lazarus (1991) proposed a theoretical model to explain how attitudes might be linked to the behavioural intentions, including the appraisal process, and the emotions. The current framework is extended to the areas of perceived quality and satisfaction. An individual aims through the type of behaviour or action to achieve a certain desired outcome, to maintain or to increase the level of satisfaction, fulfilling an amount of needs. This effort is derived from the appraisal process which follows by a coping response. A coping response can be identified throughout the behavioural intention to achieve the desirable outcome.

For example, a person makes an appraisal procedure of specific stimuli that will be followed from the appropriated emotional response aiming on increasing or maintaining the level of satisfaction, concluding into related behavioural intentions (coping responses). More simply, an initial service evaluation (appraisal) leads to an emotional reaction that in turn, drives behaviour (Kelley & Davis, 1994). Adapting the LTFA in a specific situational context suggests that the more cognitively oriented context quality and value appraisals precede satisfaction (Gotlieb, Grewal, & Brown 1994).

Figure 7. Lazarus Theoretical Framework of Appraisal (LTFA)

The reasons of the inclusion and the combination of the current theoretical frameworks was based on the attempt for better and an in-depth understanding of the emotional and behavioral patterns, exploring, interpreting and explaining the subjective perspective of the virtual experience. Through this perspective is provided the impact of the immersive involvement, identifying the behavioral responses that motivate the individuals to be engaged in VWs, aiming on the emerged positivity, enhancing, at the same time, the 3D acceptance and involvement. The present frameworks propose three dimensional perspectives that are inclosing the appropriated components on the determination of the VWB, covering all the behavioral aspects around the virtual experience, that maintain or increase the positivity in 3D spaces. In other words, these theoretical frameworks offer the knowledge for developing a comprehensive overview, via the emotions, moods and needs, of an emerged positive behavioral 3D experience, presenting the reasons to understand of what are the factors that motivate a user to interact in VWs and how this interaction can be enriched its quality and duration. Moreover, the implementation and the grouping of the current frameworks offers a way for gaining a significant awareness about what is happening and establishing the individuals' virtual well-being, recognizing the meanings, the emotional and the behavioral outcome, providing the influences of a positive virtual participation and interpretation.

2.9. Chapter - Summary

This chapter began by presenting a range of theories and research based on emotional experiences. This review drew together what is formally known about the user experience, psychology of emotions and VWs. In general, there is considerable research on emotional behavior in different areas using different theories, methods of studying

emotions based on the respective contexts. However, the impact of virtual experience on well-being is limited, complex and challenging when it comes to immersive experiences and especially on the correlations and the influences of emotions on human virtual behavior. This gap, explains the aim of the current study, i.e. to investigate in-depth the foundations and applications of emotional behaviour and the degree to which they contribute to well-being.

In other words, this study sets off to identify well-being in VEs, expecting to supply designers, psychologists, researchers and practitioners with better understanding of the affordances of the current environments, leading to a new perspective of their use. Since the significant question is to identify the well-being in VWs, this research study intends to examine the emotional and behavioral patterns of immersion in a 3D world; investigating the configuration of the emotions, moods and needs before, during and after the virtual experience. The outcome of the current investigation is knowledge that provides new material to designers and practitioners for future implementations.

Chapter 3: Methodology

This chapter presents the research methodology of this study, aims at the investigation of the main research purpose through the implementation of three theoretical frameworks (Holsapple & Wu, 2007; Siemer, 2009; Lazarus 1991). The adopted framework examines VWB before, during, and after VWs experience, under three experimental studies consisting of pre- and post- diaries, interviews, online questionnaires and retrospective observations. Data gathering achieved via quantitative and qualitative approaches, contributes to a novel theoretical framework for the analysis of emotions, moods and needs within VWs. Furthermore, the present research leads to an advanced understanding of human emotional behavior throughout a virtual experience in a social immersive environments.

3 Methodological Procedure

3.1 Overall Methodology Procedure

The research questions of the first methodological study focus on identification of the aroused emotions, moods (Ortony & Turner, 1990; Mayer & Gaschke 1988) and satisfied needs (Maslow, 1943) before, during, and after avatar design procedure and interaction in SL environment. The outcome of the current study is a list of emotional components generating the individuals' emotional profile of pre- and post- virtual experience (avatar design and interaction), which is enriched by a semi-structured interview data. Apart from the identification of the emotional profile, the study also concentrated on avatar's impact during the interaction, and on an overall assessment of the immersive participation.

The second study focused on the triangulation of the questionnaires, retrospective observations and semi-structured interviews, achieving an in-depth analysis of the correlation between emotional and behavioral appraisal patterns. The current methodological stage consists of a mixed methods sequence and emphasized on the qualitative analysis, associating the emerged emotions, moods and satisfied needs with particular actions/behaviors during virtual experience.

In both research studies, the quantitative data were analyzed statistically; using the Statistical Package of Social Science (SPSS) and the qualitative analysis was carried out using the computer software NVivo. The combination of the quantitative and qualitative analysis was to gain more accurate and valid interpretation of VWB before, during and after the immersive social experience.

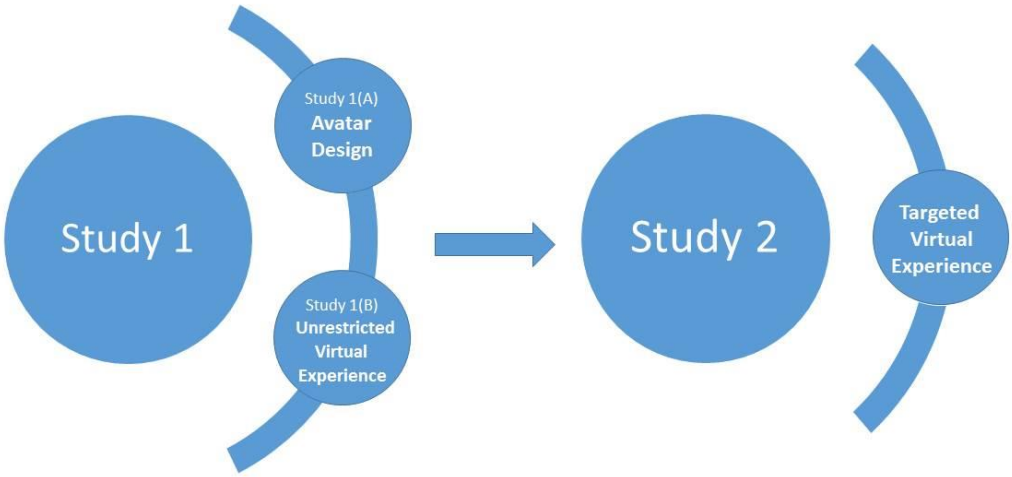

Figure 8. The Sequence of the Methodological Research Studies

The subsequent chapters of the methodology report are structured according to the steps shown in Figure 8. For each phase there is a section that describes the method, followed by a section on the results and a final section with a discussion on the key-findings of each study based on the adopted theoretical frameworks.

4. Study 1(A) – The Identification of the Emotional Profile Before and After Avatar Design Procedure

The first part of the methodological study 1(A) examined VWB (emotions, moods and needs) before and after avatar design procedure determining, at the same, time the impact on virtual participation. This was achieved through the pre- and post- test measurements, questionnaires and interviews. Thirty participants designed their avatars, rated their emotions, moods and needs before and after the customization process and with its completion, they responded to open-ended questions through the interview method. The current study was based on the following research sub-questions:

• *Sub-RQ1: What emotions and moods elements are elicited throughout the correlation of the pre- and post- avatar design procedure?*

• *Sub-RQ2: How satisfaction quality is identified before and after virtual human development?*

• *Sub-RQ3: How does avatar existence influence, emotionally and behaviorally, the virtual experience?*

4.1. Methodology Procedure

The methodology process included an exploratory study that attempted to identify the aroused emotions, moods and satisfied needs before and after avatar design procedure, combining quantitative and qualitative measurements (emphasizing mostly quantitative) aimed on a valid, "strong", and high quality overall outcome. Figure 9. illustrates the order of the methodological stages.

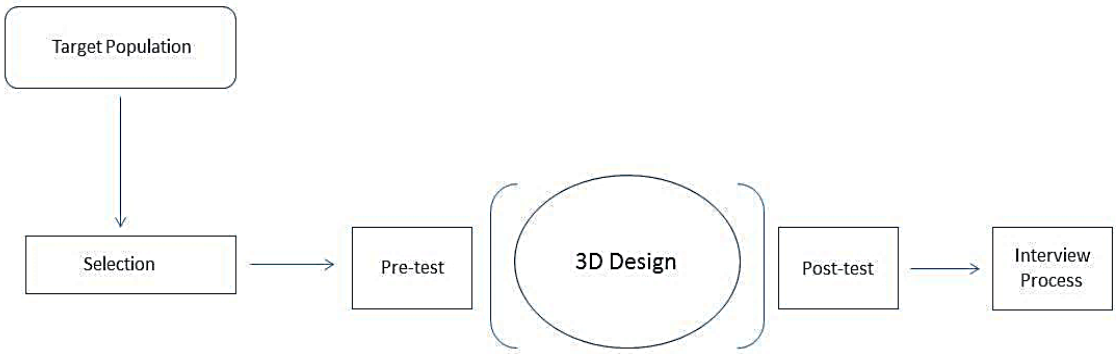

Figure 9. The Flow of the Exploratory Study of the Emotional Impact Before, During and After Avatar Design Procedure

Quasi-experimental studies can take many forms, but in the current analysis they took the form of pre- and post- measurements (Babbie, 2015). Pre- and post- diaries allowed the comparison of the aroused emotional elements (emotions, moods) and the satisfied needs, before and after avatar design procedure, enriched with the interview method.

The applied appraisal methodology (diaries and interviews) allowed the investigation of the avatar impact on the identification of the emotional profile and, in extent, on the immersive participation. The method facilitates the acquisition of more comprehensive data, which strengthen the results (Burke & Christensen 2004)

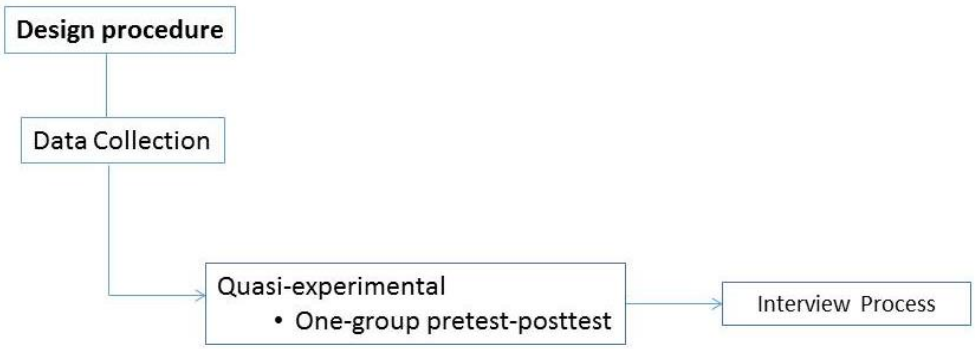

Figure 10. The Methodological Stages of the Data Collection throughout Avatar Design Procedure

The methodological research procedure included three stages: description, implementation and evaluation. In the description stage, participants were informed about the experimental sequence, the implemented methodology, diaries and interviews, and the guidance-tutorials about tools and functions.

The implementation stage dealt with avatar customization:

- *Avatar design procedure:* Before SL use, users had to develop their avatars, completing the related pre- diary and after the conclusion of the design process, the post- diary. They had to rate their elicited emotions (Ortony & Turner, 1990), moods (Mayer & Gaschke 1988) and satisfied needs (Maslow, 1943) using a Likert scale measurment.

Table 2. The Likert Rating Scale for the Emotion "Happy"

Emotions					
Happy	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	○	○	○	○	○

The data collection process was integrated with the semi-structured interviews, which included open-ended questions in accordance with the customization process, designing decisions, and the emerged thoughts and expectations. Furthermore, the participants responded to questions about the emotional and behavioral influences of the avatar presence during their virtual experience.

The quantitative data evaluation was conducted through Paired Sample *t*-test and Repeated Measures ANOVA, and the qualitative data was assessed using NVivo qualitative software, based on themes and sub-themes.

Table 3.The Research Stages of the Exploratory Method

Stages	
Description	• Informing users about SL environment experience • Development of Facebook group that was used as a communication tool, sharing information and useful links (online questionnaire, tutorials etc.)
Implementation	• Design procedure: Pre- and post- diaries determined the emotional profile during avatar design procedure, followed by interviews so as to gain an overall perspective of the experience
Evaluation	• Quantitative and Qualitative assessment of the collected data. o Quantitative analysis via SPSS software o Qualitative analysis via NVivo software

4.2. Sample

The sample of the study was from a local university. Thirty individuals (ages 18 - 35) agreed to participate voluntarily in the experimental study. The sample size was considered appropriate for this kind of research (Sands, 2009) and was selected through the implementation of a range of non-probability sampling techniques (non-random sampling, selected from the researcher based on specific characteristics) (Kothari, 2004). To ensure the maximum variation within the sample, the selection was based on the following specific criteria: (a) lack of experience in VWs, especially in SL environment, (b) active Facebook account, and (c) consistency with the sequence of the experimental procedure.

4.3. Data Collection / Data Analysis

Part of the quantitative data collection (diaries and questionnaires) was set up in an online survey system and were available on the web for 75 days. The diaries' inclusion in the current research study aimed on capturing the elicited emotions, moods and satisfied needs near the time they occurred. Semi-structured interviews, from the other side, helped the individuals to "unwrap" and express their emotional impact, experiences, observations and attitudes due to virtual participation.

Demographic questionnaires were used to identify the participants' demographic characteristics (age, gender, occupation, etc.), and to obtain a subjective perspective from the sample about the virtual experience.

Diaries Before and After Avatar Design Procedure were in form of Likert Scale questions, rating the elicited emotions, moods and the satisfied needs, as well as were included questions about the customization procedure (duration time, favorable charac-

teristics, etc.). The diaries focused on the comparison of the pre- and post- emotional profile of virtual human design and on the interpretation of designing mode that was followed.

Interviews were conducted in semi-structured formatting, and they were took place after the completion of SL participation (avatar design and interaction). Interviews were separated into a) those inquiring about customization process, and b) those looking into the bidirectional emotional influences of avatar in virtual involvement. The objectives of the interview concentrated on the emerged appraisal patterns through the experience with the virtual human.

4.4. Results

The aggregate number of the data was 60 sets of pre- and post- scores, with 30 interviews composing the emotional profile of avatar experience.

4.4.1. Quantitative Analysis

The statistical method is traditionally utilized the comparison of pre- and post- tests through the implementation of Paired Samples *t*-test and Repeated Measures ANOVA. The power of the tests measurement lies on the sample's ability to determine the interval validity of avatar design.

The first analyzed data derived from the comparison of pre- and post- diaries, providing the satisfied needs for which there was a statistical significance change (Appendix 1):

- Happiness, $t\ (29) = 3.204$, $p<.005$
- Spirituality, $t\ (29) = 4.164$, $p<.005$

- Understanding, t (29) = 3.825, p<.005
- Creativeness, t (29) = 3.625, p<.005
- Entertainment t (29) = 4.047, p<.005

According to interviews outcome, throughout the description of avatar design procedure, the fulfillment of needs was in a sequential way, leading from one need to other. According to the lack of awareness (novice users) it was necessary for the participants to understand and be familiar with the interface and with the usage of the designing tools and functions (understanding need). The individuals' transformation, for a while, into designers, developing something that would be representative in a social environment caused the satisfaction of their "creativeness". The absence of restrictions and rules in SL triggered the fictional stimulation and the sense of freedom resulting to inner-self-analysis, combining the actual and fictional experiences, stimulated the imagination and the inspiration of the users to design and conclude in a successful development of a virtual human that would be their vehicle in a unique space, satisfying their need of "spirituality".

The whole process of avatar design contributed to the fulfillment of the "entertainment" need, optimized the need for "happiness", creating expectations and positive predisposition for SL immersion.

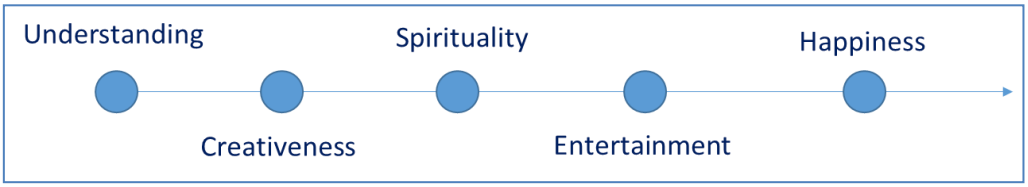

Figure 11. Sequential way of the satisfied needs during avatar design procedure

The method of Paired Samples *t*-test was continued with the analysis of the elicited emotions that are presented in Table 4.

Table 4. Emotions with Significant Differences via Paired Sample *T*-Test Analysis

Emotions		
Interest	*t* (29) = 5.214	p<.005
Attraction	*t* (29) = 3.122	p<.005
Desire	*t* (29) = 3.811	p<.005
Admiration	*t* (29) = 5.420	p<.005
Entertainment	*t* (29) = 4.511	p<.005
Hope	*t* (29) = 5.411	p<.005
Gratitude	*t* (29) = 4.307	p<.005
Pleasure	*t* (29) = 6.244	p<.005
Joy	*t* (29) = 5.470	p<.005
Triumph	*t* (29) = 5.243	p<.005
Jubilation	*t* (29) = 4.263	p<.005
Relief	*t* (29) = 3.542	p<.005
Confidence	*t* (29) = 4.270	p<.005
Sociability	*t* (29) = 3.233	p<.005
Generosity	*t* (29) = 4.511	p<.005
Sympathy	*t* (29) = 4.978	p<.005
Love	*t* (29) = 3.984	p<.005
Vigilance	*t* (29) = 4.653	p<.005
Intimacy	*t* (29) = 3.795	p<.005

"Pleasure" emotion had the highest influence from the customization process, describing it as a positive feedback, with participants making the best choices about their avatars outfit reached to an agreeable experience. In combination with the rest positive elicited emotions ("Joy", "Admiration", "Hope", "Triumph" and the "Interest"

etc.), sample was predisposed, prepared and motivated for the next stage, virtual interaction.

During the interviews, participants highlighted, that the avatar design procedure generated a positive impact, even though they encountered some difficulties on the usage of the designing functions and tools. The inner-self-analysis was grounded on a social-cultural perspective and on the individuals' background, determining the favorable characteristics that would be projected. The customization time was appropriate to reach an ideal outcome, generating an overall positive emotional experience.

Except of the emotions, moods and needs ratings, the diaries included an amount of additional, open-ended questions (multiple choices) aimed at a better understanding of the virtual selfhood development.

Table 5. The Additional Questions that were Included in the Diaries

Diary Questions
1. How is my mood now? 2. How does avatar outfit determine my satisfaction level? 3. If you had the opportunity to "add" some human, imperfect characteristics to your avatar's appearance, like wrinkles, spots, scars, extra weight, freckles, would you add them?

With regards to the mood-state (Mayer & Gaschke 1988), "Calm" and "Happy" were the only two highly influenced moods through the current experience, in contrast to the rest of the items which remained below average (< 3). The participants' concentration on designing process, in an attempt to reach into an ideal-self, helped them to escape (for a while) from real life worries, concluding into elicitation of a calmly and happily mood state.

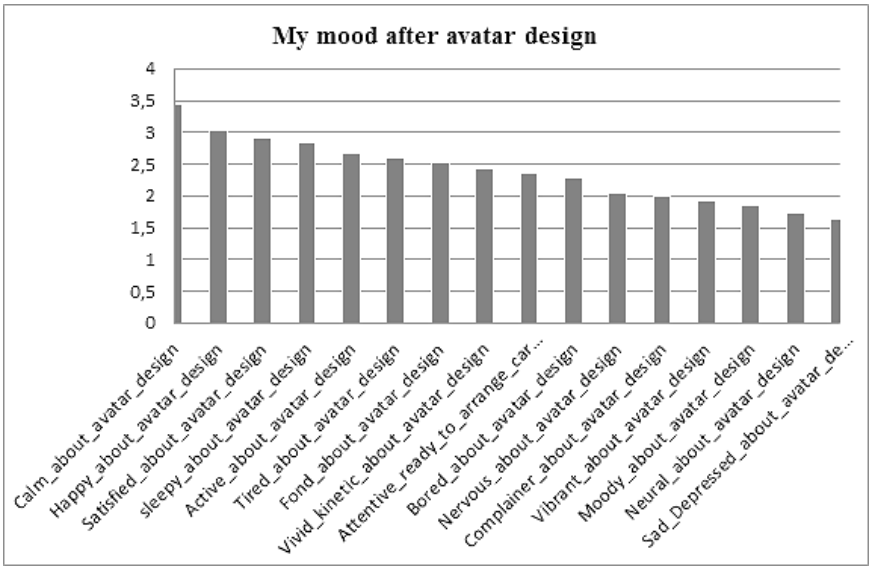

Figure 12. The Elicited Mood-Items after Avatar Design Process

Concerning on satisfaction level, the majority of the sample was 'somewhat' satisfied, included the above fulfilled needs (understanding, creativeness, spirituality, entertainment and happiness). This was emerged from the absence of a similar experience, and from the difficulties on the use of functions and tools.

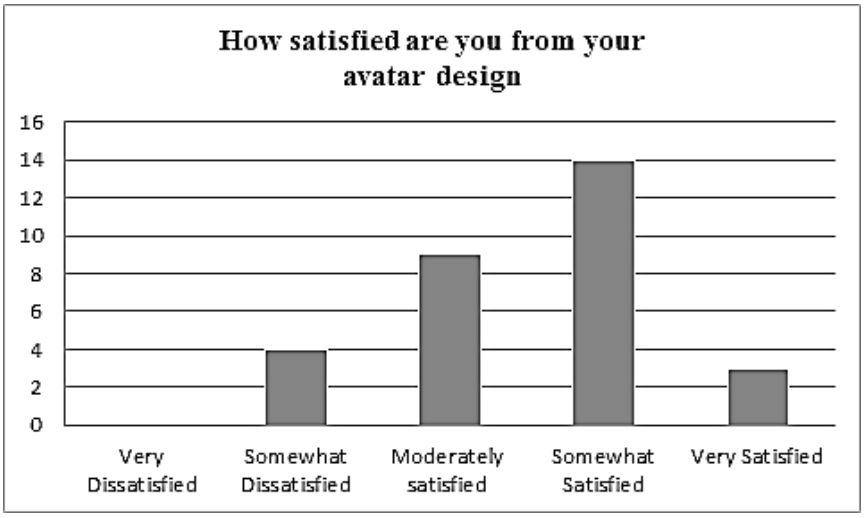

Figure 13. Satisfaction Level from Avatar Design Procedure

Quantitative data analysis was integrated, improved and enhanced with the qualitative analysis through the interview method.

4.4.2. Qualitative Analysis

In order to gain an in-depth and comprehensive overview about the virtual selfhood impact, a semi-structure interview process was carried out. The open-ended questions were informed by the literature review, aiming at the investigation of the emotional and behavioral impact through the avatar experience. Interview responses were analyzed through the qualitative data analysis computer software package NVivo. Transcripts were examined a number of times in order for the researcher to become familiarized with the data, followed by a coding process based on themes and sub-themes. During the coding process, there was a constant reference to a coding scheme based on the research purpose. An inter-coder reliability test with a sample of the data set revealed that two independent coders agreed on the segmentation in 86% of the cases. The main theme of the interviews´ analyzed data was the 'That's me' that was divided in two sub-themes: "Self-experience" and 'Exposure message' (Figure 14).

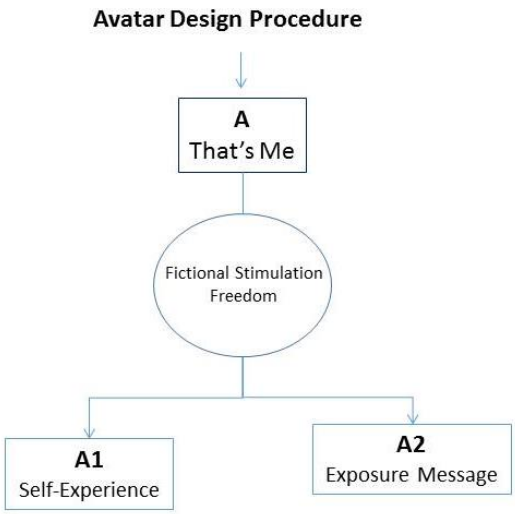

Figure 14. General Framework of the Interview Themes

'That's me'. The main theme of the interview analysis, 'That's me', derived from the fictional stimulation and the sense of freedom. The criteria of the selected characteristics were based on what was considered as socially acceptable in SL (including appearance and role), answering the question "*how would I want to look and behave if I was in a new place?"*. According to the current question, was emerged an inner-self-analysis, providing the individual's socio-cultural background and standards. The much spendable time, during the customization process, was concentrated on the face-development, pointing out that the face is the most representative, attractive and expressive part of the body.

According to 85% of the sample, the chosen fictional elements were based on the individual's favorite movies and childhood fairytales, in contrast to the rest 15% of the sample that based their selection only on their actual physical self:

> "*I customized an avatar that expressed my personality, including some characteristics of my appearance and some imaginary ones (fairy wings)"* (Participant A).

> "*I designed the ideal woman: attractive, sexy, based on my real desires, how I actually wanted to be*" (Participant B).

> *"I included imaginative characteristics for example, I chose very long hair like Rapunzel, combining it with characteristics of myself, external and internal (role)"* (Participant C).

SL freedom and the absence of specific target caused to participants much spendable time on analyzing and identifying their virtual human. Besides the factor of freedom, the long duration of avatar design procedure was also due to the lack of experience

and the absence of awareness of the designing tools and functions, arousing negative elements during the designing procedure.

The completion of the process was characterized from the phrase *'that's me'*, determining the ending point of the customization, that the current 3D illustration was the appropriate and representative for SL interaction.

The theme of 'That's me' was divided in two sub-themes, 'Self-Experience' and 'Exposure message' that are explained in the following sections.

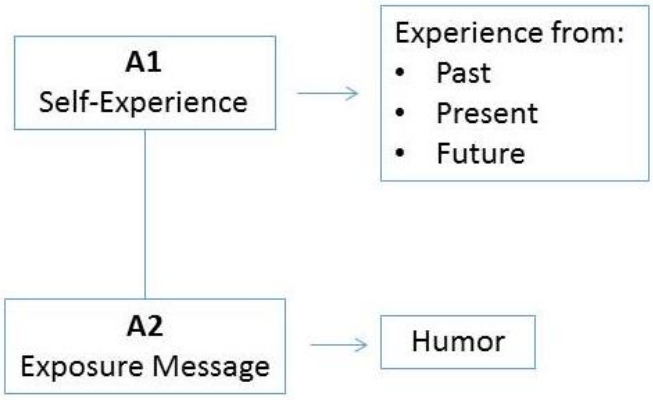

Figure 15. The Sub-Themes of "That's Me" with the Aroused Emotions and Needs

'Self-Experience. The current sub-theme was associated with the avatar design thinking, which was related to different individual's actual life experiences that were divided into 'Past', 'Present' and 'Future' experiences:

> *"My avatar was a ballerina dancer, as I was at 10 years' age. I stopped, but still like it and miss those days (clothes, competitions, movements etc.) but now it is too late to start again" (*Participant D)

"I included characteristics of my appearance, while dressing my avatar with clothes of warrior princes" (Participant E)

"My avatar represented myself in the future: a muscular, funky and cool guy with tattoos, very attractive and sociable. Also, I included some self-characteristics from the present, making a combination of my present and future self". (Participant F)

Ninety percent of the sample customized the avatars according to "Present" and "Future" experiences, and the rest from "Past" and "Present" experiences. "Future" experiences were associated with the fictional stimulation, resulting to the elicitation of a high sense of "freedom". SL freedom amplified the fictional stimulation, increasing the emotion of "freedom", which was considered as the basic factor of virtual human identification.

"From the moment that I realized that I could customize any type of avatar without rules, I designed something fictional, like X-men, Lord of the Rings etc. I didn't want to have a common and humanoid avatar". (Participant G)

"I didn't have any specific outfit, I chose some characteristics of my appearance that I believe are attractive and I used my imagination to complete my virtual appearance, aiming at something representative of myself". (Participant H)

"My avatar was a combination of myself and my imagination, it derived from the fairytales. It was a princess with a long dress and blonde hair, with my actual real skin color and some facial characteristics". (Participant I)

The second sub-theme which arose from interviews´ responses was the exposure message that participants wanted to pass in the SL.

'Exposure message'. Through the sub-theme of 'exposure message', participants wanted to convey a message via their avatar and, in this case, the context was humorous. Fourteen participants included human imperfections like a big nose and ears, or designed avatars without hair, or clothes, approaching the SL participation as an entertainment and joy time, based on the customization of a humorous avatar.

> *"I didn't want my avatar to wear any clothes, just to see the reactions of other users".* (Participant L)

> *"I put a big nose on my avatar mimicking mine, trying to make it as similar to me as I could"*. (Participant M)

> *"I thought that in SL I could have fun and entertainment, so I designed an avatar without clothes and didn't care about the rest of the citizens"* (Participant N)

This was derived from the interpretation that SL experience is a game and enjoyment time providing the appropriated message (humorous). The aim of this was to increase the pleasure and the fun during the virtual participation. In general, the positive emotional elicitation throughout the avatar design procedure created expectations and prepared the participants for a positive and rich experience in SL.

> "*My avatar outfit made me feels more comfortable when socializing, and more acceptable in different groups. It was a unique experience having a conversation with unknown users with beautiful and fictional avatars"* (Participant O)

> "*I realized that avatar role was the main factor that determined the trust and confidence between the citizens in SL. I met beautiful avatars, who were however, rude and with bad behavior, who made me feel uncomfortable"* (Participant P)

The last interview question focused on avatar definition, aiming at understanding the given meaning of being a virtual human throughout the whole experience.

> "*Avatar is not human; it is a creature that embodies ourselves; representing experiences digitally, including characteristics of our external appearance and personality"* (Participant A)

> "*Avatar is my alter-ego in combination with some imaginary elements"* (Participant C)

> "*Avatar is freedom"* (Participant F)

> *"It is a projection of the internal things that we want to express and we desire to bring out. It is an opportunity to interpret and understand ourselves from a different viewpoint"* (Participant M)

> "*It is an alternative expression of the user's personality, what someone wants to be at a given time in a parallel reality"* (Participant O)

Different avatar definitions were given, concluding that the customization of an avatar is not something easy. Avatars can be considered as an amalgam, informed by subjective experiences provided and judged in a social environment.

4.5. Chapter Summary

This chapter described the emotional profile of the participants due to avatar design procedure, providing the elicited emotions, moods and needs items of pre- and post-virtual human customization. The experiment was implemented throughout a quantitative and qualitative analysis, included thirty novice individuals, who completed online- questionnaires and answered open-ended questions via interviews. The current methodological process helped the researcher to capture and describe in words the participants' emotions, moods and needs due to avatar design experience, determining the emerged emotional profile before and after the customization process and how participants perceived and evaluated the entire procedure. The goal of the current study was to answer three sub-research questions that are addressed and discussed below.

Sub-RQ1: What emotions and moods elements are elicited throughout the correlation of the pre- and post- avatar design procedure?

The purpose of the current sub-RQ concentrated on the emotional profile throughout the correlation of pre- and post- diaries due to virtual human customization, identified the elicited emotions and mood-items. The attempt of determining the appropriated aroused items urged the users to analyse and assess their emotions and moods before the development and after its integration. The emotional identification was not a simple process; participants had to get into progress of thinking and choosing through a list of emotions and mood elements, generating two different emotional profiles.

Avatar design procedure was the first phase of the virtual involvement that was characterized from a positive elicitation, predisposed, indirectly, the acceptance of the cur-

rent unique experience. The absence of specific target and SL freedom motivated the participants to think, understand and interpret of what characteristics were constituted their avatars, throughout an inner-self-analysis. The desired characteristics were stimulated from real life and imagination, turning the process into an agreeable and enjoyable experience.

Moreover, the anonymity with the advantage of avatar protection influenced the selection and the design of the desired features aimed on positive emotionally engagement. Throughout the inner-self-analysis, was provoked a mentally escapism from real routine problems and pressures, resulting into a positive elicitation of mood-state, which influenced the aroused emotions, and partly, the emotional profile of avatar design procedure.

Based on, the above arguments the Figure 16. summarizes the emotional profile ingredients (moods and emotions) due to avatar design procedure, and the influential relationship between the moods and the emotions. According to, Zimmermann (2008), mood-state is in the background, affecting positively or negatively the elicited emotions, this is the reason that mood – circle includes the emotion – circle, which contributed into the development of the emotional profile due to avatar design procedure.

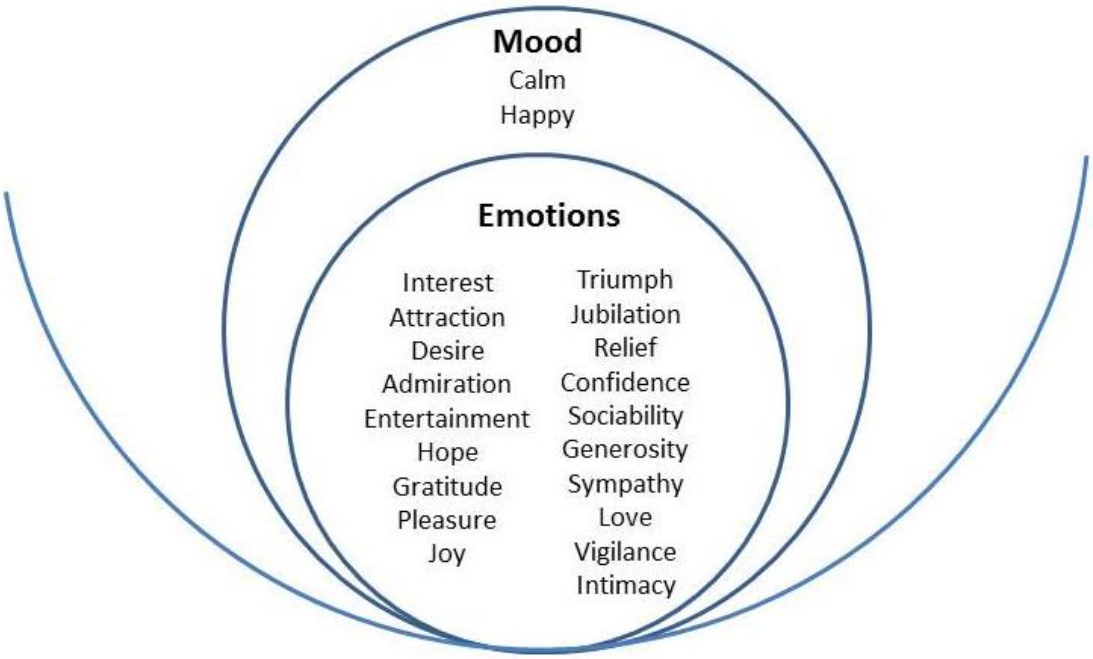

Figure 16. **The Elicited Emotions and Moods due to Avatar Design Procedure**

Sub-RQ2: How satisfaction quality is identified before and after virtual human development?

The second sub-RQ focused on satisfaction quality throughout the process of avatar design procedure. Participants rated their needs before and after the customization phase identifying what were the expected satisfied and the actually satisfied needs. Satisfaction identification was consisted of five need-items (understanding, creativeness etc.) that were resulted from the comparison of pre- and post- avatar design process.

The determination of needs' fulfillment proposed an idea of satisfaction quality, which was derived from individuals' attempt to achieve a desired outcome, integrated, in combination with emotions and moods, the emotional profile and going further, the well-being. The lack of virtual knowledge was the first factor that had an impact on needs' fulfillment, where the participants spent time on understanding the usage of the

designing tools and to be familiar and confident with their management. The amount of covered needs was increased by another two factors, the fictional stimulation and the escapism of real life routine, maintained the attention and the interesting during the development procedure, enriched and integrated the satisfaction level.

In the Figure 17. are illustrated the ingredients of satisfaction quality, in a sequential way (derived from the users' responses) due to virtual human customization.

Figure 17. The Satisfied Needs throughout the Process of Avatar Customization

The first two sub-RQs were concentrated on composition of the emotional profile due to avatar design procedure, gathering, associating and presenting, in-detail, three types of elements, emotions, moods and needs, predisposed, emotionally and behaviourally the VWs' experience acceptance. Several research studies have implemented, concentrated on avatar interaction and on the impact of different perspectives on its creator (Kolko, 1999; Biocca 1997; Ratan and Hasler, 2010; David 1989; Hubona and Burton-Jones, 2003; Lenderer et al.2000; Ong et al.2004; Wang et al. 2004; Behm-Morawitz and Mastro, 2009; Fox and Bailenson, 2009a; Fox and Bailenson, 2009b; Chandler, Konrath, and Schwarz, 2009). Most of these studies focused on the emo-

tional elicitation and user's satisfaction through the avatars´ gestures, facial expressions (Ekman and Friesen 1978), bodily reactions and conversational content, mostly during the communication process (Donath et al., 1999). Lee et al. (2010) argued that avatars can provoke only two emotions, happiness and sadness, contrariwise, the current study goes deeper, revealing an amount of aroused emotions, moods, which are strongly inter-related, creating, partly, a concrete emotional profile for the subsequent virtual experience. The third sub-RQ focused on qualitative analysis, and on the impact of avatar actual and virtual self.

Sub-RQ3: How does avatar existence influence, emotionally and behaviorally, the virtual experience?

The third sub-RQ concerned on the last part of the first study, where users through the interview procedure, "unwrapped" their thoughts about the factors, behaviors, actions and stimulations that elicited the appropriated emotions, moods and satisfied needs. The absence of restrictions and rules, offered plenty of time for inner-self-analysis, of what external and behavioural features had to be embedded on avatar, aimed on maintenance or increasing, positively, the attractiveness, enjoyment and socially acceptance during the virtual experience. The outcome was a combination of actual and fictional stimulation triggered the participants' imagination and inspiration. The fictional stimulation was based on the individuals' favorite movies, childhood fairytales and on future self (how individuals wanted to be in the future). From the other side, the actual inspiration was grounded on real life standards and cultural standards, having an essential point the external attractiveness, achieving the social acceptance.

The key-code that characterized avatars was the phrase 'that's me', which marked the completion of the process, determining the avatar readiness to be exhibited, having

two basic approvals: (a) representative of users' selves, or (b) to express a specific message. Throughout the virtual human customization, participants aimed on creation of a positive emotional relationship with their avatars, to maintain or increase their satisfaction, synthesizing a positive emotional profile. The generated positive emotional profile was the first indication of VW positive experience, providing, indirectly, the acceptance of virtual experience. The positive emotional profile due to avatar design was operated as a factor for a positive subsequent immersion, achieving a concrete relationship between the avatar and its owner, yielding, at the same time, on understanding, interpreting and accepting, positively, the VWs experience.

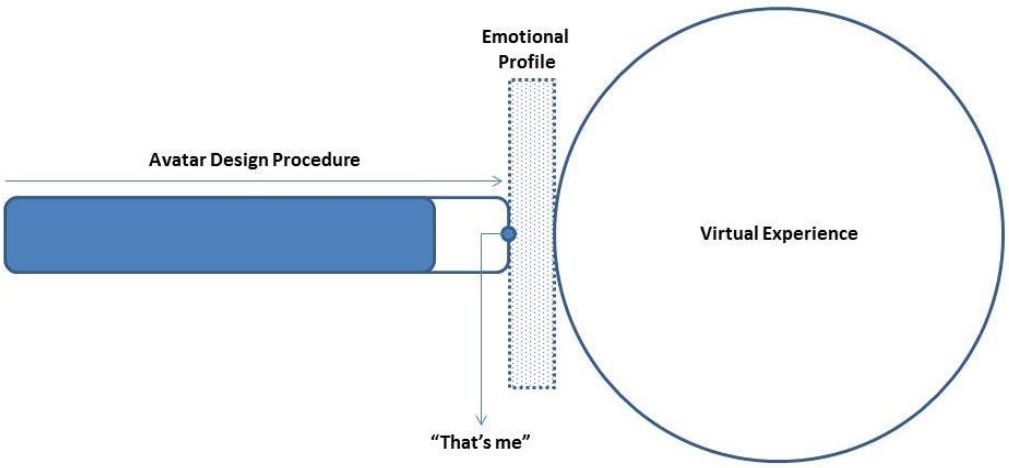

Figure 18. The Generated Emotional Profile throughout the Process of Avatar Design

Going beyond of the current outcome, are emerged two perspectives of the way that participants interpreted the avatar design procedure and indirectly the virtual experience.

The first perception considers the interpretation of VWs as social environments, and individuals have to provide their ideal self, achieving the social acceptance and increasing the external attractiveness, and indirectly, the emotional positivity.

The second perception provides the virtual worlds as games, places / spaces that are used for entertainment and pleasure, with the individuals not emphasizing so much about the external attractiveness and the social acceptance, but only for their fun and joy.

The purpose of these two interpretations is the positive emotional elicitation, including three common influential factors: freedom, fictional stimulation and anonymity, elements that an individual does not have in real life in this high level and considers that are necessary to increase his well-being.

5. STUDY 1(B) – THE IDENTIFICATION OF THE EMOTIONAL PROFILE BEFORE AND AFTER 3D EXPERIENCE

Continuing with the general methodological aim of the Study 1, the current section concentrated on pre- and post- immersive experience in SL environment, investigating the emotional fluctuations throughout the impact of virtual experience. The participants that designed their avatars, in this part of the study, they were asked to explore freely SL. The data collection process was conducted with the same methodological progression, that is, pre- and post- test measurements, questionnaires and interviews. The recruited sample (30 participants) was kept the same as with the avatar design procedure but this time, they were asked to rate the aroused emotions, moods and satisfied needs, due to virtual interaction, answering, at the same time, open-ended questions. The purpose of this study was to answer the following sub-questions:

• *Sub-RQ4: What are the aroused emotional ingredients (emotions and moods) of an unrestricted virtual experience and how are they alternated between the comparison of pre- and post- immersive experience?*

• *Sub-RQ5: How is satisfaction quality identified before and after the unrestricted virtual experience and how its ingredients are determined through their comparison?*

• *Sub-RQ6: How are individuals influenced emotionally during the unrestricted virtual experience and what kind of stimuli has an impact on their behavioral reactions?*

5.1. Methodological Procedure

The current part aimed at the identification of the emotional profile before, during and after the immersive experience in SL, investigating the elicited emotions, moods and satisfied needs. Figure 19. demonstrates the sequence of the stages followed during the methodological procedure.

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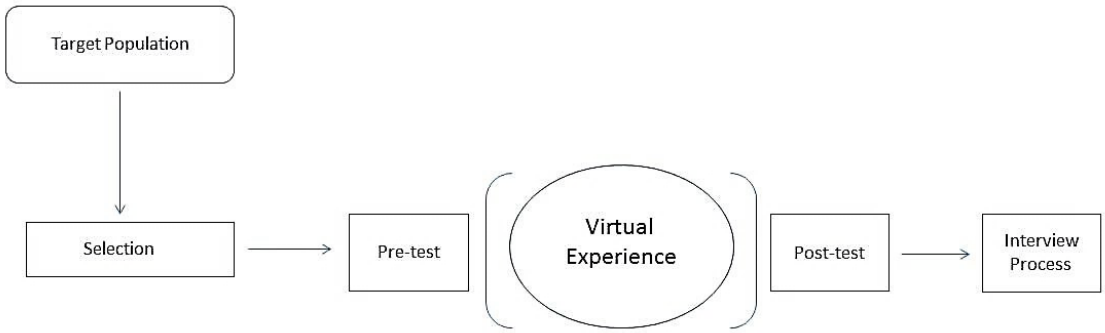


Figure 19. The Flow of the Exploratory Study for the Identification of the Emotional Profile Before and After 3D Experience

The current methodology was implemented in the same way as the methodology for the avatar design procedure, based on quasi-experimental method, throughout the pre- and post- diaries and interview progress. The provided outcome of the appraisal methodology presented an estimation of SL impact on the emotional profile before and after the virtual experience; as well as, an overview of the immersive behavior in relation to the virtual emotional stimuli.

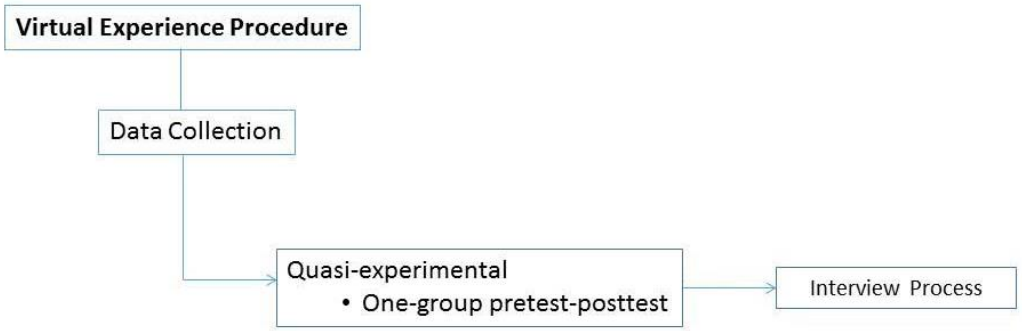


Figure 20. The Quantitative and Qualitative Methods of Data Collection

The process consisted of three stages: description, implementation and evaluation. The description stage was the same with the one during the procedure of avatar design: introduction on the use of tools and functions and on gaining a general overview about the methodological flow. The implementation stage was composed of:

- Unrestricted Virtual Experience: Pre- and post- measurement method was applied and the data was gathered during the immersive participation (communication, gaming, exploring etc.). Each user had to interact sixteen times and to complete, for each participation, the related pre- and post- diaries.

The data accumulation was integrated with the implementation of the semi-structured interviews that included open-ended questions about the emotional behavior in SL.

Finally, the evaluation stage concentrated on the quantitative and qualitative data analysis. Quantitative data, was analyzed via SPSS software, statistically applied the method of One-Sample *t*-test and Repeated Measure ANOVA and respectively, the qualitative data (interviews) was evaluated via NVivo software.

Table 6. The Stages of the Exploratory Method

	Stages
Description	• Briefly updated the sample about the experimental sequence of the stages
Implementation	• Virtual experience procedure: Pre- and post- diaries, aimed at identifying the emotional profile, followed by interviews for an overview of the emotional behavior in SL experience
Evaluation	• Quantitative and Qualitative assessment of the collected data. o Quantitative analysis via SPSS software o Qualitative analysis via NVivo software

5.2. Sample

The sample was the same with the avatar design procedure, and followed the same required criteria: (a) Computer knowledge (advanced level), (b) no experience on VEs, especially on SL, (c) active Facebook account, (d) consistency with the procedure.

5.3. Data Collection / Data Analysis

The data was gathered via online diaries and semi-structured interview methods. The diaries were conducted by using an online survey system available to participants for 75 days and were divided into: (a) Demographics questionnaires (Same with avatar

design phase), (b) Diary before interaction (16 times), (c) Diary after Interaction (16 times)

Diaries Before and After the Virtual Experience had to be completed 16 times before and 16 times after SL immersion. The duration was based on the suitability of participants to understand and be familiar with the idea of the virtual experience. Data collection was done through the Likert rating scales of emotions, moods and needs, which were the same in both interaction phases. The purpose concentrated on the comparison of emotions, moods and needs of pre- and post- SL immersion, determining the virtual emotional profile.

Semi-structured Interviews involved open-ended questions, which were separated into three (3) sections. The first section consisted of an overview of virtual experiences, the second included specific questions about 3D stimuli and behaviors, as well as, the emotional impact of the experience, and the last section focused on the general influences on the participants´ personality. The objectives of the interview procedure revealed the emotional and behavioral patterns which were caused by 3D participation.

5.4. Results

5.4.1. Quantitative Data

*Emotional profile before the virtual experience***.** The first quantitative analysis concentrated on the identification of the emotional profile before SL experience. This was calculated by the One-sample *t*-test method, checking whether the mean of the different emotions, moods and needs prior to immersion was significantly different from 3 (i.e. different from a neutral score in a 1-5 Likert scale).

The first outcome indicated that the emotions with significant difference had a lower mean than neutral, indicating that the emotional profile was negative before the virtual participation. This outcome was derived from the absence of virtual awareness and from the excessive freedom, which caused, to users, hesitations, doubts about the uncontrollable overexposure, and violation of the personal information (Appendix 2).

Continuing with the same method, the analysis turned to the satisfied needs (Table 7). The need-item of "freedom" had the highest mean average, followed by "entertainment", "autonomy", "creativeness", "love", "happiness", "understanding" and "fun", needs that participants expected to be fulfilled through the virtual participation. As it emerged from the results, "freedom" had highest ratings, which participants wanted to satisfy, parallelizing SL interaction as escapism from the real life routine and problems. After the "freedom", participants needed to be entertained, creative, happy etc., needs that were not or partly satisfied in real life.

Table 7. The Needs with Significant Difference Before 3D Immersion through One-Sample *t*-test Analysis

Needs – Before Virtual Experience		
	M	**SD**
Freedom**	3.4813	1.05009
Love*	3.1271	.99466
Autonomy*	3.1292	1.09723
Game**	3.1000	.87062
Mourning**	1.2438	.36419
Happiness**	3.1063	.72538
Conservatism**	1.9333	.84188
Understanding	3.1146	1.00109
Creativeness	3.1250	1.08750
Inertia**	1.6896	.70548
Entertainment**	3.1458	.87197

***p< .001, *p<.005*
Note. M = Mean. SD = Standard Deviation. The needs range from 1 (not at all) to 5 (very much)

The emotional profile before virtual interaction was integrated with the mood-state, which are presented in Table 8.

Table 8. The Moods with Significant Difference Before 3D Immersion through One-Sample *t*-test Analysis

Mood - Before Virtual Experience		
	M	**SD**
Positive moods		
Calm**	3.0583	.73566
Vibrant**	1.3708	.45127
Negative moods		
Complainer**	1.7917	.54544
Sad/depressed**	1.6750	.50706
Nervous**	1.6688	.57262
Moody**	1.6958	.52541
Bored**	1.8417	.63985
Edgy**	1.6292	.55828

***p< .001, *p<.005*

Note. M = Mean. SD = Standard Deviation. The mood ranges from 1 (not at all) to 5 (very much)

"Calm" was the only mood ingredient that was significantly positive before SL immersion, in relation to rest of the moods that were characterized by negative tensions.

Through the interview responses highlighted that the current negative tension derived from the impact of actual daily life: studies, many projects, much spendable time at the university, and personal problems. Furthermore, the lack of virtual knowledge and the SL unpredictability played a significant role on the negative scores. The reason that the only emotional item with positive tension was the "calm" mood, was the fact that immersion in SL was considered as a way of escaping from actual life restrictions and rules, creating expectations for liberal self-expression, and hence the highly rated need of "freedom" that participants wanted to satisfy.

Summarizing the first part of the current analysis, it can be concluded that the pre-emotional profile consisted of negative arousal elements and a number of needs expected to be satisfied. The influential factors of the pre- emotional profile were: (1) the need for escaping from the actual life routine and the expectations for specific needs

satisfaction, mostly freedom (2) the lack of VW experience, and (3) SL unpredictability, increasing the individuals' attention to high levels.

The aim of pre- emotional profile identification was to be compared with the emotional profile after the virtual interaction, determining the emotional differences, following the same analysis.

Emotional profile after the virtual experience. The second experimental phase focused on composing the emotional profile after SL experience, through the identification of the significant aroused emotions, moods and satisfied needs. Data was analyzed through the method of One-sample *t*-test, examining whether the mean score of emotions, moods and needs was significantly different from 3. (Appendix 3).

"Interest", "entertainment", "pleasure" and "happiness" were the four positive significant emotions with the highest means. "Triumph" was negative, following with "sociability", which presented a neutral tension (M=2.96); the rest of the emotions appeared negative, since they had lower means. The emotion of "entertainment" gathered the high rating showing that users enjoyed their interaction, holding their attention and interest with the general idea of the immersive experience. Beginning with the "entertainment", were followed the rest elicited positive emotion assosiating the virtual experience with the amusement with common understanding of pleasure.

Carrying on with the data analysis, satisfaction was achieved through the fullfillment of: "freedom", "game", "entertainment", "autonomy", and "inclusivity".

Table 9. The Needs and their Significant Difference After 3D Interaction

Needs - After Virtual Experience	M	SD
Freedom**	3.4896	.91121
Inclusivity**	3.0703	.87509
Autonomy*	3.1646	1.18181
Game**	3.4063	.87203
Mourning**	1.2667	.31781
Conservatism*	1.9771	.87937
Inertia**	1.7396	.71130
Entertainment**	3.2500	.75679

***p< .001, *p<.005*

Note. M = Mean. SD = Standard Deviation. The needs range from 1 (not at all) to 5 (very much)

Apart from the unfulfilled "conservatism", "inertia" and "mourning," the rest of the needs were satisfied with "freedom" and "game" presenting the highest means. As someone can observe, most of the satisfied needs were determined from pre- immersive experience, which means that users' satisfaction had a high quality due to SL involvement.

The last part of the post- emotional profile determination dealt with the mood-state. Only the "attentive" mood-item demonstrated a positively significance, in contrast to the rest that were negative (Table 10). Participants were concentrated and investigated a discrete aspect of information during their SL interaction, trying to understand and felt familiar with the whole idea of 3D experience. This helped them to escape from their reality, eliciting positive emotions and satisfying part of their needs.

Table 10. The Moods and their Significant Difference After 3D Interaction

Mood – After Virtual Experience	M	SD
Positive Moods		
Fond**	1.5918	.48998
Attentive**	3.1771	.72870

Negative Moods		
Tired**	1.5146	.45801
Moody**	1.6333	.50795
Bored**	1.4646	.46328
Sleepy**	2.0458	.41876
Complainer**	1.5729	.48747
Sad/Depressed**	1.2688	.34707

***p< .001, *p<.005*

Note. M = Mean. SD = Standard Deviation. The mood ranges from 1 (not at all) to 5 (very much)

Post- emotional profile of SL experience was modified into positive elicitation of particular emotions and moods. Besides the emotions and moods, a number of needs were fulfilled, increasing the satisfaction level. The origin of the emerged emotional positivity (according to interview responses) derived from the feeling of freedom and the fictional stimulation following specific virtual tasks. One such task was the communication between inhabitants from different countries and cultures through which ideas were exchanged, collaboration was achieved or was carried out just for fun. The second task was the virtual exploration that was divided into fictional places and into places that mimicked actual life places that were connected to positive memories (educational studies, holidays etc.).

The unrestricted interaction, far from any real restrictions and rules, in combination with anonymity, produced a concrete, was characterized from the positive emotional elicitation. Moreover, the combination of the imagination and the "freedom" was an important key point of the aroused positivity. Additionally, the mood item "attentive" was highly positive, due to the unpredictability of SL, the lack of immersive experience and the plethora of stimuli (fiction/ mimicking real life places, objects, different kinds of people) made the participants to spend time on understanding, interpreting and be familiar with the received and continuous information, influencing their emotional fluctuations.

In order to gain a more accurate and in-depth knowledge of pre- and post- status, a statistical analysis was implemented to compare the two phases, which are presented below.

Comparison of the emotions, moods and needs before and after the immersion. The previous two sections specified the elements of the emotional profiles before and after SL experience separately. The current part looks into whether the emotional elicited elements had substantial changes due to virtual immersion. This was conducted by using the method of repeated measures ANOVA (Appendix 3), demonstrating all the emotions, moods and need-items that were significant through the correlation between the pre- and post- diaries.

The emotional profile comparison revealed a highly ratings of positive and negative emotional patterns. The negative emotion of "sleepiness" was derived (through the interviews procedure) from the lack of specific target or task, reducing the motivation of the sample to continue the interaction, associating with the mood items of "bored" and "tired". Although participants found the virtual experience "interesting", eliciting their "curiosity" and "happiness". As mentioned in the literature review (Ellis & Moore, 1999; Thorson & Friestad, 1985; Bower, Gilligan & Monteiro, 1981), mood stage influences the emotional elicitation, therefore the above negative mood elements contributed to the "sleepiness" evocation. The individuals' emotional engagement in SL completed when the motivation started to be reduced.

Moreover, the emotion of "sociability" in comparison with the rest emotions presented p-value: .003 and the need of "protectiveness" had a significant difference p=.004. According to the interview responses, these two elements are connected, for the rea-

son that participants did not have the need to talk to other users, because of the anonymity, reducing the emotion of being “sociability”.

Furthermore through the quantitative analysis, was revealed additional information that concerned SL implementation as a business and entertainment tool, separating the use for entertainment into gaming and communication models. Moreover, it was revealed that users became more familiar with and began to understand SL better at the fifth interaction with this environment, and this was a factor that influenced the satisfaction level.

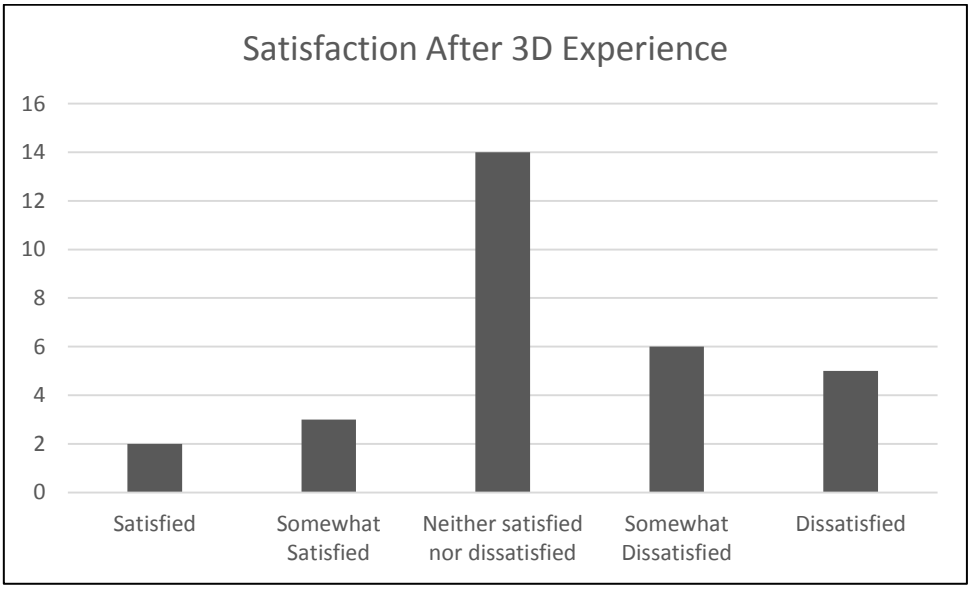


Figure 21. Post- Virtual Experience Satisfaction Ranging

Participants who were neither satisfied nor dissatisfied replied so because of the difficulty they encountered on the functional management; that had a general influential role on participation. Furthermore, the factors of anonymity, antisocial behaviors and attitudes and the emotion of insecurity of accessing their personal information, all contributed to negativity.

However, the main point of the above outcome is that the emotional elicitation is characterized from positivity. The essential factor of this positivity is the freedom that the participants have to be experienced without any restrictions, rules, escaping from their reality, stimulating, in the same time, their imagination and retrieving memories for the childhood period.

Summarizing the three phases of the emotional profile identification, the results indicated that before the SL participation there was negative tension, caused by actual life situations, the lack of previous 3D experience and SL unpredictability. At the same time, virtual immersion offered a break from real life routine, causing calmness mood (escapism). The post- virtual participation, revealed positive emotional consequences, satisfied specific (expected) needs, improving, at the same time, the "attention" mood-item, yielding on the high elicitation of the sense of "freedom", the escapism from actual life far from rules and boundaries, the privacy projection, and the fictional stimulation. The comparison between pre- and post- SL immersion led to the identification of the positive emotional profile but with some negatives that were based on real life habits which were transformed in SL, causing the same side effects. Nonetheless, SL experience has the ability to provoke a positive elicitation in all of the above groups (i.e. emotions, moods and satisfaction of needs), enhancing the emotional involvement and the user acceptance with an entertainment dimension.

Concluding the quantitative results, the current methodological study was enriched with an in-depth additional analysis of the interview responses.

5.4.2 Qualitative Data

5.4.2.1. Interviews

Qualitative data collection was carried out via the traditional, face-to-face interview method, aiming at gaining an overall perspective of the virtual experience, investigating the stimuli behind the virtual emotional profiles. Discussions took the form of a conversation, encouraging the interviewees to discuss freely and to describe their experiences in response to the questions, without restrictions (Kvale & Brinkmann, 2009). The face-to-face interviews were recorded using an audio recorder. The interviews were transcribed and analyzed utilizing NVivo. The content of the questions considered the reasons, factors, thoughts, impressions, opinions of the participants with regards to the virtual interaction.

Through the coding process, a number of themes and sub-themes emerged, resulting in a coding scheme based on the research aim. An inter-coder reliability test with a sample of the data set revealed that two independent coders agreed on the segmentation in 71% of the cases.

There were four themes, which came up in the interview responses: “Place”, “Anonymity”, “Freedom” and “Functional Difficulties”, which in turn were broken down into several sub-themes, which are presented in Figures 22, 23 and outlined in depth in next units.

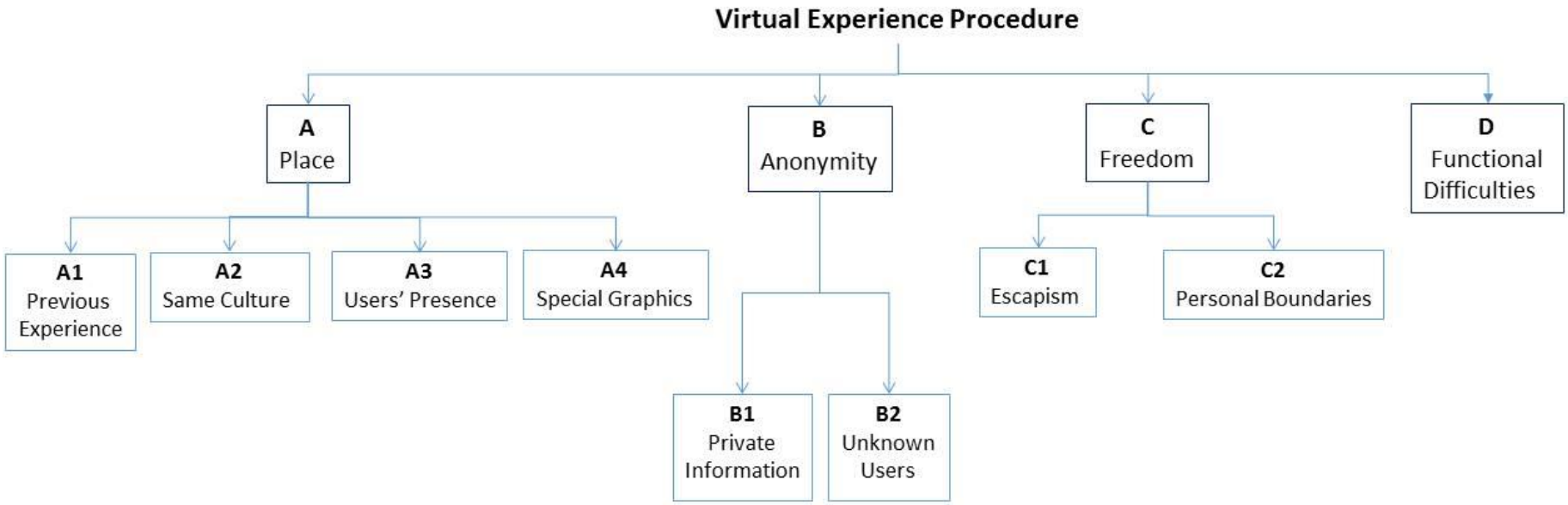


Figure 22. Themes and Sub-themes of Virtual Experience Procedure

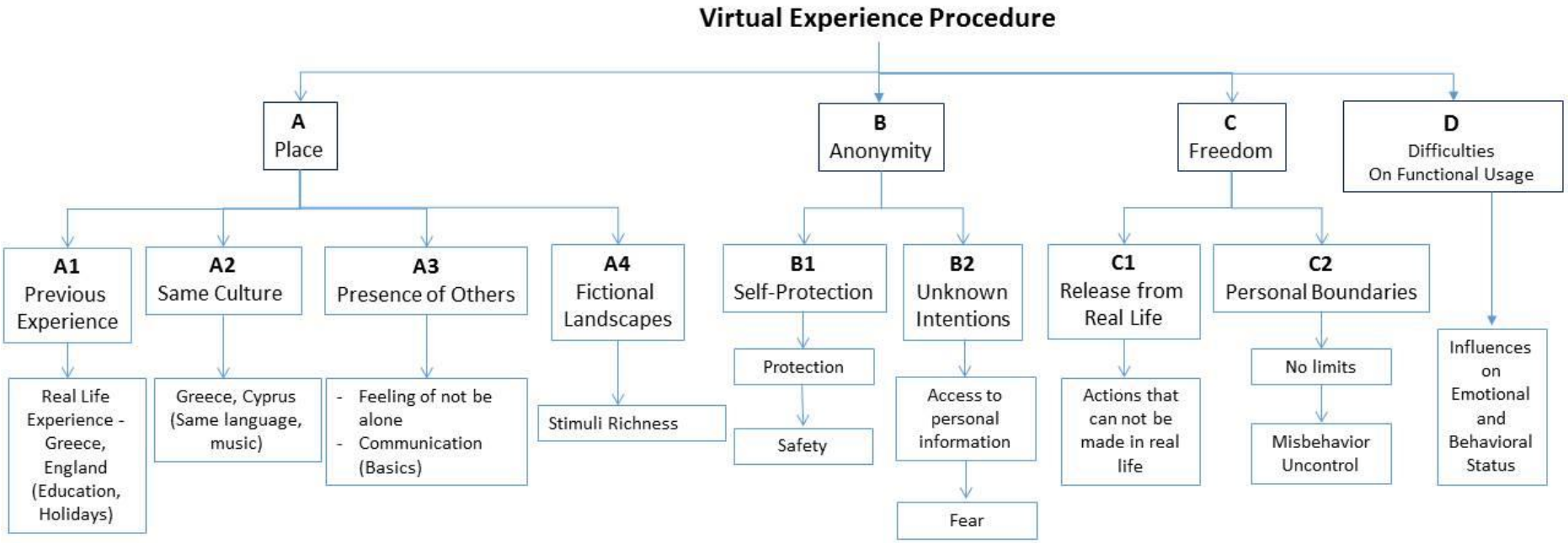


Figure 23. Detailed illustration of Themes and Sub-themes of the Virtual Experience Procedure

Theme – Place. The first theme dealt with the visited places/locations in SL, and was considered as the main reason for the emotional and behavioral modifications. The function of teleporting into different locations without any boundaries and restrictions increased the users' sense of "freedom". The majority of the sample followed a specific path: first they visited places that mimicked real life and then they chose from SL suggested locations, which included fictional places, places for beginners, or the most visited locations.

> *"I started thinking where I wanted to go, searching for places that I had visited in real life, having the curiosity to see how representative they were in SL"* (Participant A).

> *"It was incredible that I could go everywhere only with a click. I chose from the existing list, based on the icon button. If something was attractive from its cover photo, I was teleported there to examine the whole place"* (Participant B)

The duration of being in a place was based on how comfortable an individual felt to navigate, and how rich were the surrounded virtual stimuli. The determinants of this duration were the attractiveness of the graphics, the handling of the tools and functions and the presence of others.

The theme of "Place" consisted of four sub-themes "Previous Experience", "Same Culture", "Presence of others" and "Fictional Landscapes", all of which contributed to determine the individuals' emotional stimuli.

Sub theme - Previous Experience. The first factor that influenced the selection of places/locations had to do with actual previous experiences. Individuals were curious to investigate how representative were the virtual representations in relation to the actual places (associating with the holidays and educational studies), hoping to relive the same memorable (positive) experience. London, Athens and Paris were the most popular destinations visiting university campuses, coffee shops, galleries, clubs, bars etc.

> *"I visited Oxford Street in London, because when I studied there I would go there for shopping every Saturday."* (Participant C)

> *"I was excited when I was in Athens, at the Parthenon, the city center, the port, as it made me felt relaxed and comfortable, especially when I communicated with some other citizens in the same language"* (Participant D)

Throughout the virtual exploration, there was a continuous comparison with real life with 55% of the sample argued that the virtual places were the same with the physical ones, while the rest argued the opposite. Irrespective of the similarities, individuals stayed at a place (e.g. London, Paris) aiming on positive elicitation. Besides of London and Paris, one of the most visited place was Athens (Greece), not only because of previous experiences, but also because of the same cultural background (same language, culture, religion etc.).

Sub theme - Same Culture. The second subtheme of "Place" was "Same Culture", where the sample chose locations according to their cultural background (Athens, Mykonos, even Ancient Greece) to explore how they were represented in SL:

"The reason I visited Athens, was because I'm not so familiar with the English language, so I felt safer there to talk to someone" (Participant D)

"I went to Mykonos, because I like it and I wanted to hear Greek music, to go out for a drink and talk to someone in my language. I found a Greek man from Salonika and he invited me to his virtual private house for a party. It was a very good experience" (Participant E)

"When I was in Mykonos I flirted with some girls and had sex with one of them. She was a university student from Athens and we became friends. It was very exciting" (Participant F)

Visiting a place with a similar culture made the participants to be more "familiar", confident and receptive to communicate and to form their relationships with other citizens. It is important to mention that the emotion of "fear" was absent in locations with the same cultural background, while the feeling of "freedom" was more intense. Furthermore, the sense of being somewhere without any verbal and behavioral difficulties resulted in the elicitation of "familiarity" and "confidence" and in general in positive arousal.

Apart from cultural factors, the common determinant of "familiarity" was the presence of others, causing the sense of not being alone in the virtual environment.

Subtheme – 'Presence of others'. Except of the personal and cultural background, 'presence of others' played an significant role on the duration of staying in a place. Besides the general environmental attractiveness, 90% of the sample pointed-out that the existence of other citizens in a location determined the time they chose to stay there, irrespective of whether there was any intention for socializing or not.

"I chose places from the SL suggested list according to traffic. I was afraid to be alone in a place, without anyone around" (Participant G)

"There was no need to speak to someone, just to see them, to feel that I was not alone. If someone came and talked to me, I began a conversation, if not, then I explored the surrounding stimuli" (Participant H)

There was no necessity for communication, only for exploration and interaction with several stimuli. This absence of this need was based on "fear" and "insecurity" which derived from anonymity, with only 30% of the sample that socialized keeping to the basics e.g. *hello, how are you, what are you doing here* etc. In some cases, the most in-depth conversations originated between citizens with the same cultural background or with SL help-agents. As mentioned previously, the duration in a place was depended, also, from its attractiveness, which was associated with the fiction arousing the imaginative stimulation.

Subtheme - Fictional Landscapes. Fictional stimulation started from the stage of avatar design procedure and was increased during the fictional placement experience.

"My immersion in fictional places caused a feeling of freedom which, in combination with the function of flying mode made me lose the sense of time. I completely escaped from real life. I repeated my visit to the same landscape" (Participant I)

"Imaginative places in combination with music, gave the sense of relaxing and calmness. I remembered my childhood fairytales with princesses and dragons. I stayed there for a long time, exploring each stimulus. I did not want to leave,

so I tried to find something new to explore, to extend my time there" (Participant H)

"In these (fictional) places, I did not care about the presence of others, there was a plethora of stimuli, interactions, sounds and colors. I felt that the presence of others was a burden. I sat by the sea, watching a big turtle fly, relaxing and forgetting everything" (Participant K)

Fictional graphics and stimuli had a strong impact on the positive emotional state, causing participants to fully immerse and to lose their sense of time. The fictional graphics and images, the interaction objects, the music, the sounds and the usage of the flying mode, increased the association between the freedom and the imagination, resulting into an intense immersion thereby the escapism from real life. Consequently, the selected virtual places were considered as important ingredients on the aroused emotional behavior contribution and partly, on the development of the virtual well-being.

As mentioned previously, there was a need for the presence of others but not for socializing, and this was based on the factor of anonymity and the lack of knowledge about the other citizens' background.

Theme - Anonymity

An significant factor that came up from the interviews was the 'anonymity', which influenced the virtual behavior and attitude. The fact that someone was behind an avatar, generated an ambiguous senses: on one side, participants felt "comfortable" and "safe" that they were not to be recognized, thus interacting freely, protecting their private life. On the other side, 'anonymity' aroused negative emotions like "fear",

because of the lack of virtual knowledge increased the doubt about the others' intentions.

> *"I was afraid to talk to someone because I did not know who was behind the avatar and how exposed I was. I was worried about others gaining access to my account and to my personal data."* (Participant E)

> *"I came close with one "guy" and we travelled together in different places, talking, joking, we became virtual friends. The seventh time, he began to come closer and suggested we had sex; I immediately blocked him and logged off. From that day I did not see him again. After that, I was very cautious with the rest of the citizens (Participant H)*

Ninety percentage of the sample mentioned the factor of 'anonymity', caused both positive and negative elicitation, and was divided into the sub-themes of 'Self-Protection' and 'Unknown intentions'.

Subtheme – 'Self-Protection'. 'Anonymity', behind the avatar, was considered as a determinant on socializing during the SL experience, influencing the communication process between users. Avatar existence satisfied the needs of "safety" and "security", generating an experience that was characterized by "freedom", without any exposure of personal information.

> *"Being behind my avatar, without anyone knowing me, allowed me to overcome my inhibitions. I did not care about making mistakes during the interaction because the other users did not recognize me"* (Participant K)

"I navigated naked without worrying about what others said about me, it was funny. They sent me messages telling me to get dressed or that it was shameful, but I did not pay attention. (Participant L)

Generally, from one side, avatar operated as a cover of self-privacy, eliminating real life restrictions and rules, increasing the desire of full immersion into SL and from the other side had a negative impact

Subtheme – 'Unknown Intentions'. The negative aspect of 'anonymity' was characterized by the "fear" and doubt about other citizens intentions, taking the advantage of avatar coverage. The lack of virtual awareness and experience caused more suspiciousness and cautiousness during the exploration, reducing the necessity for communication.

"From the first time that I entered into the VW I was very reserved because I did not know anyone, until I familiarized myself with the place. I started talking to someone, but only the basics. The difference of SL is that you cannot recognize the person behind the avatar, and you do not know if the presented information is true, so I was more cautious" (Participant I)

"In a conversation group, one of the members sent me a private message, pointing-out that there was not any information about me in my profile page. He started asking me more personal questions, and this made me leave the conversation and that place. He threatened me that he could block me from SL, and I logged off immediately" (Participant J)

Around the 35% of the sample pointed out that there was willingness for communication with entry into SL, but after the gained virtual experience, the sense of doubt was increased and the trust was reduced, resulting to negative emotional arousal. Consequently, participants chose only the exploration and interaction tasks. Those participants that communicated, they remained into basics, except of some cases that found people with the same background or interests increasing more in-depth conversations.

Indirectly the 'anonymity' was associated with freedom, influencing positively and negatively the virtual interaction. 'Freedom' was the main determinant and most referred term, associated with each task, stimulus, and behaviour, offering a different meaning to the virtual experience.

Theme - Freedom

A noteworthy element, and much mentioned expression that was associated with SL experience was the sense of 'freedom'. This emotion was, firstly, elicited during the avatar design procedure, and became more intense throughout the virtual participation. The absence of rules and regulations increased this sense but, at the same time, created the necessity for setting up personal boundaries.

> *"It was a very good opportunity to go everywhere, talk to everyone freely, without any restrictions on virtual time or on interaction. Once, I had sex in a public place without caring about others around me, it was a thing that I had always wanted to do in real life but I could not"* (Participant M)

> *"For the first time that I used the flying mode, I felt that I was free to go everywhere, to see the mountains, the sea, and the people from above, to go under the sea and dance with mermaids, it was fantastic.* (Participant N)

Stimulation of freedom was the result of two elements: the flying function and fictional patterns. The opportunity of flying in combination with fictional stimuli during the virtual involvement, were the reasons that caused and increased the sense of an unrestricted experience, leading to a high level of immersion. This was positively interpreted as real life escapism and negatively as an excessive exposure without any confines.

Subtheme – 'Escapism'. Escapism from reality, without any rules and restrictions operated as a catalytic factor of "freedom", leading into a high level of immersion, without any sense of real-time.

> *"I went to a seabed and found an ancient palace with mermaids and sea horses. It was amazing that I could do all these things. I started the exploration, forgetting my actual problems, because it was something unique and beautiful"* (Participant O)

> *"During my exploration I did not want to walk, only to fly, so I did my socializing while I was in the air. It was a very good function, offering me the opportunity to go everywhere, to feel free without any restrictions. I used this function under the water, exploring the seabed in flying mode"* (Participant P)

> *"When I teleported myself in imaginative places, I stayed there for a long time to admire the place, the elements, to hear the sounds. I was relaxed and calm after a busy day. Every day, I looked forward to coming home and entering SL to discover another imaginative place.* (Participant Q)

All the participants pointed-out that the sense of 'escapism' became much more intense in fictional locations, enriching their imaginative stimulation and retrieving their childhood memories, bringing them away from real life routine and problems.

This excessive offer of 'freedom' had a negative side, mostly on privacy access and on the aroused weird behaviors and attitudes.

Sub-theme – 'Personal Boundaries'. Sixty percentage of the sample set up their boundaries and confines on the revealing of personal information mostly, during the communication task. 'Anonymity' and the lack of virtual experience played an important role in determining these personal boundaries.

> *"I was afraid to go into an in-depth conversation with other avatars. Consequently, I kept to the basics. If a person tried to learn more about me, I stopped him, or I left without any explanations"* (Participant O)

> *"As I was searching for places, I found some inappropriate places for free lovers and avoided going there, because it was not in my intentions"* (Participant X)

> *"When I visited Mykonos, as I was walking in a street I found two male avatars having sex. I was surprised and I left immediately. I believe that there must be some restrictions"* (Participant P)

The absence any practical and ethical limitations in SL experience increased the "insecurity" and the "fear", creating the need to individuals for setting-up personal boundaries to protect the privacy access. This was obvious in the socializing task, where the antisocial, rude behaviours and attitudes were the evidences, as well as, the

excessive attempt, from other citizens, to "have access", through the continuous questions, on personal information. All these factors made the participants to put their own boundaries, especially, during the socializing task, protecting themselves. This factor in relation with some difficulties on handling of the functions and tools operated as obstacles on the achievement of fully positive elicitation.

Theme – 'Difficulties on Functional Usage'. As one would expect, the handling of functions and tools for a sample without prior experience in the field, played an important role on the general experience and immersion in virtual participation.

> *"I was confused on how to ride a bike; I was trying to find the way to use it. I got nervous"* (Participant R)

> *"The 3rd time, I tried to relax in a bath. I had taken-off my clothes and when I tried to wear them, I could not find how to put them back. I was naked, until a person helped me. I was ashamed and nervous at the same time"* (Participant S)

> *"An agent offered me some new clothes and I tried to find them in my personal menu. Also, I was driving a car, going around a square, and when I decided to stop it I could not, I was searching to find the buttons to stop it. It was complicated"* (Participant Y)

Eighty-five percent of the sample encountered difficulties in recognizing and using buttons, tools and functional characteristics of objects during the interaction. In combination with the several mistakes due to the lack of virtual experience resulted on investing too much time in such matters, that causing negative emotions.

5.4.Chapter Summary

This chapter described the pre- and post- emotional profile throughout the virtual experience, providing in-detail the elicited emotions, moods and needs items. The experiment was implemented throughout a quantitative and qualitative analysis included thirty novice individuals, whose completed online-questionnaires and responded open-ended questions via interviews. The current methodological process investigated the participation in a VW, urged the sample to identify in words their emotions, moods and needs, discovered what their primary emotional items were before and after virtual immersion and how they managed and evaluated the entire procedure. The purpose of the current study was based on three sub-research questions that are addressed and discussed in the next sections:

Sub-RQ4: What are the aroused emotional ingredients (emotions and moods) of an unrestricted virtual experience and how are they alternated between the comparison of pre- and post- immersive experience?

The purpose of the current sub-RQ concentrated on the identification of the emotional profile before and after virtual interaction and on the emotional elicitation throughout the correlation of pre- and post- diaries, providing the significant emotions and mood items. The current attempt of the emotional determination encouraged the users to analyse and assess their aroused emotions and moods before and after the immersive experiences. Participants had to get in the rational progress to select specific emotional elements through a list, generating their emotional profiles before and after the VW interaction.

The pre- virtual interaction profile provided a low rated elicitation, especially on emotion-items than moods. A notable point was the high rated mood-item "calm", which was derived from the avoidance of reality such as studies, projects, much spendable time at the university, and personal problems. However, the current reason had not 'strong' influence on avoidance the negative scores of the rest emotional items. Consequently, the influential factors of the pre- emotional profile were (1) the escapism from the actual life routine (2) the lack of VW experience and (3) the virtual unpredictability, which increased the individuals' calmness mood-state and reduced the rest emotional patterns, synthesizing an emotional profile significantly negative.

From the other side, post- immersive experience was characterized from positive elicitation providing the appropriated emotions and moods. This was derived from (1) the virtual relieving of personal experiences that met a number of subjective actual standards (2) the anonymity, which generated more uninhibited expressions and behaviours while protecting, at the same time, the individual's personality (3) the fictional stimulation that was associated with the sense of freedom (fictional places, avatars, flying mode) and (4) the escapism from reality. All these reasons converted the immersive experience to a 'window' away from actual life restrictions and rules, without any suspensions, where participants had the opportunity to enjoy and recall positive memories from their childhood (fairy-tales).

The comparison of pre- and post- emotional status revealed high ratings of positive emotional patterns. The importance of the current elicited positivity was due to freedom that offered the opportunity for interaction without any limitations, guidelines, away from reality, enriching the imaginative stimulation, and retrieving memories for the childhood period, enhanced the participation and the acceptance of the VW. The

only negative factor, but not strong enough to influence the positive stage, was resulted from the lack of specific target and motivation, which aroused the emotion of "boring". The Figure 24 and 25 illustrate the emotions and moods before, after and through their comparison between them.

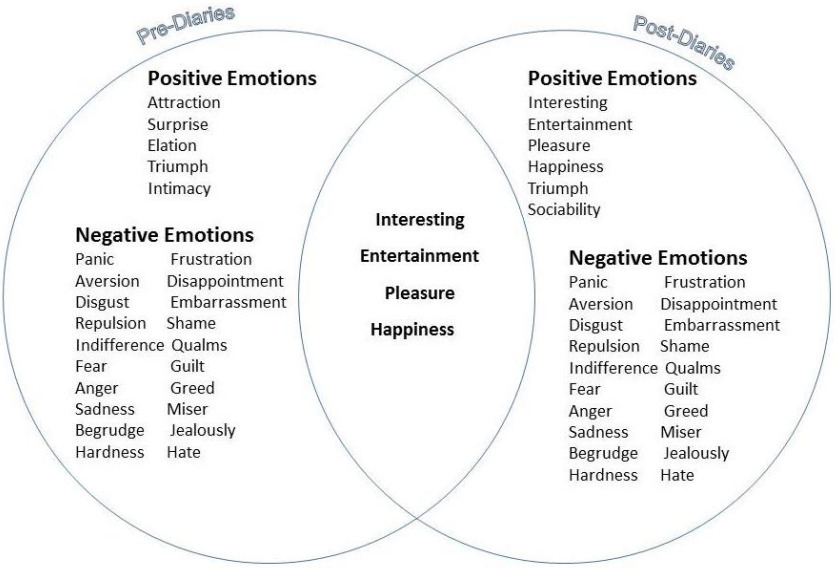


Figure 24. The Elicited Emotions of the Pre- and Post- and of their Between them Comparison throughout the Unrestricted Virtual Experience

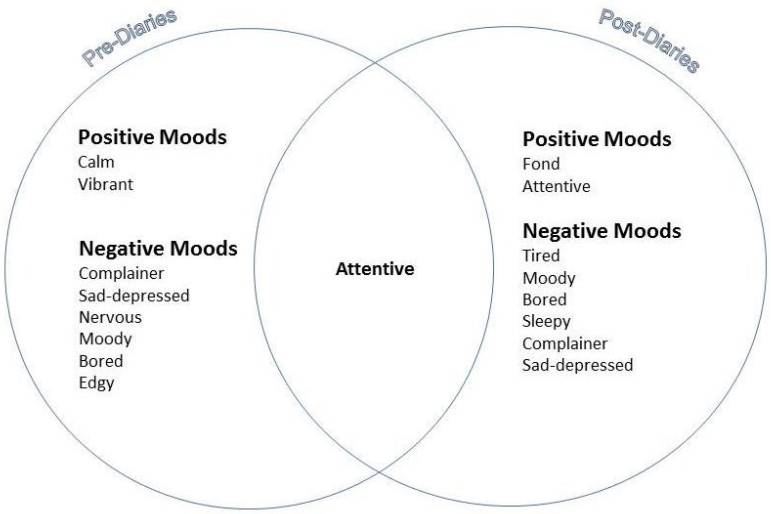


Figure 25. The Mood State Before and After And Due to Unrestricted Virtual Interaction

Sub-RQ5: How is satisfaction quality identified before and after the unrestricted virtual experience and how its ingredients are determined through their comparison?

Besides the emotions and moods, satisfaction level had a significant role in the development of the emotional profile due to virtual experience. Participants before the immersive experience had to recognize and mention what were their needs that they expected to be fulfilled, presenting indirectly, what they, actually, wanted the current time aimed on increasing their satisfaction quality, and what they expected from the immersive participation.

After the virtual experience, the satisfaction level was characterized from high rated elements, derived from specific factors: (1) the virtual freedom where users could interact without any rules and restrictions stimulating their imagination (2) the privacy protection behind their avatars, keeping them-selves safe without any personal exposure (3) the possibility of errors/mistakes without any impact (4) the presence of other users, played a significant role for the sense that they were not alone making them more comfortable and (5) the escapism from the actual life routine. However the confrontation of some difficulties on the usage and functional management influenced, partly, negatively the virtual participation, reducing the satisfaction level.

The determination and clarification of the need-items before and after the immersive participation helped the individuals to identify and express their needs that were operated as a motivation for virtual involvement, urged them to form their behavioral intentions, aimed on their satisfaction. Moreover, the current determination helped the participants to be more selective and specific on virtual stimuli, cues, or events during their interaction, aiming on the maintenance or increasing their satisfaction level.

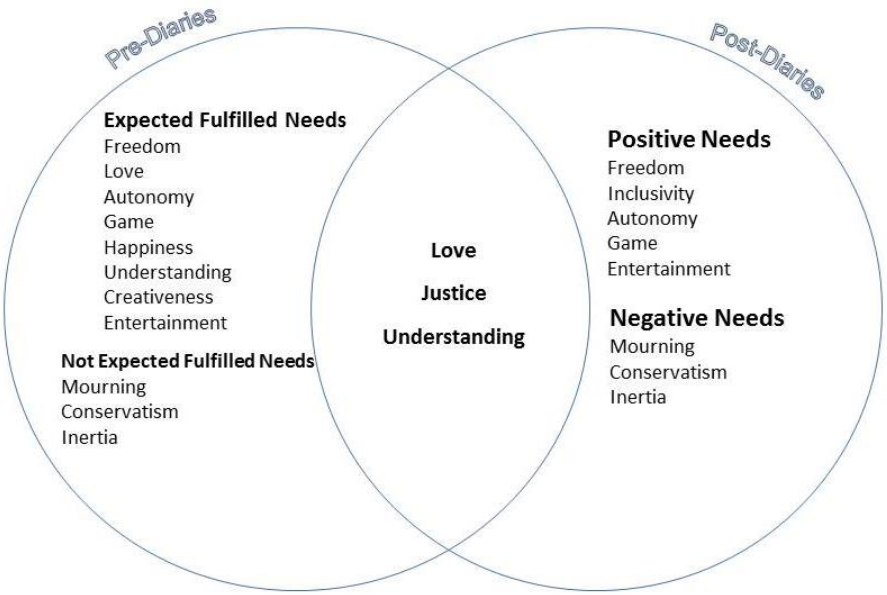


Figure 26. The Expected and the Fulfilled Needs Before, After and Due to Virtual Participation

The sub-RQ4 , sub-RQ5 were concentrated on composition of a concrete emotional profile due to unrestricted virtual experience, synthesizing, correlating and presenting, in-detail, three categories of ingredients, emotions, moods and needs, influencing the behavioural patterns during the VW experience. Before VW participation, the emotional tension was negative, caused by actual life situations, the lack of previous 3D experience and SL unpredictability, however the given opportunity of escaping from real life routine, caused a general positive mood-state. After the 3D involvement, were revealed positive emotional consequences, with a high satisfaction quality derived from fictional stimulation, sense of freedom, privacy projection and from the absence of rules and restrictions. The comparison between pre- and post- emotional profiles led to the defining of a positive outcome but with some negative influences that were based on real life habits which were transformed in the VW having the same side emotional and behavioral effects. Nonetheless, the immersive experience has the ability to provoke a positive elicitation in all of the above groups (i.e. emotions,

moods and satisfaction of needs), enhancing the emotional involvement and the user acceptance with an entertainment dimension.

The third sub-RQ focused on qualitative analysis, presenting the impacted factors of virtual participation on emotional and behavioural elicitation.

Sub-RQ6: How are individuals influenced emotionally during the unrestricted virtual experience and what kind of stimuli has an impact on their behavioral reactions?

Throughout the virtual experience, via interviews, many factors were mentioned that played a significant role on the emotional state of the participants. The first and the most important factor was freedom, where the users could interact without rules and restrictions interacting in different tasks. Moreover, the anonymity and the sense of privacy were the two factors that increased the positivity, offering to individuals the option of protection their personal information exposure. These factors were derived from two virtual tasks. The first task was the socializing, where the users exchanged ideas with other inhabitants from different countries and cultures, or they communicated each other just for fun. The second task was the exploration that was divided into fictional places and into places that mimicked actual life places connecting them with the subjective positive memories (studies, holidays etc.).

Achieving much emotional and behavioral experienced enrichment, participants combined these tasks, to gain high sense of familiarity, confidence and to learn and interpret the received new information. The current tasks, in relation with the unpredictability of SL, the plethora of stimuli (fiction/ mimicking real life places, objects, different kinds of people) and the anonymity, contributed on paying close attention and concentration during the whole involvement, producing a concrete positive elicitation.

Summarizing the whole experience, the outcome indicated that before SL participation the negative emotional tension was influenced from the actual life situations, the lack of previous 3D experience and SL unpredictability. Nevertheless, breaking the individuals' real life routine (escapism), and be immersed in a VE, away from problems and rules influenced the mood-state (calmness), positively.

The post- virtual participation, revealed positive emotional consequences, satisfied specific needs, improving, the participants' attentiveness, by extension the immersion and escapism from real life. The high sense of freedom, absence of rules and boundaries, the privacy projection, and the fictional stimulation were the determinants of the current emotional elicitation. The comparison between pre- and post- emotional profiles was characterized from positivity, although some negatives habits from real life, that were transformed in VW culture, caused the same side effects.

The emerged outcome of the above research study results was that the unrestricted virtual experience was operated as a "window" for the individuals to escape from their routine problems and pressure and be experienced in an alternative world, without any rules and restrictions, stimulating, at the same time, their fantasy, enjoying the virtual freedom, without any costs, achieving, partly, high sense of immersion and escapism from real life, yielding into a positive emotional elicitation.

However, the lack of specific target influenced the duration and the intensity of the emotional and behavioral patterns, which was reduced throughout the virtual interactions, affecting, the satisfaction quality, the interesting and the motivation for the continuity of the virtual interaction.

6. STUDY 2 – THE CORRELATION OF THE EMOTIONAL AND BEHAVIORAL PATTERNS THROUGOUT THE VIRTUAL IMMERSION

The current study aimed at the identification of the emotional behavior during SL immersion, analyzed, clarified and associated the aroused emotions with the appropriate behavioral patterns. Furthermore, the study provided the fluctuations of the mood-state and need items of each participation task. Data accumulation derived from the implementation of mixed methods: semi-structure interviews, online questionnaires, and retrospective observations, revealing an implicit knowledge (meanings and interpretations) of the virtual subjective well-being, highlighting the correlation of the significant emotional elements with specific behaviors. The methodological approach was based on answering the following research questions:

• *Sub-RQ7: What are the aroused mood-state ingredients in each targeted virtual experience and how are they classified?*

• *Sub-RQ8: How is satisfaction quality identified throughout the virtual tasks and how are the composed elements modified separately?*

• *Sub-RQ9: What are the emotional and behavioral patterns throughout the immersive task-participation and how are their correlations molded between them?*

6.1. Methodology

The purpose of the second study concentrated on the issues beyond the obvious immersive experience, investigating the relationship between emotional and behavioral patterns through the implementation of appraisal methods. Appraisal methods consisted of a triangulation approach including questionnaires, retrospective observations and semi-structured interviews.

6.2. Sample

The sample of the study was recruited from a local university and was composed of seventeen individuals (age range 20-30), who participated voluntarily in the study, having met the following specific criteria:

- Computer knowledge (advanced level)
- Lack of experience in immersive environments, especially in SL
- Consistency with the experimental procedure

6.3. Instrument

The questionnaires were carried out using an online survey, which was accessible for 45 days. Additionally, interviews were conducted during face-to-face meetings between the participant and researcher, analyzed in a computer software package, NVivo. Data collection was implemented through:

- Demographics Questionnaires
- Questionnaires about fulfilled needs and mood-state
- Semi-Structured Interviews
- Retrospective Observation

Demographics Questionnaires: apart from questions about the participants' age, gender and occupation, participants were asked to express generic beliefs and opinions about VWs, aiming at the identification of their persona, and gaining an overview perspective of VWs.

Questionnaires about fulfilled needs and mood-state: were completed after each task-participation, with participants choosing and rating their satisfied needs (Maslow 1943) and the mood-items (Mayer & Gaschke 1988), aiming at determining the mood-state and needs fulfillment after each SL involvement.

Semi-structured interviews – Retrospective Observations: were conducted after the achievement of each task-participation. During the interviews, a retrospective observation of the current SL interaction was carried out, designating and correlating the emotional stimuli with the appropriate emerged behavior. At the same time, participants were asked to select and rate their elicited emotions (Ortony and Turner, 1990) of every behavioral pattern.

6.4. Procedure

SL participation was accomplished throughout the successful completion of four different tasks:

- Exploration
- Socializing
- Find a Target
- Free Choice

The sequence of the current tasks was not random. First, participants had to become familiarized with the VE and gain the appropriated knowledge throughout the achievement of an exploration-task, where they had to investigate the interface, the function and tool usage, the interaction process, and to navigate and discover different destinations, aiming at increasing their self-confidence.

During the socializing task, participants were asked to get involved in a conversational experience with the rest of the inhabitants individually or in groups, without any content or language restrictions, aiming at improving the virtual communication skills. The third task focused on finding a specific target from the selection of suggested destinations that were determined by the researcher and divided into mirrored real life and fictional places. Finally, the last task offered the users the freedom to choose one or a combination of the previous tasks.

Each task was conducted on separate dates, had duration of 15 minutes and was screen-recorded. After each task, questionnaires were administered about mood-state and needs fulfillment, using a Likert Scale formatting (*from 1 (definitely disagree) to 5 (definitely agree) to*). Afterwards, interviews took place in parallel with retrospective observation, presenting the previous screen-recorded task, with the participants pointing out their emotional actions, behaviors and attitudes, connecting them with the evoked emotions in an excel sheet.

6.5. Results

6.5.1. Quantitative Analysis

Quantitative analysis concentrated on the satisfied needs and aroused mood-items that were calculated through the implementation of the row data analysis, by checking

whether the means of the different mood and need items were different to a neutral score of 3 (Likert Scale).

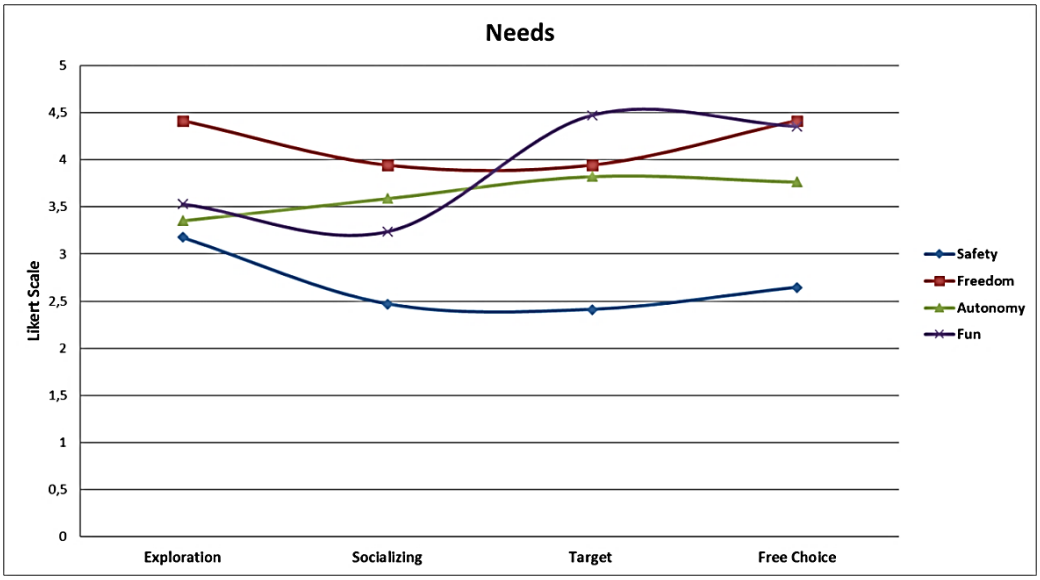


Figure 28.The fulfillment of Safety, Freedom, Autonomy and Fun needs throughout the Immersive Experience

The examination began with the satisfied need-items analysis which consisted of: “freedom”, “entertainment”, “fun”, “autonomy”, “happiness”, “safety”, and “creativeness”. “Freedom” presented the highest mean (M=4.17). Figures 28, 29 illustrate the evolution of the fulfilled needs throughout different tasks in SL.

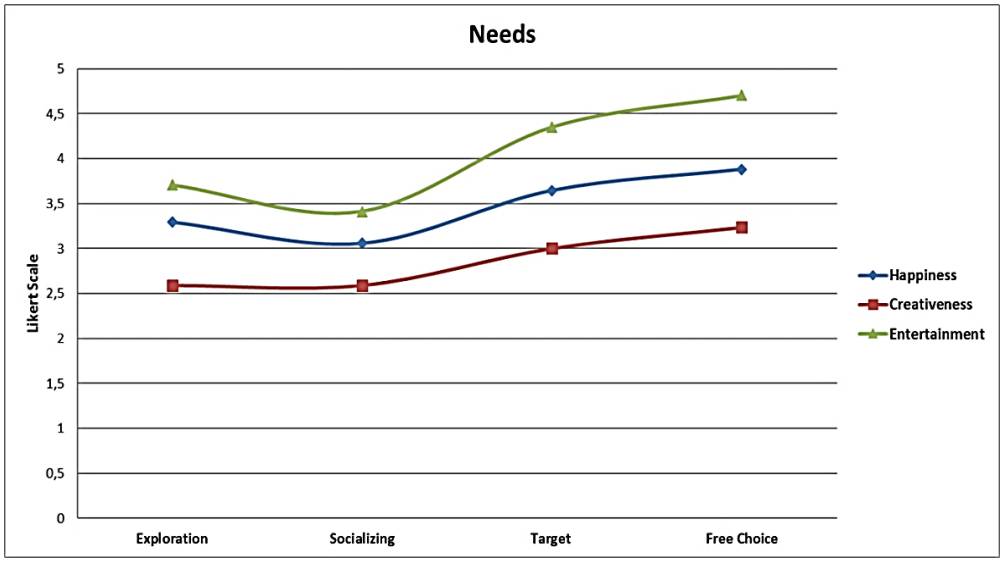


Figure 29.The Fulfillment of Happiness, Creativeness and Entertainment Needs through the Immersive Experience

The graphs showed a high level of fulfillment in the last two participations; find a target-task and the free-choice-task. The Socializing task presented a lower average, in comparison to the exploration-task that was characterized by a positive satisfaction tendency, but not as high as that of the two last task-participations.

It is notable to mention that the "safety" need had an abrupt positive alteration, between the second and the third virtual task. Moreover, the "fun" need item started with a high average mean (in the exploration task) and concluded with a downward tendency. Furthermore, the "freedom" and "autonomy" needs had an intersection point in the third task (Find a target), in comparison to the "entertainment", "happiness" and "creativeness" (Figure 29) that had a parallel positive tension, beginning with "entertainment", which was higher, followed by "happiness" and "creativeness".

According to need fullfillment, participants rated at a different level their satisfaction level after each-participation. The exploration task did not trigger a high level of satisfaction due to the fact that it was the first virtual 'contact' and there was an effort

to understand and become familiarized with the environment (Figure 30). In the socializing-task, needs were concluded as neither satisfied nor dissatisfied with a tendency towards very dissatisfied (Figure 31).

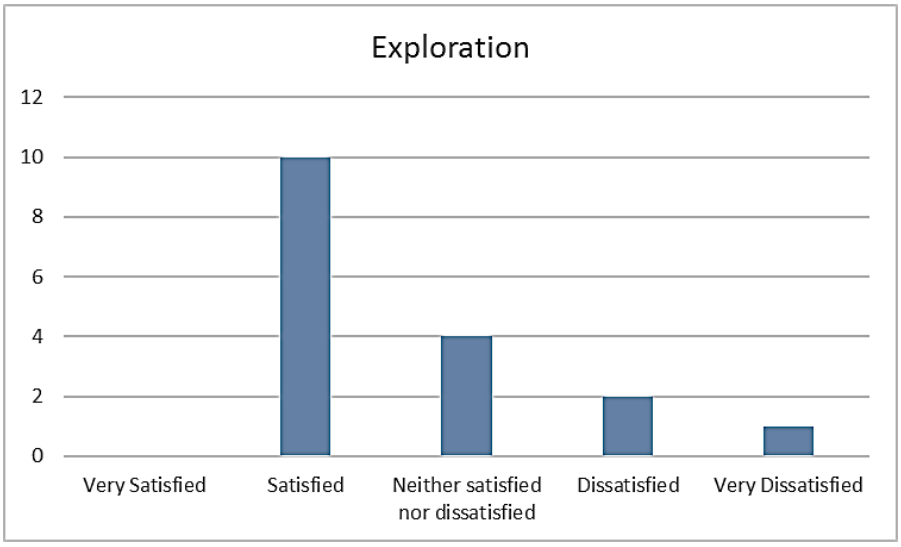


Figure 30. Satisfaction during the Exploration-Task

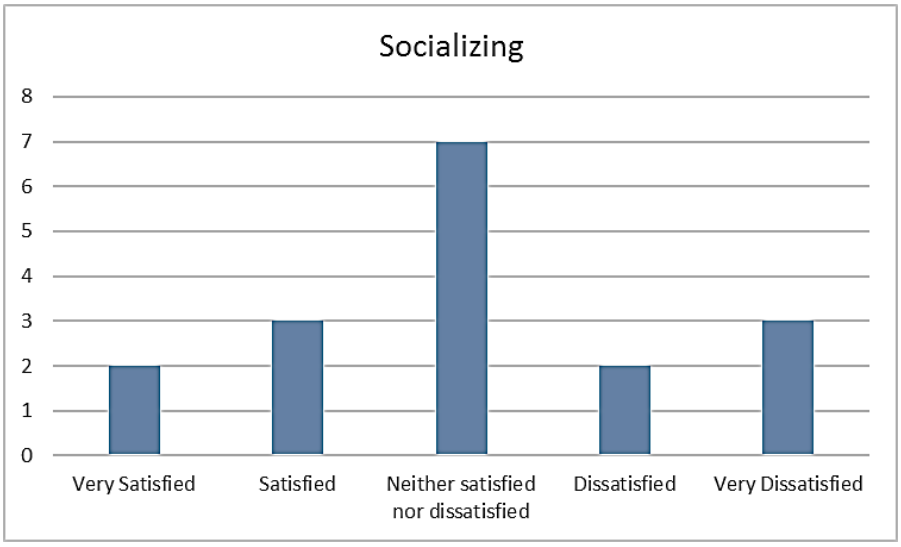


Figure 31.Satisfaction during the Socializing-Task

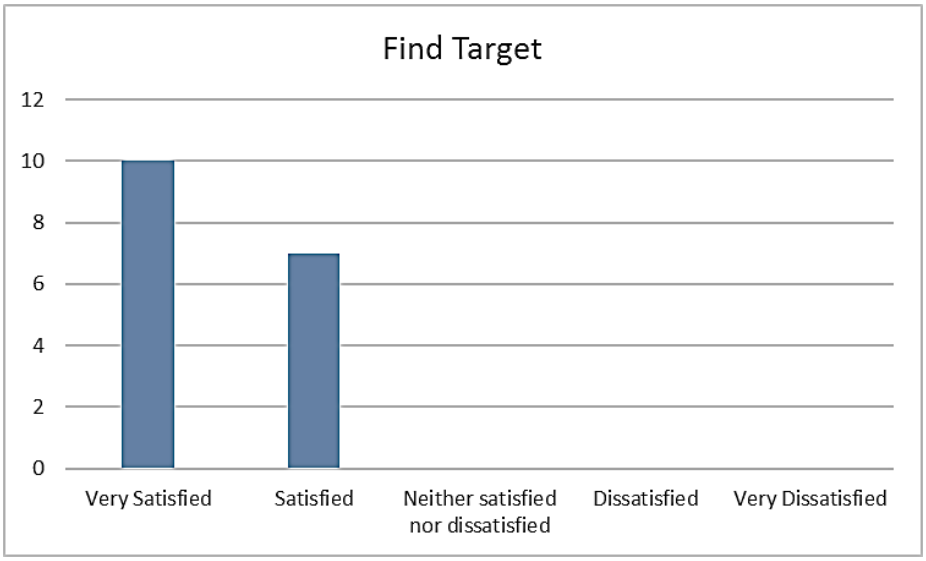


Figure 32.Satisfaction during the Find-Target-Task

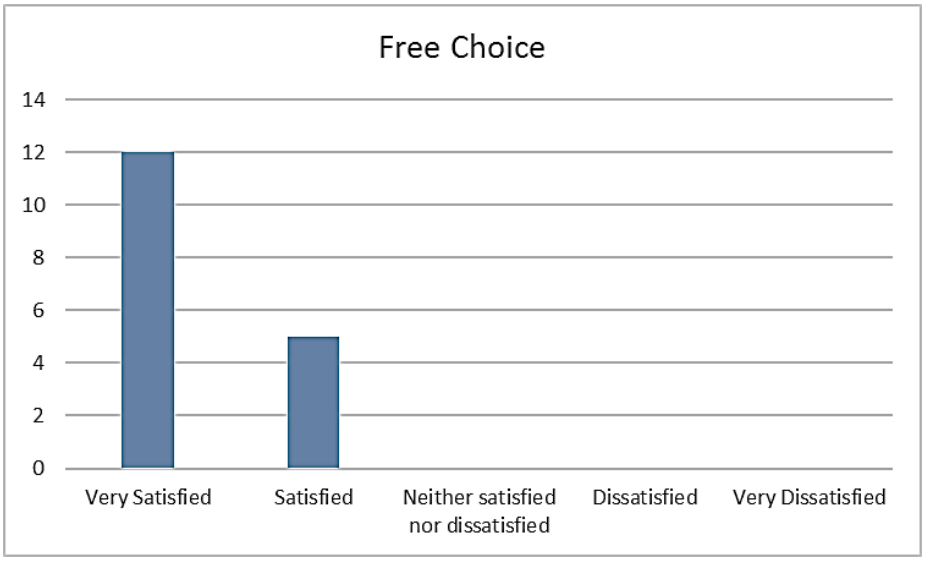


Figure 33.The determination of Satisfaction during the Free-Choice-Task

Regarding the third task, the satisfaction level was amplified positively (very satisfied), without any dissatisfied indications. In the free-choice-task, the majority of the sample was very satisfied, eliminating the tendencies of neutral and dissatisfaction (Figure 32, 33).

Figure 34 provides concisely the fluctuated flow of satisfaction alterations throughout the different SL tasks. As indicated, individuals were very satisfied from the free-choice-task, and were satisfied in both the exploration and finding a target tasks.

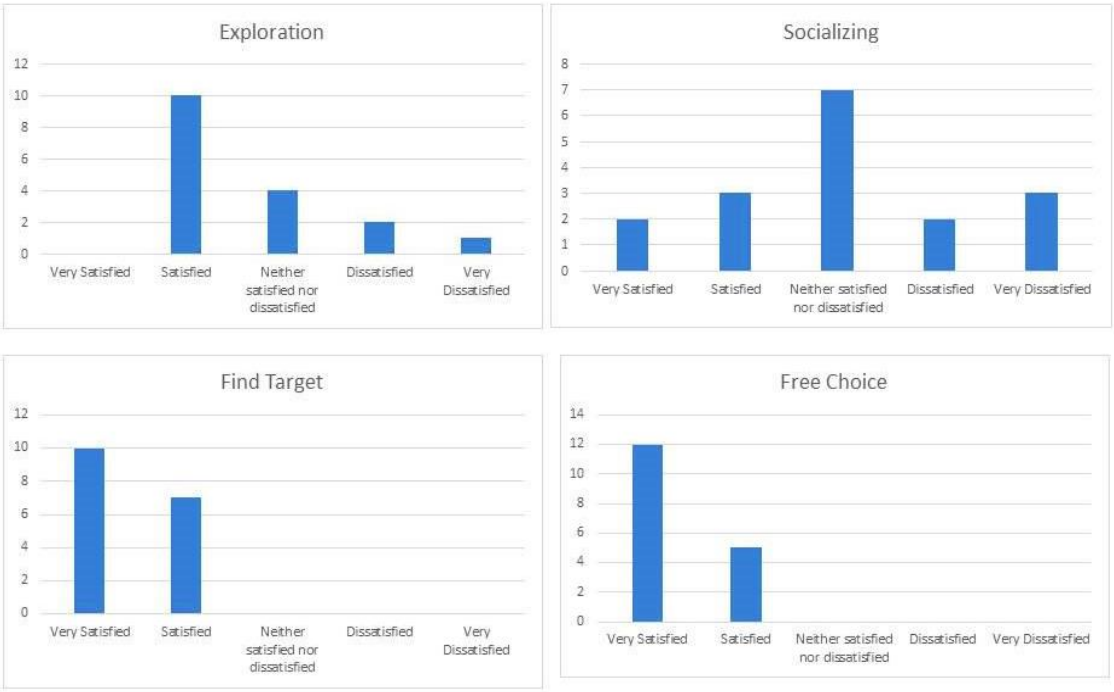


Figure 34. The Overall Satisfaction through the Four Task-Participation

During the socializing-task, the sample was neither satisfied nor dissatisfied, with a tendency towards dissatisfaction.

After the needs fulfillment and the evaluation of the satisfaction level, the analysis continued with regards to the aroused mood-items throughout the different virtual tasks. The figures 35-36 exhibit the elicited mood-items with the highest average: “vivid”, “happy”, “vigorous”, “calm”, “satisfied” and “active”.

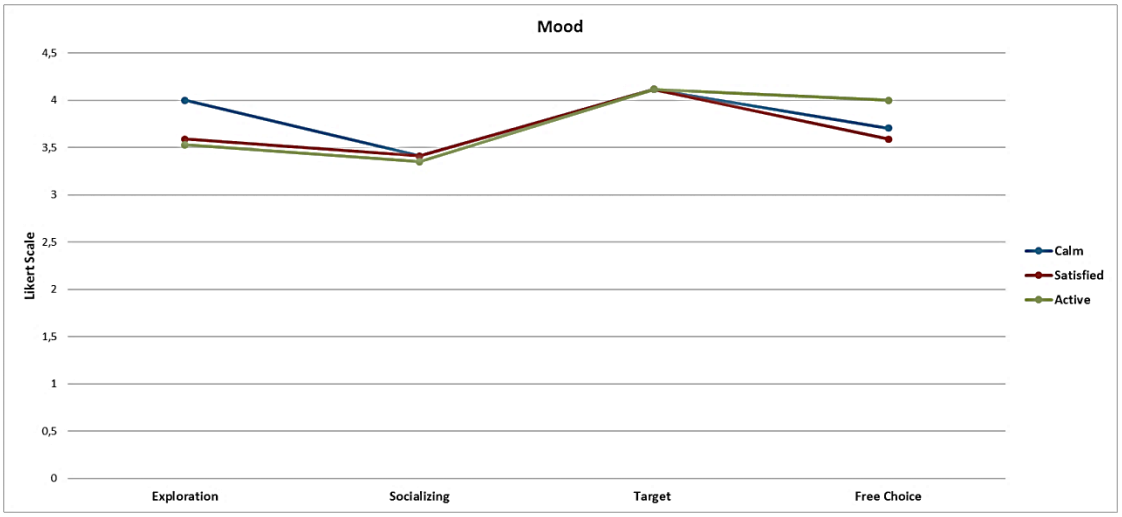


Figure 35. The Flow of Calm and Satisfied, Active Mood-items

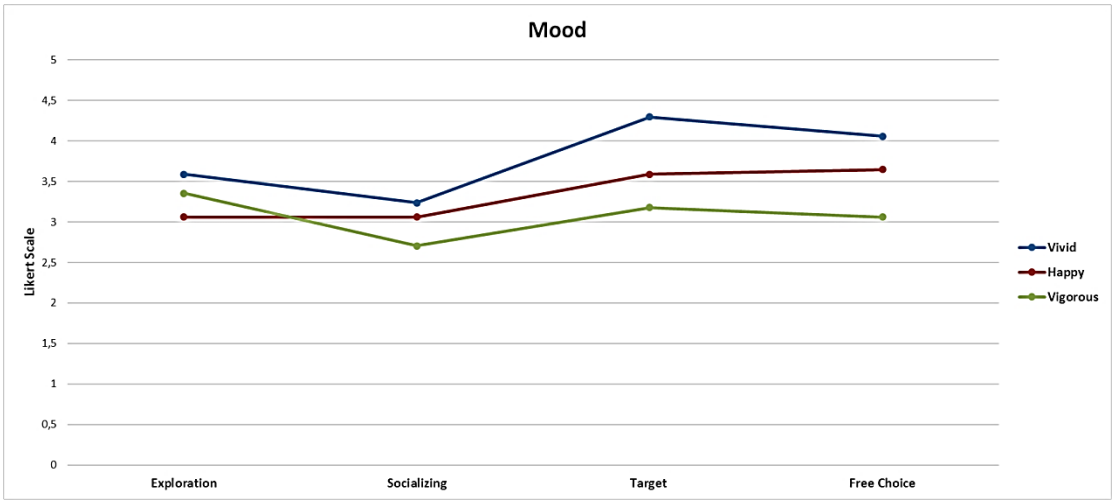


Figure 36. The Flow of Vivid, Happy and Vigorous Mood-items

The third task gathered the highest means on “vivid” “calm”, “satisfied” and “active” moot-items. Moreover, the current task was considered as the intersection point of three elicited mood-items (“calm”, “satisfied” and “active”). Contrariwise, the socializing-task had the lower average means and was the mid-point of the “calm”, “satisfied” and “active” mood-items. “Calm”, “satisfied” and “active” ranged between 3.5 and 4 of Likert Scale, for the tasks of exploration and free choice.

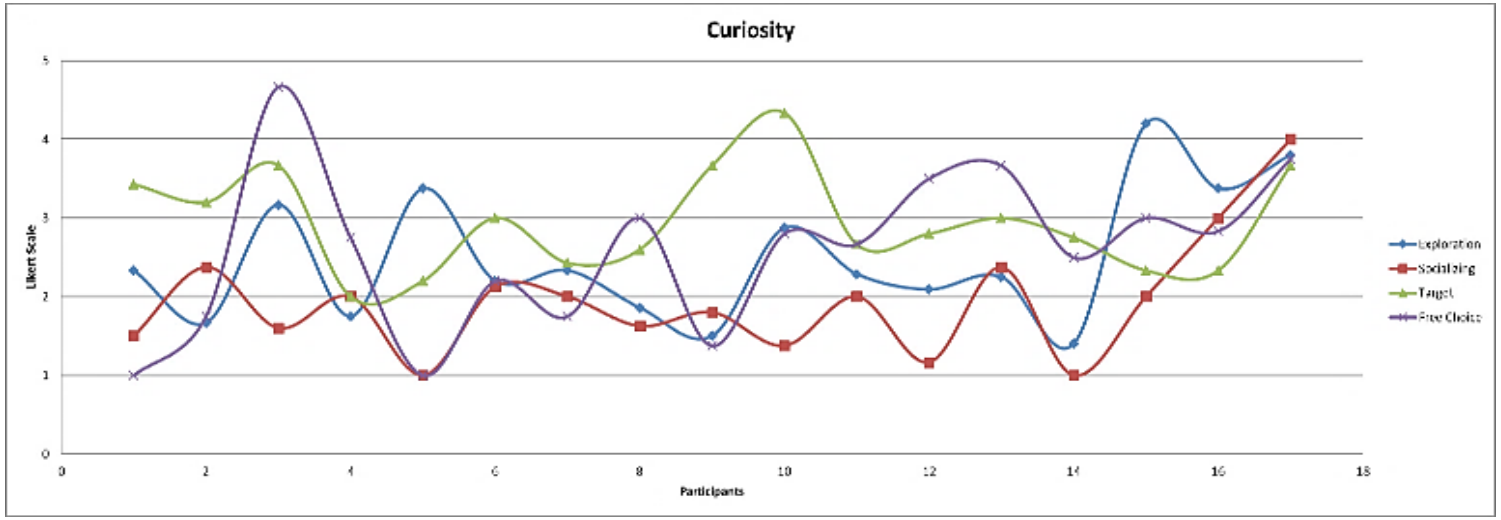
The third task was characterized by high ratings of “calm” (M=3.80), “vivid” (M=3.79) and “active” (M=3.74), in contrast to the rest items that had a lower mean.

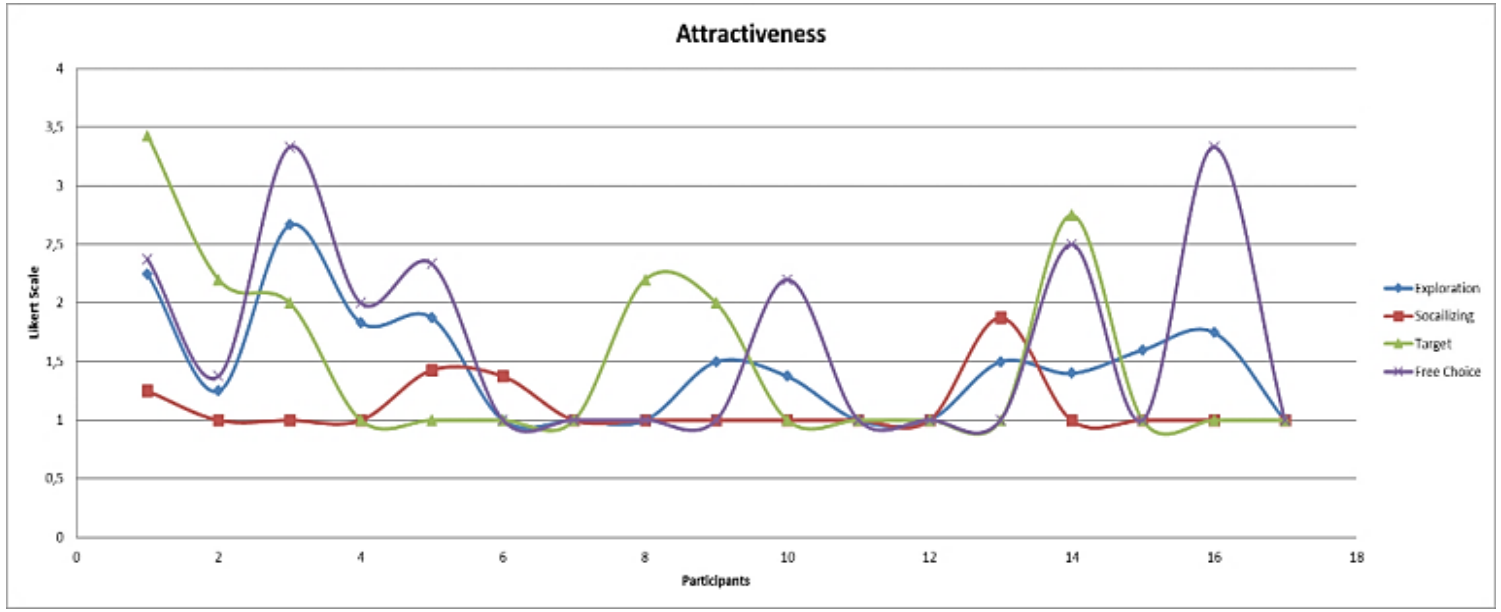
Generally, the mood-state was characterized by high ratings between the tasks of finding a target and the free-choice, followed by the exploration task and, lastly, by the socializing task.

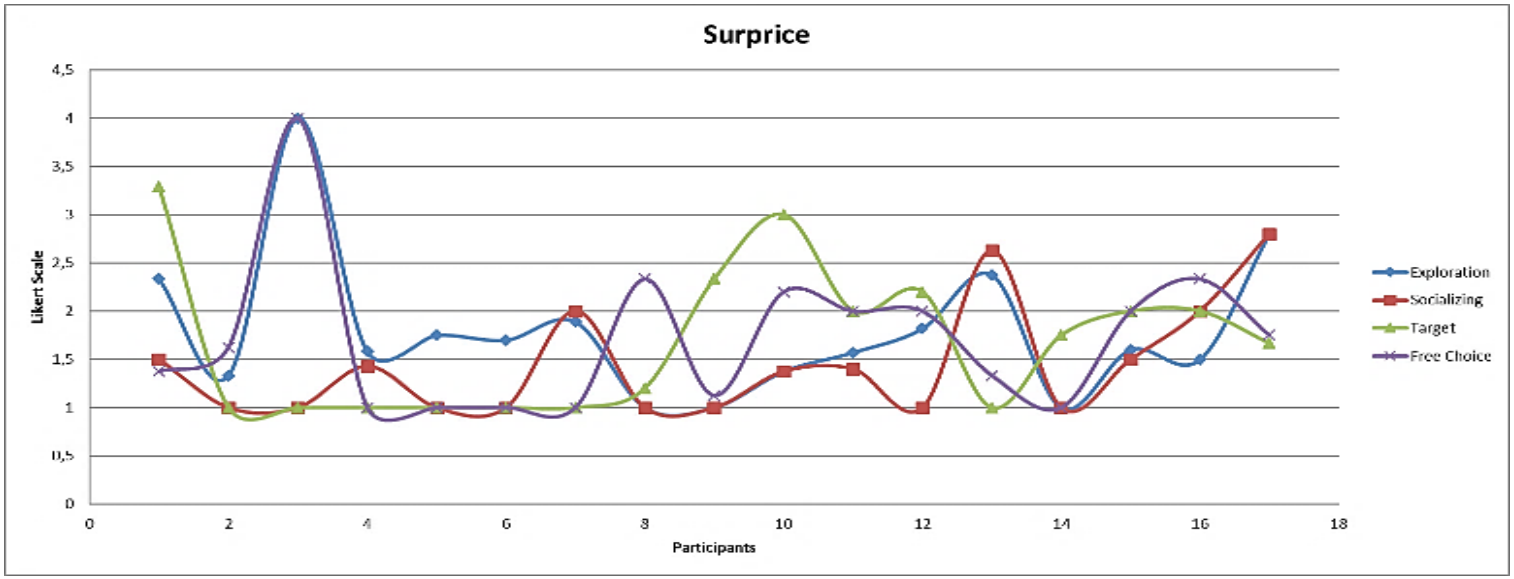
Quantitative analysis aimed at determining the satisfied needs and elicited mood state during the four task-participations in SL, revealing a fluctuation flow due to behaviors and actions. For more in-depth, comprehensive and valid results, quantitative analysis was enriched with the additional qualitative data.

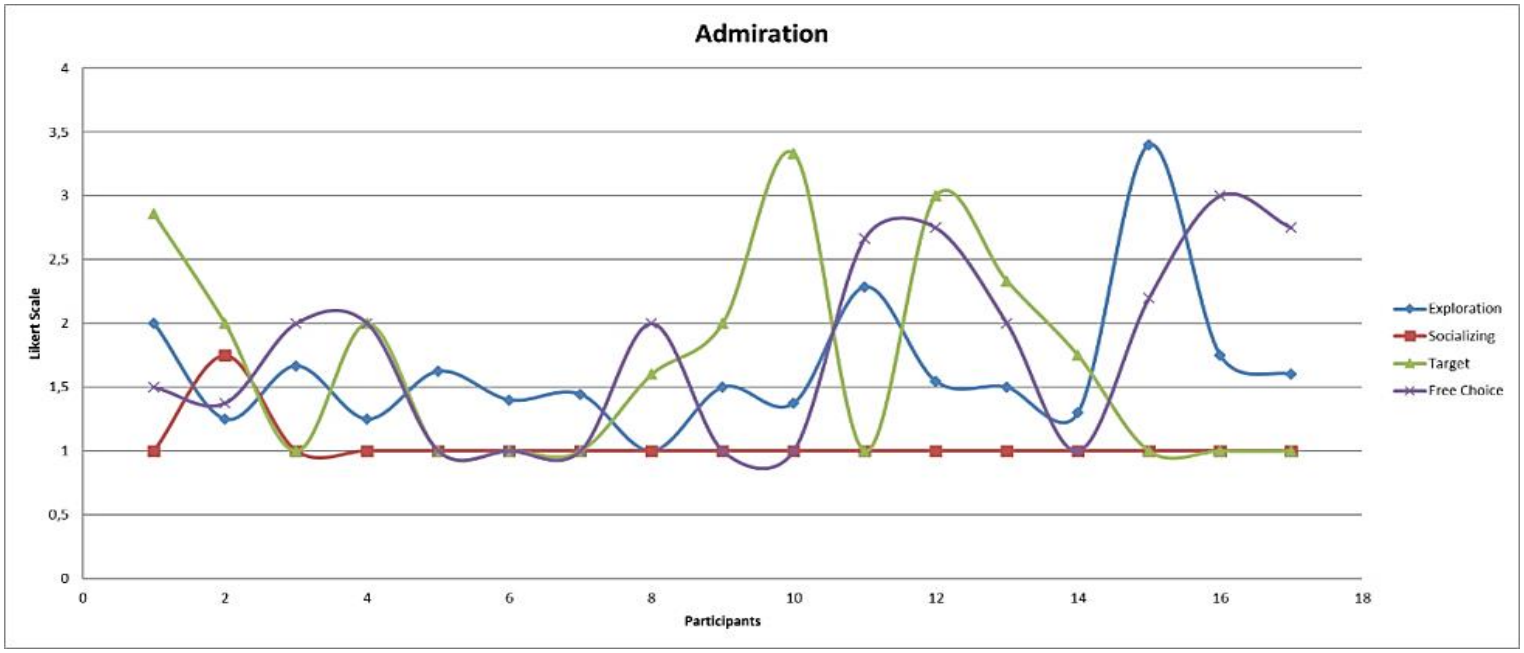
6.5.2. Qualitative Analysis

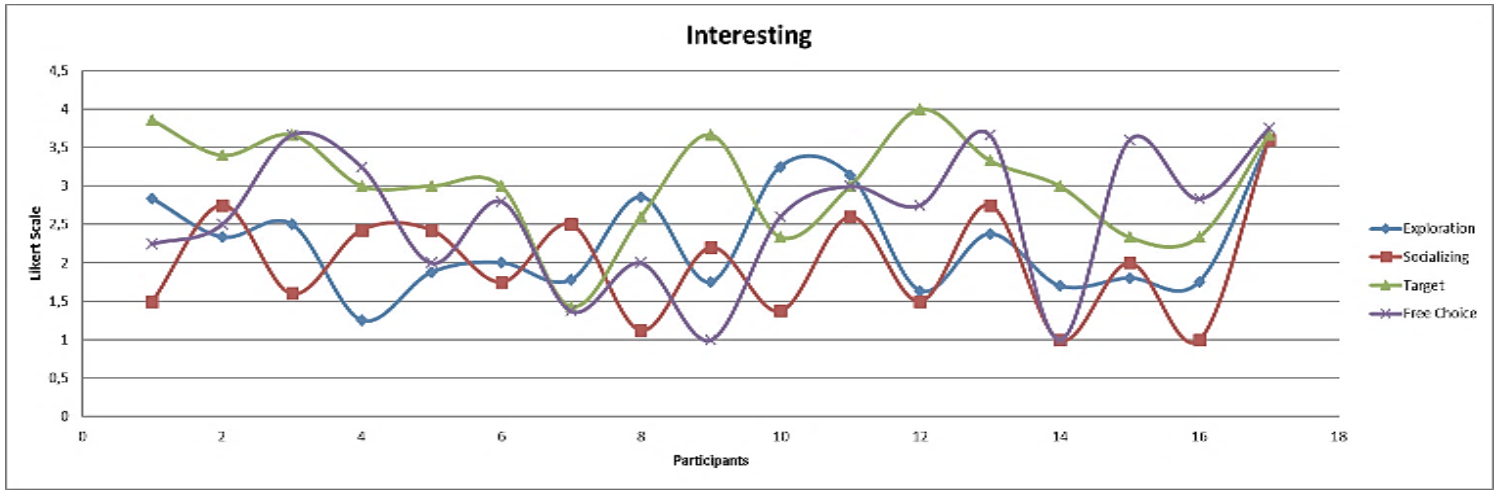
The implementation of interviews and retrospective observation, determined the stimulating actions, achieving the correlation of the virtual behavioral patterns with the appropriated emotions. The graphs below show the flow of the elicited emotions (average mean ≤ 3) during the four tasks.

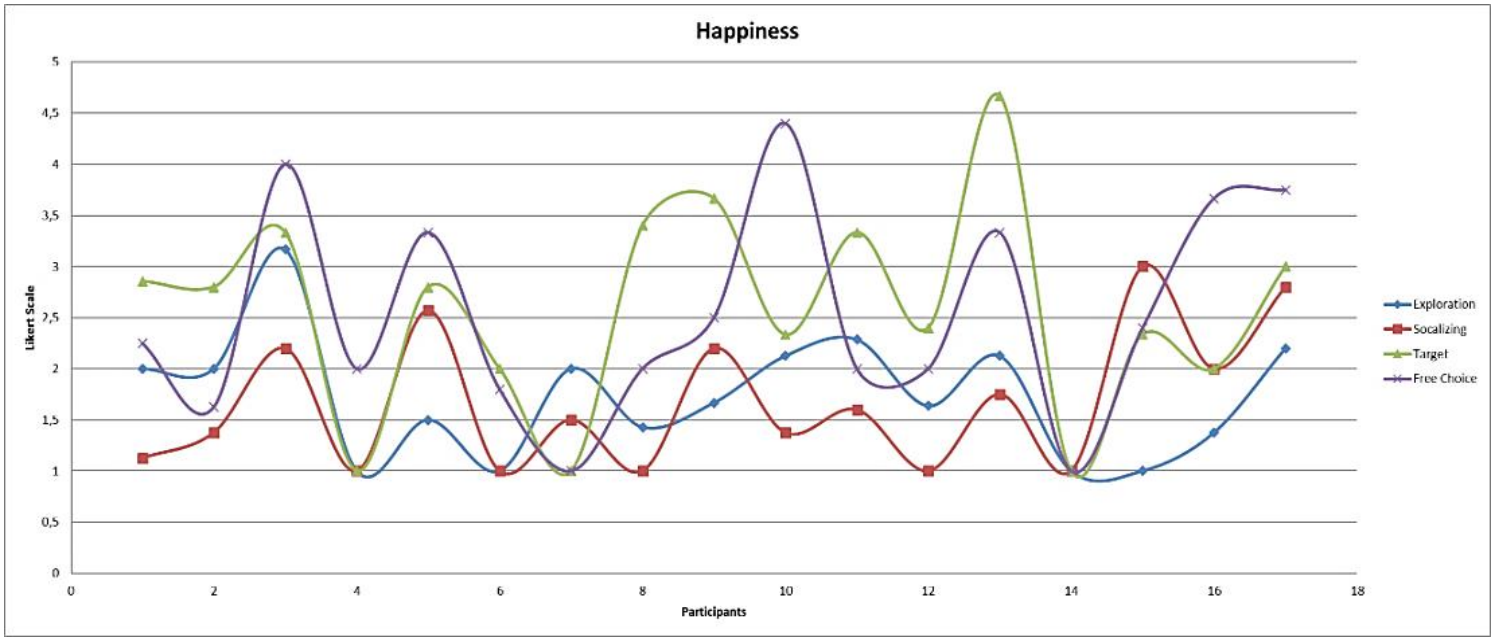

Curiosity
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

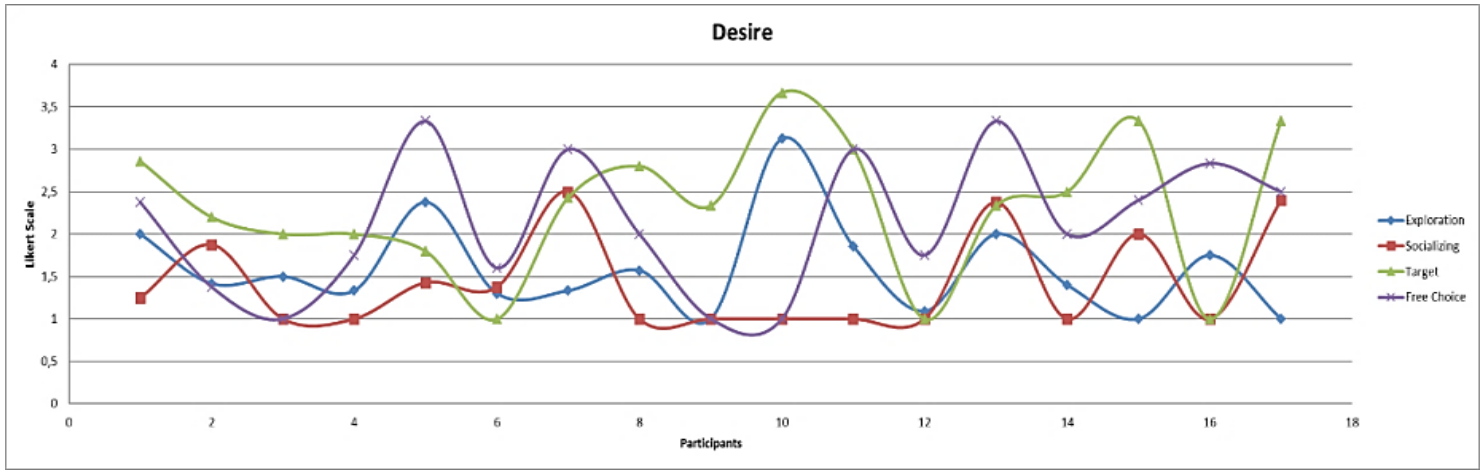

Attractiveness
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

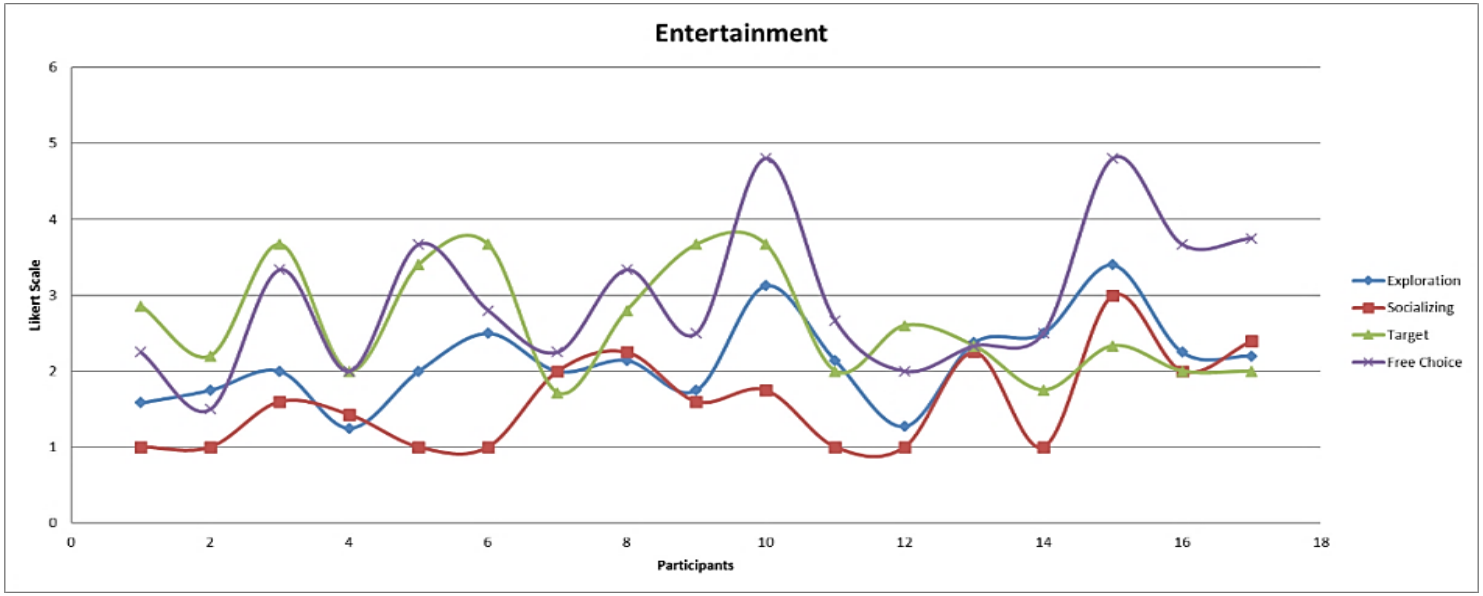

Surprice
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

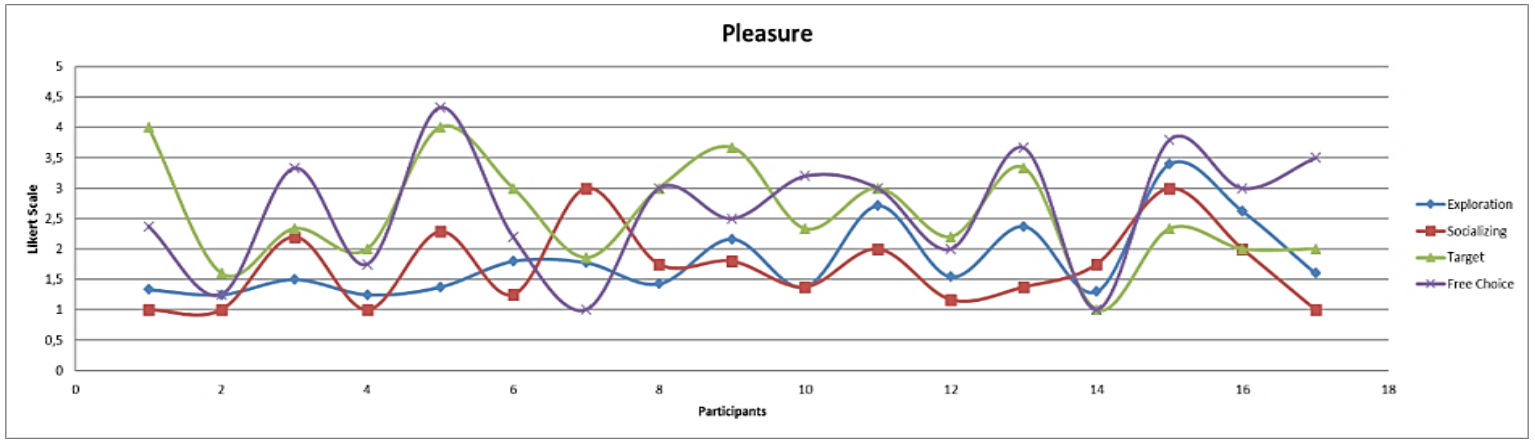

Admiration
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

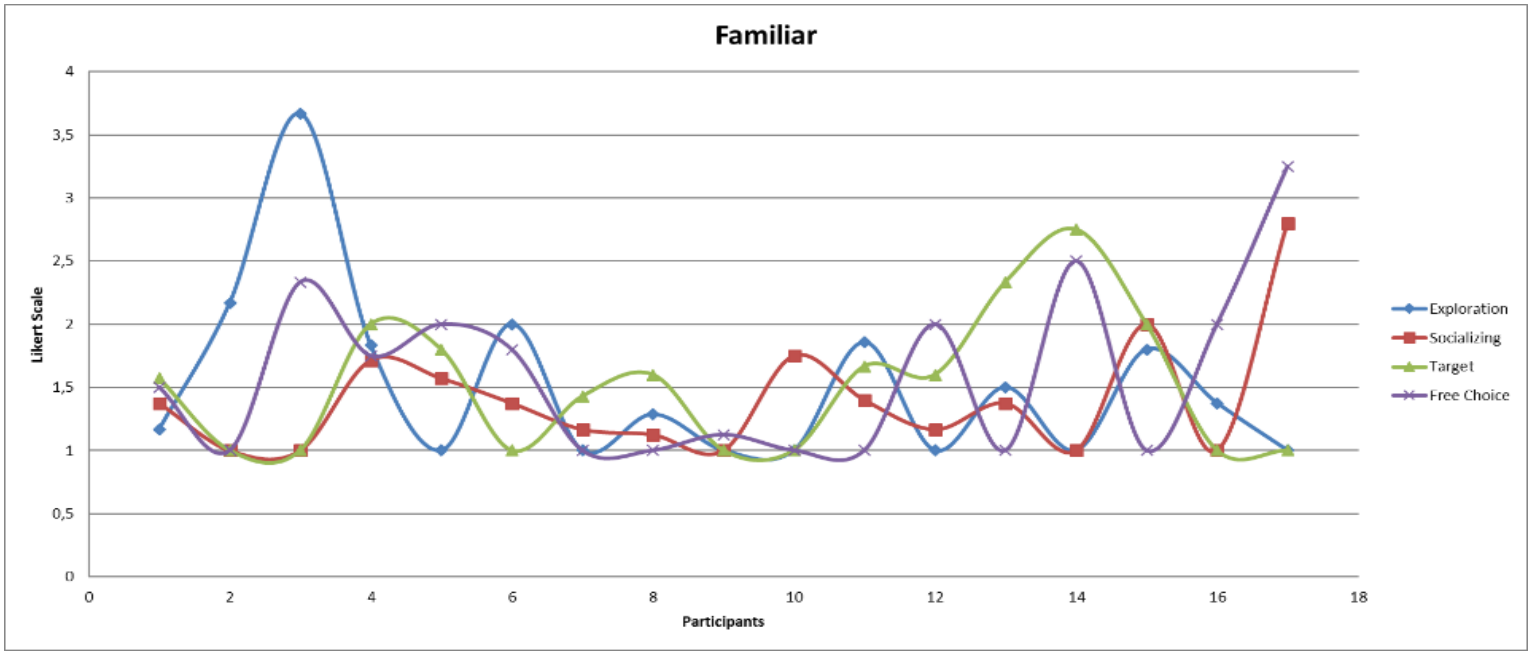

Interesting
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

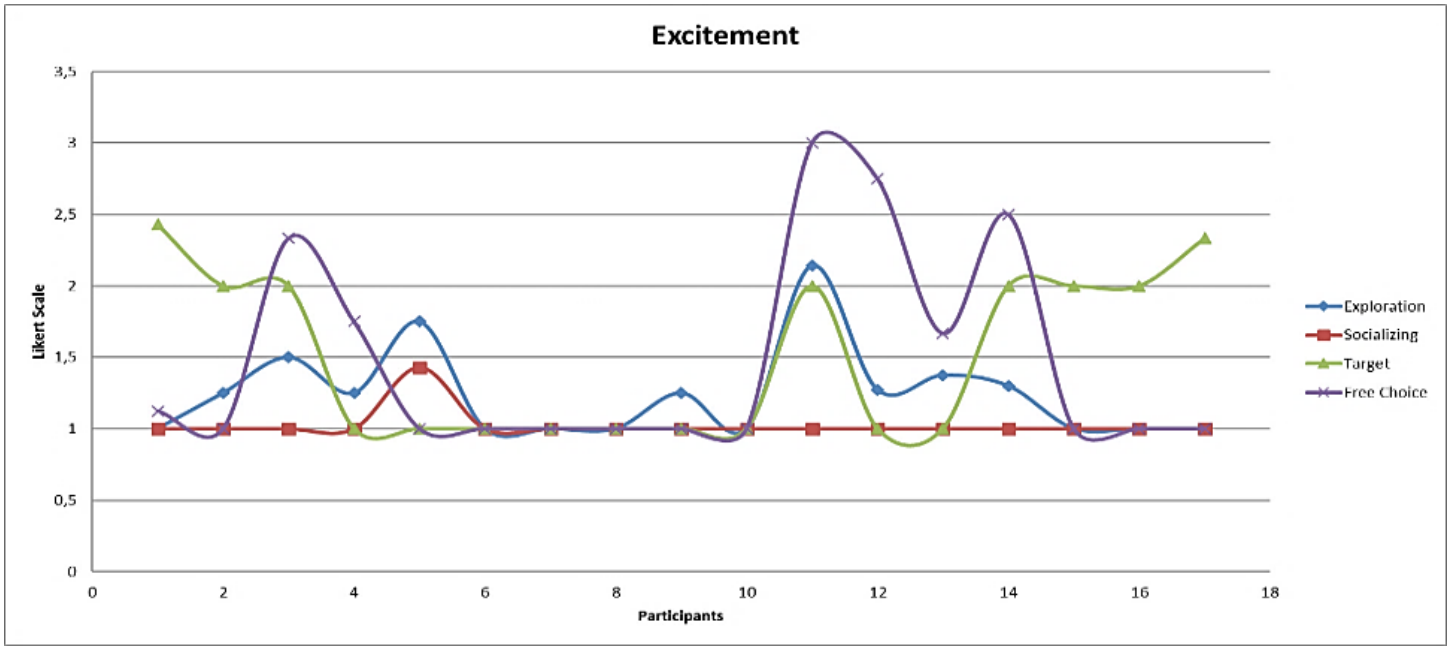

Happiness
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

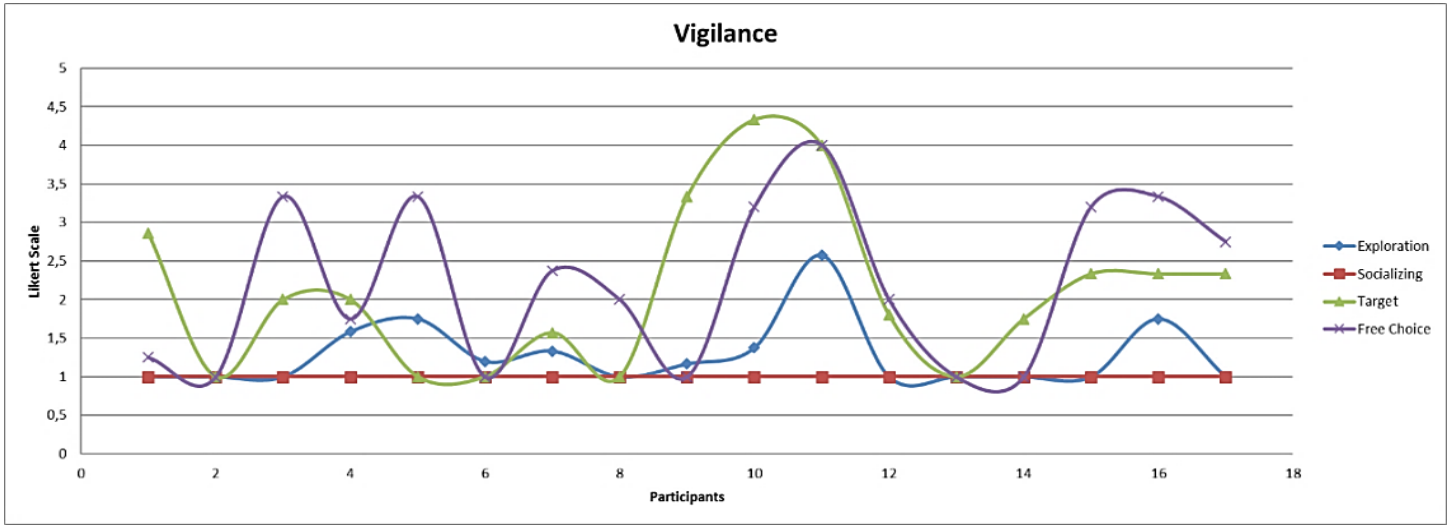

Desire
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice


Entertainment
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice


Pleasure
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice


Familiar
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice


Excitement
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice


Vigilance
Likert Scale
Participants
Exploration
Socializing
Target
Free Choice

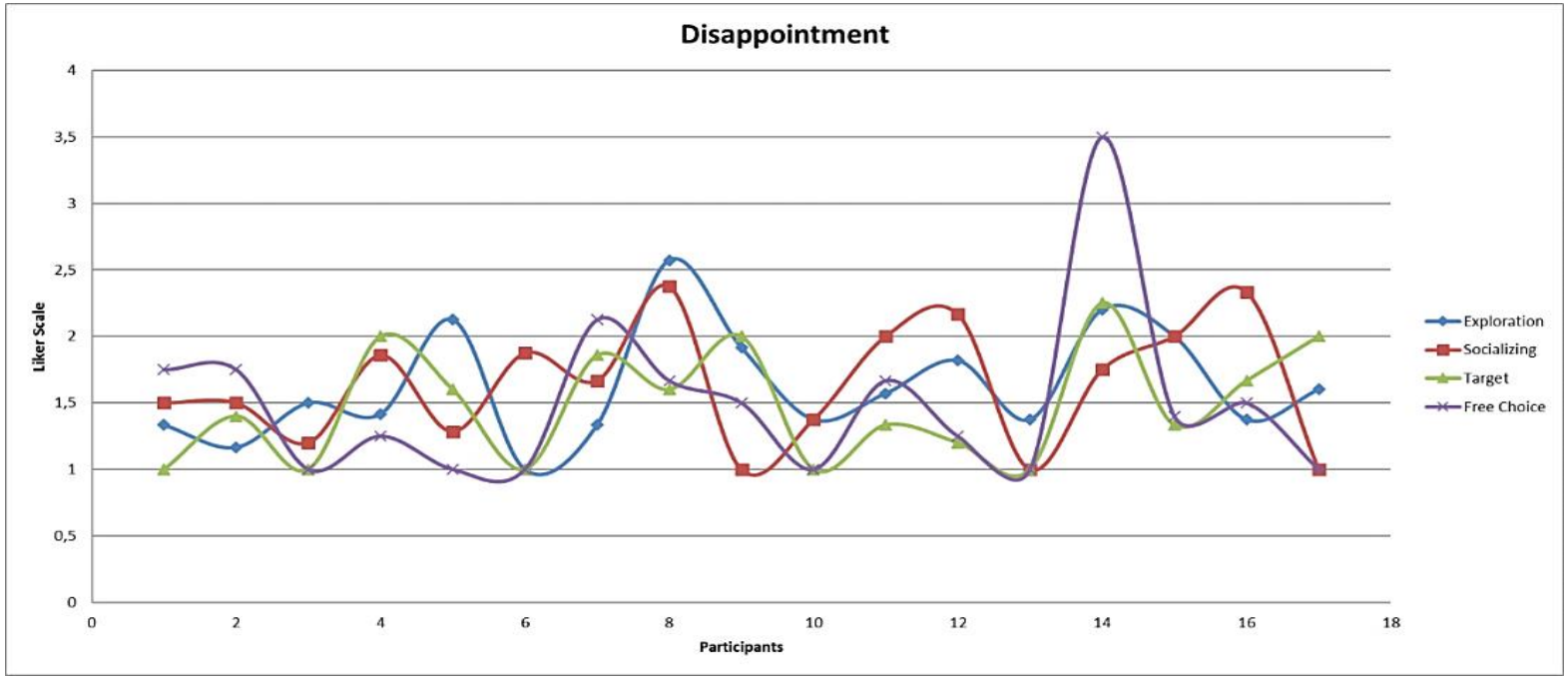


Figure 37. The Flow of the Emotional Elicited Patterns (Curiosity, Attractiveness, Surprise, Admiration, Interesting, Happiness, Desire, Entertainment, Pleasure, Familiar, Excitement, Vigilance and Disappointment)

The figures above illustrate the intensive changeability of the highly rated emotions (average mean of 3) for each task-participation. Notable emotional fluctuations were perceived in the third and fourth tasks (find a target and free choice), with “curiosity”, “interest”, “desire”, “happiness”, “entertainment” “disappointment” and “pleasure” presenting a more changeable tendency than the rest of the emotions. Socializing-task was the only participation that collected the lower averages, followed by the exploration, free-choice and find the target tasks, with “happiness” presenting the most abrupt and pronounced alterations.

The exploration task did not gather high ratings, as it was the first immersive participation and was characterized by hesitation and the attempt of gaining familiarity. The reasons why the socializing-task presented the lower fluctuations can be attributed to anonymity, antisocial behavior and general indifference. The most positive intense and steep emotional alternations took place in the task of finding a target, due to the previous disappointing experience (socializing), and the existence of a specific scenario. Lastly, in the free-choice-task, 85% of sample chose to repeat the third task, deciding to relive the positive experience of discovering a target. The rest of the participants preferred to combine different tasks, like exploration-socializing, or exploration-finding a target, or to just repeat the socializing or exploration, expecting to convert the previous neutral or negative arousal into positive.

The current analysis was concluded with the specification of the emotional elements throughout the achievement of different virtual tasks. The next stage through the qualitative analysis was considered on the associations of the emotions with specific behavioral patterns, conducted interviews and retrospective observations methods.

6.5.2.1. Interviews and Retrospective Observations

Qualitative data was gathered through interviews and retrospective observations. Semi-structured interviews aimed at the identification and correlation of the evoked emotions with precise behaviors and actions in SL. These discussions took the form of a conversation, encouraged the interviewees to deliberate and describe freely the virtual experience in response to the opened-ended questions. By way of the interview process, participants perceived retrospectively the previous screen recorded participation, indicated the emotional causes, factors, thoughts, impressions, opinions etc. and selected and rated, at the same time, the corresponding emotions.

An audio recorder was used during the face-to-face interviews and the data were transcribed and analyzed in NVivo. The coding of the interview analysis was based on themes and sub-themes from the literature review, dividing them into three main parts of the process: (a) starting point, (b) during the experience, (c) ending point. An inter-coder reliability test with a sample of the data set revealed that two independent coders agreed on the segmentation in 76% of the cases.

Figure 38 demonstrates the exploration task including the main themes and the sub-themes which emerged from the interview responses.

EXPLORATION

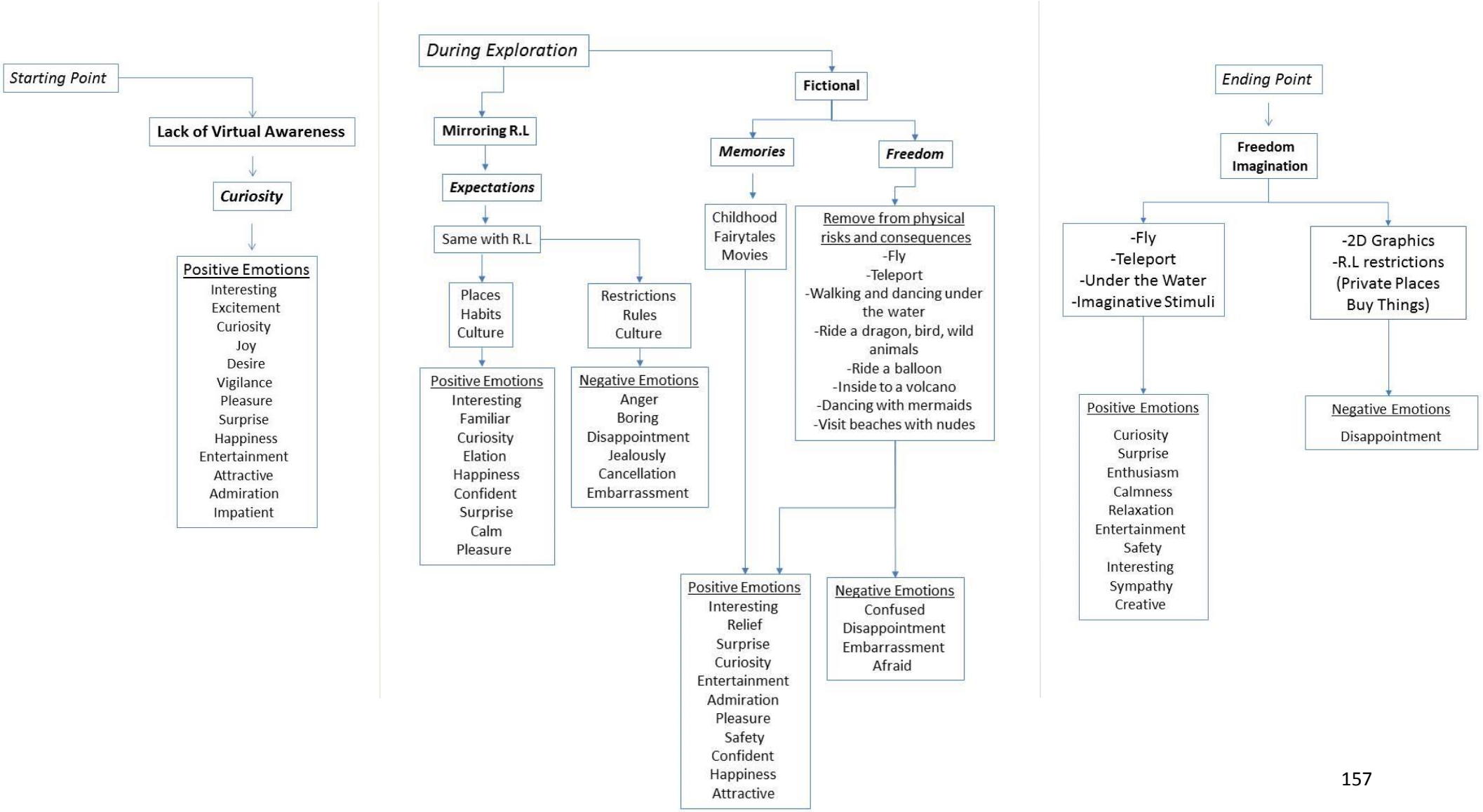


Figure 38. Exploration Task

Starting Point

Main-Theme 'Lack of Virtual Awareness'. The first SL experience was characterized by the absence of virtual knowledge, revealing the need and the desire for discovering and investigating SL.

> *"I was curious and excited to get into SL and anticipated to understand this new world, the activities that someone could participate in"* (Participant A)

The novice entity and the lack of virtual awareness in SL were associated with hesitation, aloofness and, somewhat fear. Except for these factors, the emotion of curiosity was intensified, operating as a motivator in SL immersion.

Sub-theme 'Curiosity'. The motivation of been immersed in a unique environment without any knowledge about it, enhanced the need for discovery and learning how to use this unique experience.

> *"At the beginning, when I was informed of SL world exploration, I felt excited, found it interesting to navigate in it through an avatar existence. My imagination was triggered and I was in vigilance mode to get immersed"* (Participant B)

Curiosity operated as a motivation tool, encouraged the participants for the immersive experience, developed expectations and a positive tendency, and identified, at the same time, the incentives of participation.

During the Experience

SL exploration was divided into places that imitated actual life, and into fictional ones, aiming at gaining familiarity and confidence with the environment and the interaction process.

Main-Theme 'Mirroring Real Life Places". The preferences of SL placement concentrated on locations mirroring real life and were influenced by previous actual experiences which were characterized by positivity.

> *"I went to London because I was there from my studies and my visiting would make me feel familiar and comfortable with the virtual experience. Furthermore, I was curious to see how it was depicted in SL"* (Participant C)

> *"I was teleported to Mykonos, due to the similar language and culture and because I felt safer there"* (Participant D)

> *"I arrived in Rome on account of my previous experience but I was disappointed because it did not look like Rome in reality. I stayed there for a while, navigating around different spots in the city"* (Participant E)

The criteria of destination selection were influenced by the previous real life experiences, with participants aiming at reliving the same experiences virtually, expecting a positive elicitation. Moreover, during the exploration-task, there was a conscious comparison of the virtual and actual stimuli, specifying the similarities and the differences. If the virtual was the same or close to actual stimuli, there was a verification of the participants' expectations, concluding into positive influence. If there were many differences then there was neutral or negative influence.

Sub-theme 'Expectations'. Expectations resulted, mostly, from the need to relive actual, previous experiences, with the purpose of evoking positive emotions.

> *"Athens city was represented well enough, defying my considerations and hesitations. I navigated in the town, interacted with different objects, and had some fun in a Greek bar"* (Participant F)

> *"I went to a place in London that was private, without any permission to get in there. This made me nervous and embarrassed. Furthermore, the owners were rude, commanding me to leave from there"* (Participant G)

The most preferable destinations were Greece (Athens, Mykonos), London and Paris, places that were associated with the participants´ educational and vacations experiences. The similarities and differences between real and virtual stimuli and experiences determined the positive and the negative arousal. Positive emotions emerged mostly if there were similarities to real life in graphics, landscapes, characteristics, behaviors, actions and events. Otherwise, the comparison was characterized by negativity. Furthermore, negative emotions were evoked due to existence of some real life standards that influenced the experience. That is, private places or groups where someone had to pay or to be a member in, in order to have an access were seen negatively. Also, some kinds of behaviors like rudeness, indifference and insolence, reminded participants that some actual, cultural habits could not be avoided, producing thus negative elicitations, and thus preventing full immersion.

This negative emotional alternation was reduced in the second aspect of SL exploration-task, which focused on fictional locations.

Main-Theme 'Fictional'. The gained experience through the exploration in imitated actual life places produced the confidence and revealed the need to move beyond the common destinations, visiting fictional locations.

> *"I was teleported to a mythical location with dragons, which reminded me of fairytales. I was excited with the graphics and with the whole sense of the place"* (Participant H)

> *"After finishing my exploration of Paris, I wanted to go somewhere different, not so common. I selected a fictional place from the suggested list, where there were flying turtles and boats, unusual colors, curious sounds and people. I stayed there for a long time to experience and learn about it"* (Participant I)

In contrast to places mirroring real life, fictional destinations, which were selected from a suggested list, were characterised by a variety of unique stimuli (colours, graphics, sounds, unusual avatars etc.) increased the attendance, the motivation and the immersion level of the participants and were characterized by positivity, kindling memories from childhood.

Sub-theme 'Memories'. The first element which emerged from the fictional stimulation was the evoked memories from the participants´ childhood, fairytales and movies.

> *"The experience that I have in my mind was the dance with a mermaid under the sea. It was an incredible and unexpected occasion.* (Participant K)

"I was driving a dragon, navigating around and admiring the place. It was something unique and imaginative, it reminded me of the movie ΄Lord of the Rings΄" (Participant L)

The association of fictional immersion with the anamnesis (childhood, fairytales etc.) operated as an instrument of recalling positive actual periods that were characterized by innocence and spontaneity deriving, mostly, from childhood. A plethora of different fictional and attractive stimuli resulted to extending the time-participation and to producing a beneficial, in-depth immersion. Except for the retrieval of memorable experiences, fictional placement contributed to the intensification of the sense of freedom.

Sub-theme 'Freedom'. Freedom was a term that was mentioned extensively during the interview procedure, and was generally related to virtual experience but especially, with the fictional places.

"The graphics, the colors, the sounds and the different imaginative stimuli were partly responsible for the feeling of freedom, determining my exploration in the specific place" (Participant M)

"I chose a castle as a destination because I did not have a similar experience, so I wanted to live this experience. I was only in the flying mode, I interacted with the imaginative stimuli feeling, at the same time, free to discover" (Participant N)

The use of the flying mode was the first factor contributing to this intensity which, in combination with the attractive graphics, illustrations (fancy colours, variety of

sounds, mythical creatures etc.) and the appropriate activities (dancing with mermaids, driving dragon and birds etc.) was considered on highly liberating sense. Freedom played an important role on the full immersion in SL, since all real life references, rules and restrictions were absent, triggering the memorable positive experiences.

However, the difficulties on the handling of functions and tools, and the presence of 2D graphics, aroused negative emotions that were not, however, so extensive as to influence the general positive sense.

Ending Point

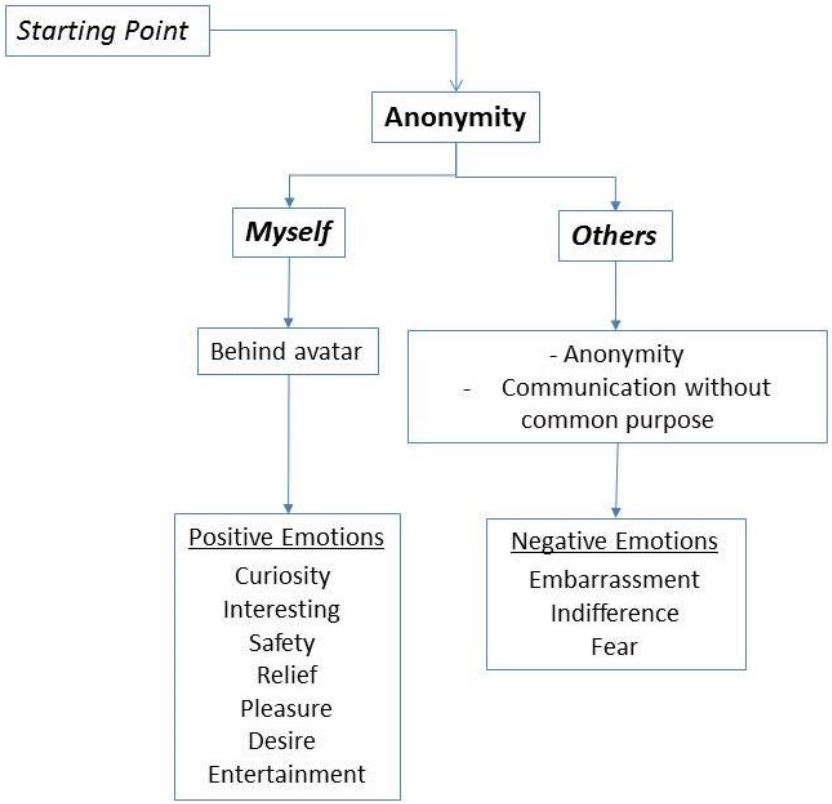
Main-Theme 'Freedom and Imagination". After the integration of the exploration-task, the two main emerged traits were freedom and imagination. These two attributes evolved from particular functions such as: flying mode, teleporting function, memorable positive retrieval (childhood fairytales and movies) and the fictional stimulation (dancing with mermaids, riding a dragon), which contributed to positive and negative elicitations. 'Freedom and Imagination' generated a powerful sensual immersion, detached the individuals from actual life routine and provided a different meaning to virtual experience. Apart from the elicited positive emotions, one generic negative emotion became evident. This was the emotion of disappointment due to difficulties of user tool and function handling, 2D graphics and the conveyance of actual life characteristics (rules, bad behaviours etc.) to the SL world. Nonetheless, the prevailing positivity was not influenced by the above negative emotional factors.

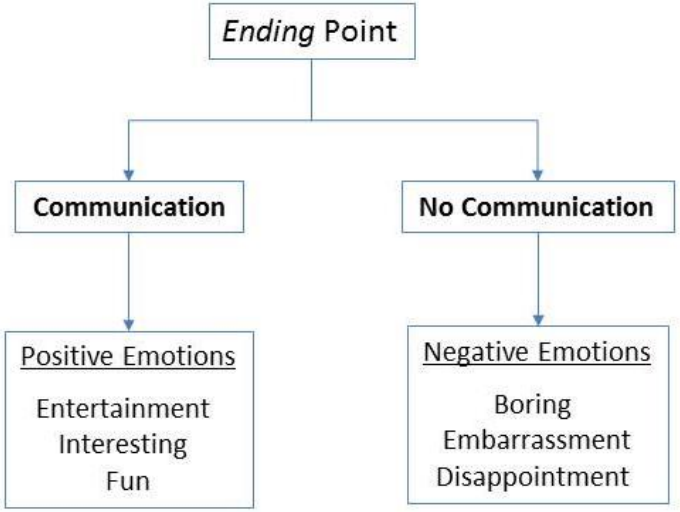
The first task (exploration-task) operated as an introduction to virtual life, which included visiting different places and locations, interacting with virtual stimuli, and in

general gaining familiarity and confidence with SL experience. The lack of knowledge evoked the sense of curiosity that acted as a motivator and a desire to experience this world. The preferable destinations were divided into: mirroring real life and fictional. Mirroring real life, places were visited based on previous positive experiences and participants consciously compared them with the actual, arousing the appropriate emotions. In the case of fictional places, childhood memories and freedom were the two factors that increased the spendable time and the intensity of the positive emotions.

The next task-participation, the socializing-task aimed at the development of virtual communicational skills with the rest of the citizens. The figure below demonstrates the three phases of the current task-participation (Figure 39).

Socializing-Task





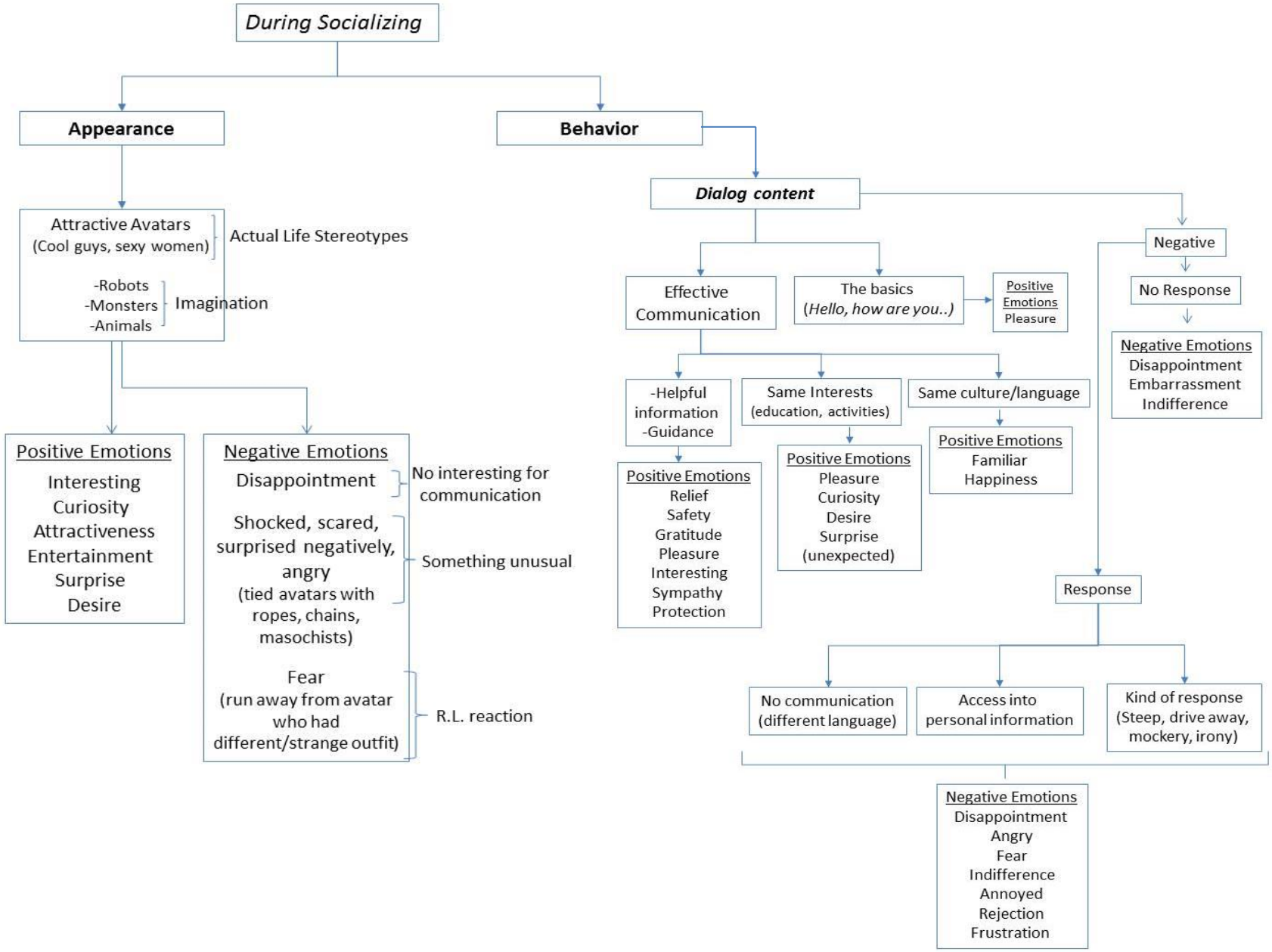


Figure 39. Socializing Task

Starting Point

Main-Theme 'Anonymity'. Anonymity played a significant role on negatively prejudicing towards the concept of socializing and, in combination with the lack of virtual experience and awareness, increased the hesitance of being sociable in a VE, behind an avatar.

> *"I was afraid because I did not know anyone or how easy it was for someone to have access to my private data"* (Participant O)

> *"I felt bored trying to find a common subject to talk to someone. It was a waste of time to chat without a specific purpose"* (Participant P)

The predominating emotion of cautiousness about virtual socializing derived from actual life culture that influenced negatively the whole procedure. The emotion of insecurity, fear of personal exposure and the absence of trust biased the intentions of behind the attempts for communication with other inhabitants. However, there were participants that felt safe and free to have a dialogue with other residents, knowing that the avatar could not project their personal information, acting anonymized. Consequently, the 'anonymity' factor produced two opposite reactions: positive, the unrestricted self-expression and negative because of the effect of others´ bad behavior and attitudes.

Sub-theme 'Myself'. Due to avatar existence in SL, the socializing-task was encountered as an opportunity for free communication and for learning about different cultures and people, exchanging ideas and opinions without any fear of personal information exposure. In parallel, self-masking behind avatar removed the participants'

insecurities and doubts about privacy and prepared them emotionally and behaviorally for virtual socialization.

> *"I did not care who was behind an avatar, I did not know him and he did not know me, I could risk talking to people"* (Participant Q)

> *"I still felt free while socializing because I was hidden behind my avatar, without exposure of myself. It was a chance to meet people from different cultures and countries around the world"* (Participant R)

Accordingly, avatar coverage was considered as the means of improving the autonomy in SL communication without any worries about rude or bad behaviours, influencing positively the self-confidence. Due to this advantage, many participants met people from around the world with different cultures and habits, had positive conversations and exchanged ideas and opinions. Nevertheless, there was part of the sample that had negative experiences during the virtual chatting.

Sub-theme 'Others'. A number of participants were negatively prejudiced about virtual socialization, on account of fear and insecurity on how easy it was for someone to have access to their personal information. Moreover the indifferent attitude of some inhabitants contributed to negative arousal.

> *"I was in a negative state before the task started, because I did not have the trust to chat with unknown persons, without any background information about them. My doubts were much more because, due to anonymity, I did not know how advanced the computer level of the other person was, and what he/she could do to my account or my computer, I felt exposed"* (Participant S)

"In real life I talk to unknown persons just to ask some basic information. The difference with virtual communication was that I could not see them, so the hesitation and the fear were high" (Participant T)

There were three factors that emerged and influenced negatively the current task, starting with the first that arose from real life culture, and which had to do with the conversation with an unknown person. This became even more intense in SL, due to the fact that individuals were hidden behind an avatar; without presenting their actual appearance and background, the sense of fear and concern about the intentions of other inhabitants increased. The second factor had to do with the accessibility to personal data that derived from the lack of awareness of the other citizens' background and their level of computer knowledge. Lastly, the communication process without any common aim or target was considered as needless, without any motivation for chatting and, in combination with an indifferent attitude during the dialogue process, it aroused negative emotions.

During the Experience

The criteria for selecting virtual interlocutors were based on two factors: external appearance and behavioral patterns. The duration of the dialogue was determined by the content, the existence of common interests and the behavioral attitude of the talker.

Main-Theme 'Appearance'. The criteria for selecting a chatting partner were grounded on the attractiveness of the avatar's external appearance.

"*I found a sexy lady standing alone in a corner and I sent her a message, to start the dialogue. Firstly, we told the basics and then we navigated around,*

continuing our conversation. Our chatting concentrated on our backgrounds, and in the end we became virtual friends" (Participant U)

"I was excited with someone's' outfit of a monster, and started talking to him. He had a sense of humor, made me feel more comfortable, advising me about the SL world, to protect me. (Participant V)

"I went to Athens to speak in my language; I felt safer, becoming involved in more essential socializing. I found a girl and we started chatting, which lasted for a long time, and we ended-up having virtual sex at her private place" (Participant W)

Appearance was separated into: a) actual life stereotypes (sexy lady, cool guy etc.), where avatars were more easily acceptable, on starting a conversation and on fictional inspirations (monsters, elves, cars etc.), which were uncommon and interesting, and increased the "curiosity" about the person that was behind the avatar, stimulating imagination. In both cases, the emotions of fear and insecurity prevailed at different levels, especially in some cases of extreme appearances (chain and rope tied avatars, slaves, sadomasochists etc.) that triggered much more negativity, repelling the attempt for communication. Even though the appearance was considered as the first criterion of social approach, the duration of the dialogue was determined by the others' attitude, context, and the general reaction of the interlocutor.

Main-Theme 'Behavior'. The duration of socializing depended on the content of the dialogue and the overall behaviour and attitude of the communicator. Through the interview process it was revealed that the attractiveness of an external appearance was not always consistent with courtesy and decent behaviour; instead, some attractive

avatars had a rude behaviour or an indifferent attitude. However, there were people that were sociable, generating extensive dialogue.

> *"I sent a message to an attractive lady, started chatting with her, but I did not receive any response, so I left from there, to find someone else.* (Participant X)

> *"I talked to some people in SL but just the basics (Hello, how are you…), without any essence in the dialogue. This task was boring.* (Participant Y)

Except for communicational behaviour, a factor that caused positive and negative influences was the content of the conversation and how useful, beneficial and interesting it was.

Sub-theme 'Dialog Content'. The purpose of the socializing-task did not focus on the number of interlocutors, but on the conversational content and on the gained knowledge. The dialogue content was divided into basics (*hello, how are you*) that was characterized from indifference and boredom, and in an in-depth conversation that led to fruitful and interesting content, with the purpose of learning new things.

> *"I went to London for this task and started sending messages to the people around. I did some chatting, just the basics, I did not go into in-depth content" (Participant Z)*

> *"I found two guys next to me to talk to, but I did not get any response. I continued in order to find someone else, just to complete my target" (Participant IA)*

> *"At the beginning of the task I found two persons to talk to, but I did not receive any response. Then I saw a third person and we chatted, limiting our conversation to the basics. After that, I found a lady and we had an in-depth dialogue on our common interests, exchanging information about our work. At some point, I started to be afraid of the exposure of my personal information, and I ended our conversation kindly" (Participant IB)*

The comprehensive communication was divided into three types of content. The first concentrated on dialogue with a purpose that aimed at providing help and guidance support, given by some agents in SL that had this role (that is, to offer hints and tutorials about virtual experience, introducing the new comers in SL). The second type of an in-depth conversation was related to the same educational and work background between interlocutors. The common interests between them led to a more vital chat-talk, extended the duration of the conversation, leading to a fruitful conversation. The last type was based on the similarities in culture and language. Individuals visited locations where they could express themselves freely and felt confident, without any difficulties in language expression and in sharing cultural patterns. Although there was a positive elicitation of emotions from the extensive communicational content, this was not strong enough to eliminate the prevailing fear and insecurity about the privacy. Furthermore, the negativity was enhanced due to rude, abrupt and ironic responses, and due to misunderstandings caused by the use of different languages.

Ending Point

Main-Theme 'Communication". The completion of the socializing-task followed a specific sequence, starting from the attractiveness of the appearance and moving on to

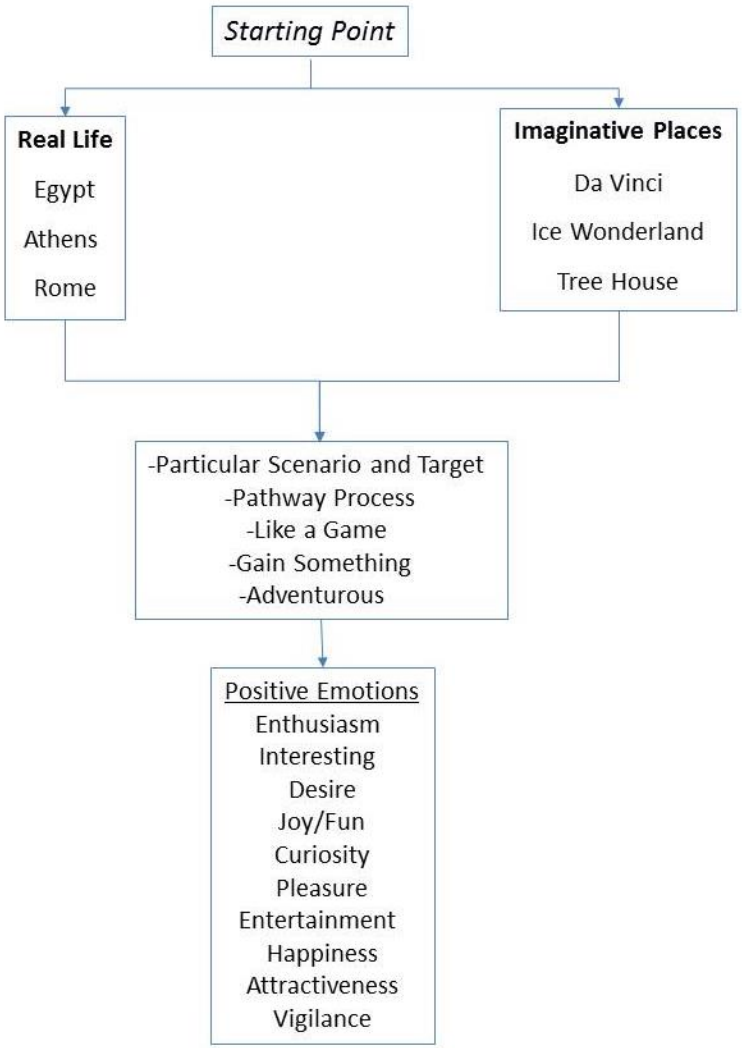
the conversational content (like actual life) that determined the duration of the communication process. The content was divided into basics, which did not last long, and where the emotional fluctuations were neutral to positive. Contrariwise, an in-depth conversational content with a common target, interests, or background, had much more duration, eliciting positive emotions. On the other hand, this type of communication had negative influences too, due to the rude, abrupt and ironic responses.

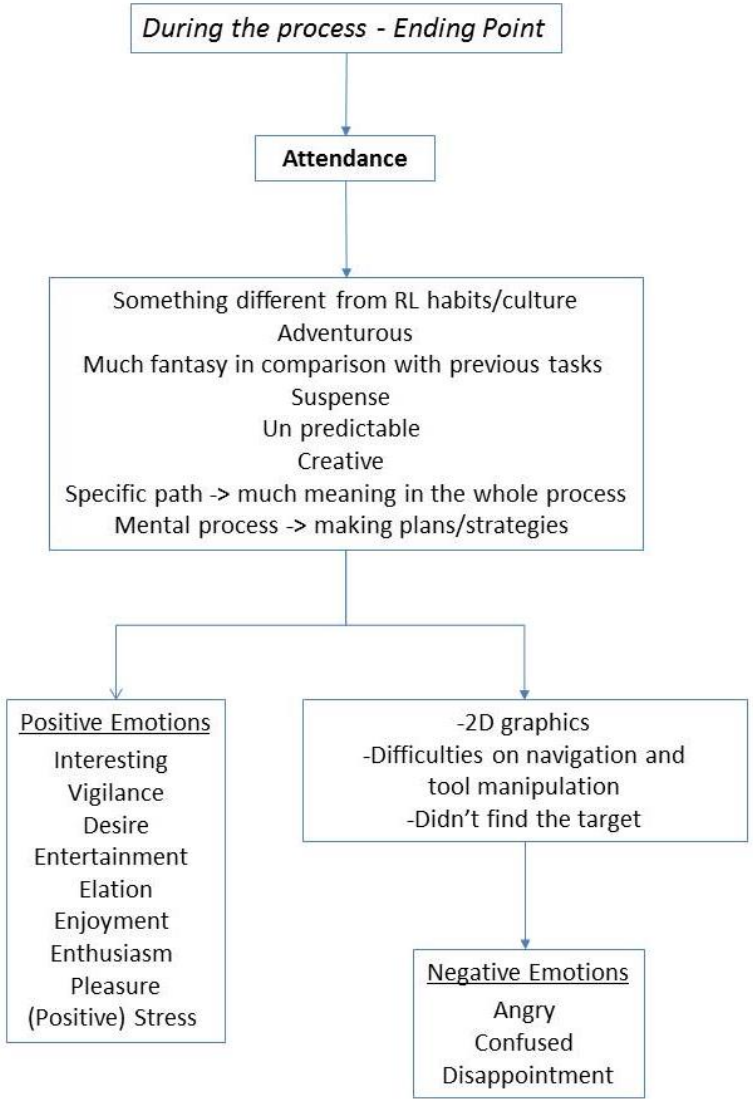
Main-Theme 'No Communication". The attitude of indifference in the communication process confirmed the negative predispositions, backing the argument that some actual cultural patterns are transferred in virtual life, with a negative impact.

The socializing-task aimed at achieving and increasing communicational skills in SL experience. The current task was not as positive as the previous, due to the factor of anonymity, the lack of virtual experiences and the negative behavioral confrontations during the process. The sample was divided into participants that felt "safer" and "confident" to talk freely to unknown people behind their avatars, and into those who were afraid and insecure to chat, on account of anonymity, the absence of a common target, and the lack of previous similar experiences. The criteria of selection of the virtual interlocutors were based firstly on appearance and then on the behavior and attitude. There were two types of appearance: actual life (humanoid outfit), and fictional (fictional outfit- animals, monsters). With regards to the dialogue content, it was separated into (a) support and guidance, (b) same language and culture, and (c) common target, concluding to positive elicitation. Conversely, the negative aspect of the socializing-task derived from the (a) rude and abrupt responses, (b) generic indifference, and (c) limited dialogue content (basics). The general outcome of the current task revealed many actual cultural similarities on the behavioral patterns.

The following participation-task focused on finding specific targets in different virtual destinations deriving from the mimicked real life and fictional.

Find a Target-Task





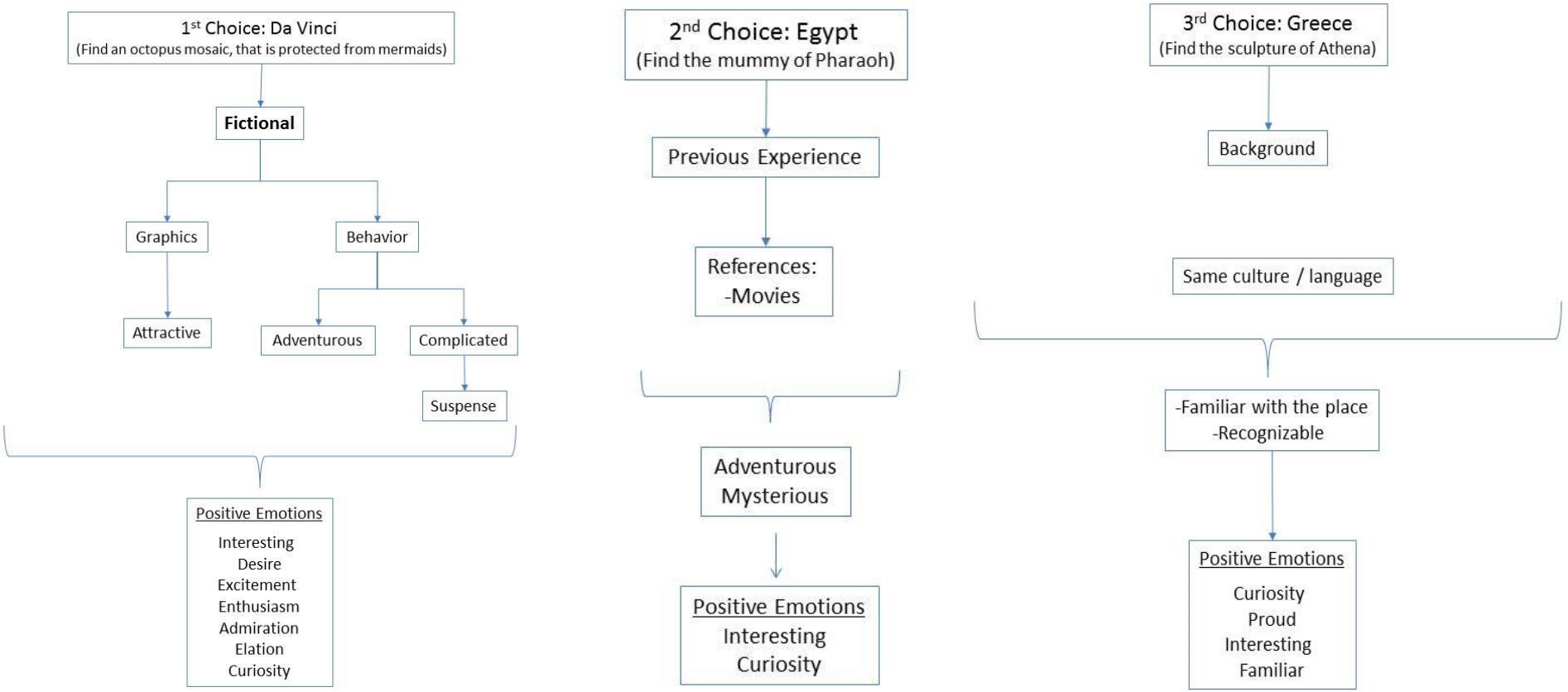


Figure 39. Find a Target - Task

Finding-Target-Task

The targets and the locations were identified by the researcher and separated into locations mirroring actual life and into fictional ones. The destinations mirroring actual life were: Ancient Egypt, Athens and Rome, and the fictional ones were: Da Vinci, Ice Wonderland and Tree House. All the locations had a specific scenario to be followed, with some additional hints that were supportive and helpful, and the duration of each mission was 15 minutes.

Preferable Destinations

Da Vinci. The most desirable destination was based on fictional stimulation, where the participants had to find a mosaic with an octopus, which was protected by mermaids.

The fictional graphics, the bright colors, the sounds and the mythical creatures enriched the whole experience with attractiveness, livelihood and vividness. Despite the mission's complexity, the adventurous sense and the suspense, it had a high attendance and led to a high immersive quality. Twenty percent of the sample did not find the target but, due to positive emotional intensity, participants were not influenced by this.

Ancient Egypt. The next favourable target was ancient Egypt, where the aim was to discover the mummy of the Pharaoh. The decision for selecting the current destination derived from the actual life knowledge which associated the experience in ancient Egypt with unexpected, mysterious and enigmatic adventures originating from the movies. The successful attempt of transferring virtually the same atmosphere of an-

cient Egypt, as in the movies (treasures, flying carpets, gold murals, etc.), led to a fruitful and adventurous experience, with the seventy percent of the sample concluding a successful mission.

Ancient Greece. The third most preferable destination was ancient Greece, where participants had to discover the golden ivory sculpture of goddess Athena. This preference was based on the familiarity with the cultural background, which operated as a motivation to participate for the successful completion. The elicitation of curiosity to compare the virtual depiction with the actual was also a factor behind this choice. Eighty-five percent of the sample completed the task, an achievement which brought about emotion of pride.

During the process - Ending Point

Main Theme 'Attendance'. The reason that participation in this task had a positive impact, derived from the scenario that acted as a motivator to those who participated, from the the adventurous and unpredictable nature of the task, and from the continuous effort to reach to target.

> *"There was a motivation to find something; to "follow a particular path", analysing the hints leading to the discovery of something. At the same time, I admired the fictional and impressive graphics. It was the most inspiring time that I had in SL until then." (Participant IC)*

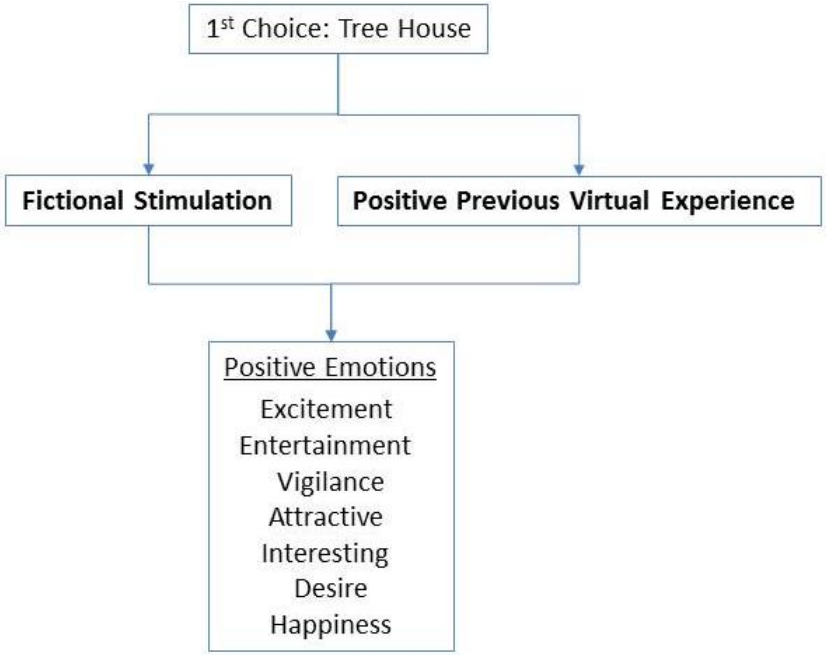
> *"There was interest, excitement, curiosity, entertainment. There was motivation and suspense during the whole process, a combination of fiction and adventure that operated as a total escape from real life routine."* (Participant ID)

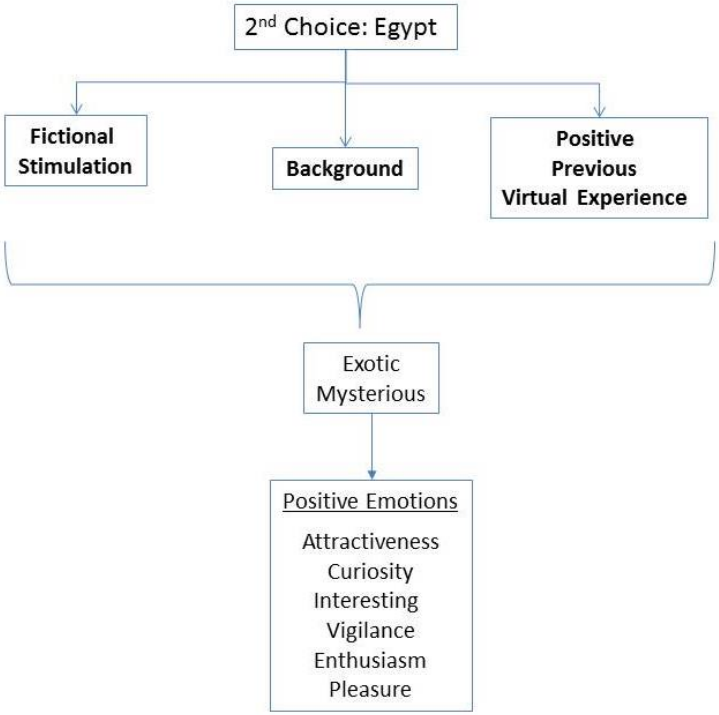
The current task-participation offered an intensive immersion and attendance in SL experience. The existence of different scenarios and targets triggered the participants' motivation and desire to achieve the task as a reward, satisfied their needs and made them feel positive. In case of an unsuccessful conclusion, a somewhat negative impact was generated, but not so intense as to affect the general aroused positivity. Besides unsuccessful results, there were additional factors that caused negative emotions including some difficulties on the handling of the functions and the presence of 2D graphics, but without any major consequences on the general positivity.

The third task focused on challenge, on the achievement of a specific mission through chosen favorable destinations. The existence of a scenario, a specific pathway, the mental and cognitive process and the adventurous nature of the tasks, provoked full immersion with a strong positive outcome. The only aroused negative elements were related to functional management and the presence of 2D graphics, influencing full immersion in virtual life.

The final task-participation was the free-choice-task, offering the opportunity of repetition of one or more of the previous immersive experiences. Figure below shows the decisions of the fourth participation task.

Free-Choice-Task





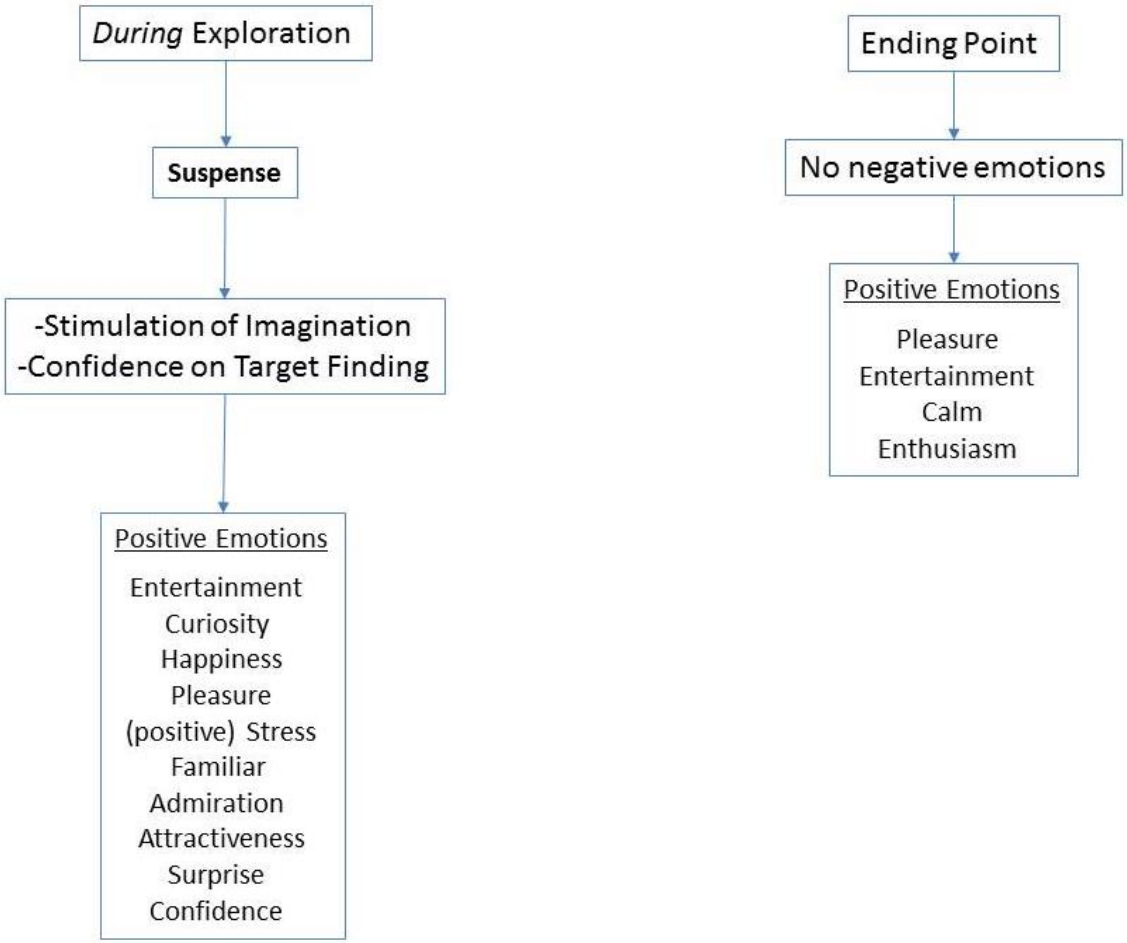


Figure 40. Free Choice - Task

Starting Point

Most participants decided to repeat the third task (Find a Target), choosing one of the remaining destinations. The 30% of the sample selected the exploration-task and the socializing-task, aiming at the conversion of the previous negatives into positives. The rest of the sample decided to combine the two tasks expecting high positive immersion.

> *"I decided to repeat the third participation, I was enthusiastic and alert during the process to reach the target. I went again to ancient Egypt because I had not found the target the first time, so I wanted now to try and find it"* (Participant IE)

> *"I combined the exploration and the socializing tasks because I did not have a good experience the first time, so after getting familiar with the environment, I tried to repeat them, hoping to complete the target successfully."* (Participant IF)

The given opportunity of free choice, in combination with the gained familiarity and confidence, resulted into the repetition of the positive experiences and to a highly positive elicitation, as well as to the conversion of negative experiences into positive.

During the process

Sub theme 'Suspense'. The first preferable choice was the third task, finding a target, due to the previous positive experience, selecting the destination of ancient Egypt that was characterized by mystery, adventure and suspense.

> *"I remembered the target of ancient Egypt, so I decided to choose it. On the way to finding the target, I perceived the different stimuli around me interacting in some cases with them, without any concern about the time limitation. I felt confident with the process"* (Participant IG)

Self-confidence and the gained virtual knowledge led the participants to enjoy their last SL experience without the stress of task-achievement, while they enjoyed the process and avoided any problems and negatives during the immersion.

Ending Point

Main-Theme 'Absence of Negativity'. The 'absence of negativity' during the current task-participation was based on previous virtual knowledge, familiarity, self-confidence, and on the combination of freedom and fictional stimulation, generating a high emotional level "pleasure," "entertainment," "calmness," and "enthusiasm".

With regards to the last task participation, SL experience was characterized by positivity deriving from three factors: the combination of actual and fictional experiences, escapism from real life routine without any actual obstacles and rules, and the high sense of freedom. The negative aspect of SL immersion concentrated on the transfer of actual life taboos and stereotypes, which was obvious during the socializing-task that was characterized, partly, from indifference, rude and ironic responses and in general, immoral behavior and attitude. Other disadvantages concerned the difficulties of handling the tools and functions and the plethora of pop-up windows, preventing the full immersion in the environment.

6.6. Chapter Summary

The current methodological study concentrated on the correlation of the emotional and behavioral patterns via specific tasks in SL. The findings of this study were based on a number of research sub-questions that followed the implementation of the appraisal methods, explored the virtual stimuli in relation to aroused emotions, moods and satisfied needs. The data collection was established by questionnaires, open-ended interviews, and retrospective observations, throughout the verbal sharing of virtual emotional experiences. The purpose of the current study was based on three sub-research questions that are addressed and discussed in the next sections:

Sub-RQ7: What are the aroused mood-state ingredients in each targeted virtual experience and how are they classified?Sub-RQ8: How is satisfaction quality identified throughout the virtual tasks and how are the composed elements modified separately?

The research sub-RQ7 focused on the identification of the mood-state and how it was configured through the different tasks during the virtual experience. The elicited mood-stage was positive, and it was remained, mostly, the same in all tasks. The significance of this continuous positivity was the specification of the target, where the participants in a time frame had to achieve particular goals, keeping their attendance, and the motivation to accomplish their "mission". Notable, the positive intensity was in high ratings during the third task, which had the form of a game, and this justified its repetition in the fourth task that they were free to choose their favorite task.

Furthermore, an amount of additional factors contributed to the positive mood-items such as, the virtual freedom without any rules and restrictions, the fictional stimulation, anonymity and the protection behind the avatars, the possibility of er-

rors/mistakes without any impact and the escapism from the actual life routine, influencing, at the same time, the elicitation of the emotional patterns.

The second sub-RQ8 was concentrated on the satisfaction quality in each task separately, investigating the configurations of the fulfilled needs in the different virtual missions, respectively. In general, the level of satisfaction was fluctuated from neutral to very satisfied, without any negative indications, specifying that the particular tasks yielded to a high rated satisfaction quality. Furthermore, through the tasks analysis, the more specific and concrete a target was, the more intensive satisfaction level it selected, generating motivations and challenges. Especially during the third and the forth task, the satisfaction level was in high ratings.

The factors that donated on high needs' fulfilment were: the virtual relieving of subjective actual standards, the anonymity, which produced more uninhibited expressions and behaviors while protecting, the individual's personality, the stimulation of fantasy which was associated with the sense of freedom (fictional places, avatars, flying mode) and the escapism from reality.

In other words, the general outcome from the aroused emotional patterns showed that the more targeted an interaction is, the more intensive is the elicitation, either positively or negatively. In the current participation, the attempt of virtual task achievement caused a positive mood-state influencing the users' behavioral intentions throughout of different appraisal procedures concluding into an appropriated satisfaction level. The identification of mood and needs operated as a predisposition of the emotional and behavioral patterns through the interviews and retrospective observation that their implementation was not incidental.

Sub-RQ9: What are the emotional and behavioral patterns throughout the immersive task-participation and how are their correlations molded between them?

The next phase was to associate the stimuli (context) / actions (behaviors) during the virtual tasks' experience with the specific aroused emotions, through the retrospective observation. Virtual context included fictional graphics and avatars, objects and metaphors from actual life, characteristics and symbols based on real life standards, sound/music, that caused of the appropriate emotional and behavioral patterns. It is worth to mention that the third task (find a specific targeted), which was in a game-form, lasted less time than the rest but with more intensive emotional elicitation, mostly positive. This is the reason that users when they were free to choose in the fourth task wanted to repeat the current task, achieving an emotionally fruitful virtual experience.

Additionally, the absence of virtual awareness, the mirrored real life places, the sense of freedom, the fictional stimulation, the possibility of errors/mistakes without any self-influence and the escapism from the actual life operated as additional factors for learning that follows intensive emotional alternations throughout the understanding of virtual experience, generating a strong emotional and behavioral relationship. This was clearer during the third task (find specific target) and its repetition in the fourth task-participation. The two main associations of the evoked emotional and behavioral patterns were the bidirectional relationship between cause and effect and the aroused feedback by their between them engagement.

The socializing-task was the task that gathered the lower ratings, and this was based anonymity, the lack of virtual experiences, on the negative behavioral confrontations during the process, and the absence of a common target increased the sense of fear

and insecurity to communicate to chat. Additionally, the rude and abrupt responses, the generic indifference, and limited dialogue content (basics) contributed also into low ratings, concluding into general opinion that there were many actual-cultural similarities on virtual behavioral patterns that bothered the participants during the virtual experience.

Summarizing, the outcome of the current study focused on the emotional responses and behaviors, enhancing the understanding and the user acceptance of VWs. Moreover, the influential relationship between emotions and situational stimuli, contributed to provide the appropriated behavioral intentions that were needed during the virtual experience, to motivate the individuals and to achieve their goal, increasing the positivity.

Both of the above immersions included moment-by-moment experiences which can be analyzed in regards to three elements: context, motivations and actions. The difference between unrestricted virtual experience and the targeted virtual interaction lies in the element of motivation, which is weakened in the last participations of the first immersion, in comparison to the second type of immersion that is kept unchangeable. Context, which is divided into attractive metaphors, irresistible content, ideas, graphics, animation, sounds and images attractiveness, captures and holds the individuals attention, offers surprises and challenges, influencing the emotional elicitation.

All these context-elements are distributed in two subjective experiences, those mirroring actual life and the fictional ones. Elements mirroring actual life are associated with memories and previous positive experiences; they confirm the expectations and the standard through the comparison of virtual and real elements and increase the

emotional engagement with the stimuli. In contrast, fictional elements are connected with movies, fairy tales and childhood periods that are associated with positive elicitations and which generate the need of 'reliving' a similar experience. The evaluation both of actual and fictional stimulation determines the individual's position and the way of interaction in SL, labelled with the appropriated emotional patterns that operate as assessors.

Beyond the above results, the outcome of the second research study concludes that if a task or a target is more specific then is achieved high intensity of the emotional (either positive or negative) and behavioral patterns, high intensity of the immersion and of the escapism from real life. If the task has a successful results then the emotional impact is positive providing high level of emotional intensity and behavioural duration. From the other side, if the task has an unsuccessful results, then the emotional impact is negative but not so intensive, for the reason that the sense of immersion and the sense of escapism from real life are amplified, so the satisfaction quality is high concluding in a positive elicitation. Consequently, the sense of immersion and the sense of escapism from real life, throughout a specification of a task, are the two main factors that influence the emotional and the behavioural fluctuations, independently from the results.

Chapter 7. Discussion, Research Contribution, Limitations, Future Work and Conclusion

This chapter discusses the amalgamation of the new emerged awareness and its contributions, through the current dissertation thesis, in the area of Virtual Well-Being. The substantive outcomes are derived from the responses of the established research questions Sub-RQ1 to Sub-RQ9, which initially set out in chapter 1 that are aimed on the main research question of the existing thesis. This chapter presents an overall discussion of the research conclusions, beginning with Study 1 (A) that investigates the pre- and post- emotional profile of avatar design procedure and the impact during the immersive experience. Subsequently, Study 1(B) concentrates on the classification of the emotional profile before and after the virtual experience and a general overview of the virtual participation. Study 2 discusses the correlation of the emotional and behavioral patterns throughout the virtual immersion. Lastly, it deliberates the conclusions, the limitations of the current research implementation and the implications of the results in different areas.

7. Discussions of the Main Findings from the Current Research

The current dissertation aims at the identification of the VWB throughout an immersive experience; gaining a richer understanding of the virtual impact through the investigation of the emotional and behavioral patterns as factors which increase the quality of a 3D experience, promoting, rising and supporting the positive emotional activities. The achievement of this aim is based on three theoretical models: (1) Hedonic Research Framework for User Acceptance of Virtual Worlds (Holsapple and Wu, 2007), which identifies the emotional engagement of individuals in VWs, throughout their behavior, clarifying the virtual worlds acceptance, (2) Dispositional Theory of Mood (Siemer, 2009) that responds to a wide variety of situations with the emotional experiences, identifying the cognition and the appraisal procedure, and (3) Lazarus Theoretical Framework of Appraisal (1991), which presents the behavioral responses of the individual's particular action. The current theoretical frameworks aim on answering specific research questions that are divided into three studies (a) avatar design procedure, (b) unrestricted virtual experience, and (c) targeted virtual experience, implementing a sequence of appraisal methods that consist of quantitative and qualitative analysis.

Study 1(A):

- **Sub-RQ1: What emotions and moods elements are elicited throughout the correlation of the pre- and post- avatar design procedure?**

- **Sub-RQ2: How satisfaction quality is identified before and after virtual human development?**

- **Sub-RQ3: How does avatar existence influence, emotionally and behaviorally, the virtual experience?**

The virtual human customization procedure focuses on identification of the emotional profile throughout the comparison of pre- and post- emotions, moods and needs, exhorting the participants to think, analyze and assess the related, with the process, emotional patterns.

Avatar design helps the participants to get involved in the procedure of customization and to escape, for a while, from their routine, stimulating their fantasy through the attempt of specifying the external appearance and roleplaying, operating as a motivation for a fruitful acceptable and positive VW participation. SL freedom leads to the appropriate spendable time on avatar design to reach to the point of 'That's me' which determines the ending point of the development. The included characteristics/features are stimulated from previous positive experiences and meaningful memories, generates an ideal virtual self. The conveyance and the analysis of the inner-self is based on two subjective perspectives of VWs. The first perspective interprets the VWs as a social environments aiming on the social acceptance and attractiveness through the combination of the personal experiences (memories), and the fictional stimulation (connected with future experience). The second perspective interprets the VWs as places for fun, entertainment and joy, passing of a precise (humours) message.

Consequently, the development of an ideal virtual human is based on personal experiences (including actual and fictional elements with a high sense of freedom), leading to inner-self-analysis from a social perspective, and from entertainment perspective, aiming, in both cases, on increasing positive elicitation and high satisfaction quality.

Study 1(B):

- **Sub-RQ4: What are the aroused emotional ingredients (emotions and moods) of an unrestricted virtual experience and how are they alternated between the comparison of pre- and post- immersive experience?**

- **Sub-RQ5: How is satisfaction quality identified before and after the unrestricted virtual experience and how its ingredients are determined through their comparison?**

- **Sub-RQ6: How are individuals influenced emotionally during the unrestricted virtual experience and what kind of stimuli has an impact on their behavioral reactions?**

The second study emphasis on the unrestricted virtual interaction, determining the emotional profile, pre- and post- and during to SL experience, presenting the users' actions and behaviours, investigating the individuals as a part of the in-world, and not just an external perceivers. Participants generate a subjective meaningful experience through their desired role-playing and behavioural activities, maintain and increase their positive emotional environmental existence.

The aroused behavioural actions are based on 'inner-self-expression' and 'self-protection' deriving from virtual freedom and the escapism from real life, which operate as a bipolar factor to improve the VWB. 'Inner-self-expression' is grounded on the socio-cultural background, the attempt to escape from real life, turning away from duties and social responsibilities, the stereotypes connections, the anonymity and the establishment of personal boundaries.

From the other side, ‘self-protection’ is associated with the sense of freedom that the individuals have to interact liberally and also is associated with the doubt and the lack of trust, according to access on personal information, and on the absence of virtual knowledge, establishing personal boundaries and limitations. These two behavioural patterns emerge due to the existence of others users.

In other words, the unrestricted VW participation is operated as an alternated way of escapism from routine problems and pressure, far from rules and restrictions, enjoying the virtual freedom, stimulating, at the same time, the imagination, without any costs, protecting the privacy, achieving a positive emotional elicitation.

Study 2:

- **Sub-RQ7: What are the aroused mood-state ingredients in each targeted virtual experience and how are they classified?**

- **Sub-RQ8: How is satisfaction quality identified throughout the virtual tasks and how are the composed elements modified separately?**

- **Sub-RQ9: What are the emotional and behavioral patterns throughout the immersive task-participation and how are their correlations molded between them?**

Lastly, the targeted virtual experience deliberates an in-depth identification of the emotional and behavioral patterns by analyzing, clarifying and associating the aroused emotions with specific behavioral activities, revealing, at the same time, the fluctuations of the mood-state and the satisfied needs for each task-participation. The exist-

ence of precise goals and the attempt of achieving a particular tasks, create a concrete emotional engagement between the user and the environment, focusing on a positive arousal. The challenge of what participants have to do in each task-participation keeps the motivation, the attention and the effort for achievement in high levels, eliciting the emotional intensity and the satisfaction level.

During the task-participations, users allocate more attention to create the conditions of a greater sense of immersion. The more attention the users pay, the more absorbed and emotionally engaged they become in the VW, increasing the time-period and the intensity of the positive emotional elicitation. Except of the goal specification, there are additional factors that yield to the positive emotional elicitation, the fictional stimulation (fictional places, avatars, flying mode), the sense of freedom, the escapism from reality, the possibility of errors/mistakes without any impact, offer to participants the opportunity to enjoy and recall positive memories from their childhood (fairytales).

Summarizing, the outcome of the targeted virtual experience, is focusing on emotional responses and behaviors, enhancing the understanding and the user acceptance of VWs, developing an influential relationship between emotions and situational stimuli. This relationship contributes to provide the appropriated behavioral intentions that are needed during the virtual experience, to motivate the individuals and to achieve specific goals, aiming on high ratings of the emotional positivity.

Generally, the current dissertation thesis is coming to be compared and confirm some arguments of the literature review. According to Forlizzi and Battarbee (2004), whose defined the term of ‘experience’ as a conscious self-talk, can be parallelized with avatar design procedure, where the individuals spend time to optimize their positive elicitation influences, shaping their intentions for the upcoming virtual experience. From

the other side, virtual involvement can be characterized as 'An Experience' that has a beginning and an end (Forlizzi & Battarbee, 2004), concluding, into positive emotional profile with the appropriated behavioural patterns.

Important to mention is about Malone's determination of the three basic characteristics that operate as motivators of user experience, challenge, fantasy, and curiosity (Malone, 1981). Fantasy stimulation and curiosity are intensive during the three different virtual experiences but the third characteristic, challenge, is added in the last study (targeted virtual experience) through the effort of task achievement, causes highly rated elicited emotions, moods and satisfaction quality. This is coming to verify the aroused emotional and behavioural patterns (Desmet, 2003), which are based on goals' specification describing exactly what the individuals have to achieve, real life standards that regulates the individuals' expectations on how the virtual stimuli/avatar and behaviours should be, determining the morality and their attitude, dispositioning the liked or disliked stimuli, determining the emotional associations between them and the virtual objects. According to Desmet (2003), emotions are evoked by stimuli that are derived from the past, present and future, in the current research the virtual stimuli belong mostly to the past (childhood memories) and to future, which is associated with the fantasy (fairy tales, movies), triggering the individuals imagination, with a meaningful associations.

Consistent with, the embodiment of the three theoretical models (User Acceptance of VWs, Dispositional Theory of Moods & Lazarus Theoretical Framework of Appraisal) and the nine sub-RQs resulted into understanding, interpreting and evaluating the VWs experience, throughout the elicited emotional and behavioral patterns determining the virtual well-being, as a self –evaluation during the virtual involvement that is based on the previous memorable experience, on fictional stimulation, on verification

of real life standards and culture, judging moment by moment the virtual positive elicitation and the satisfaction quality, concluding into VWB. This is clarified and summarized in the figure 41.

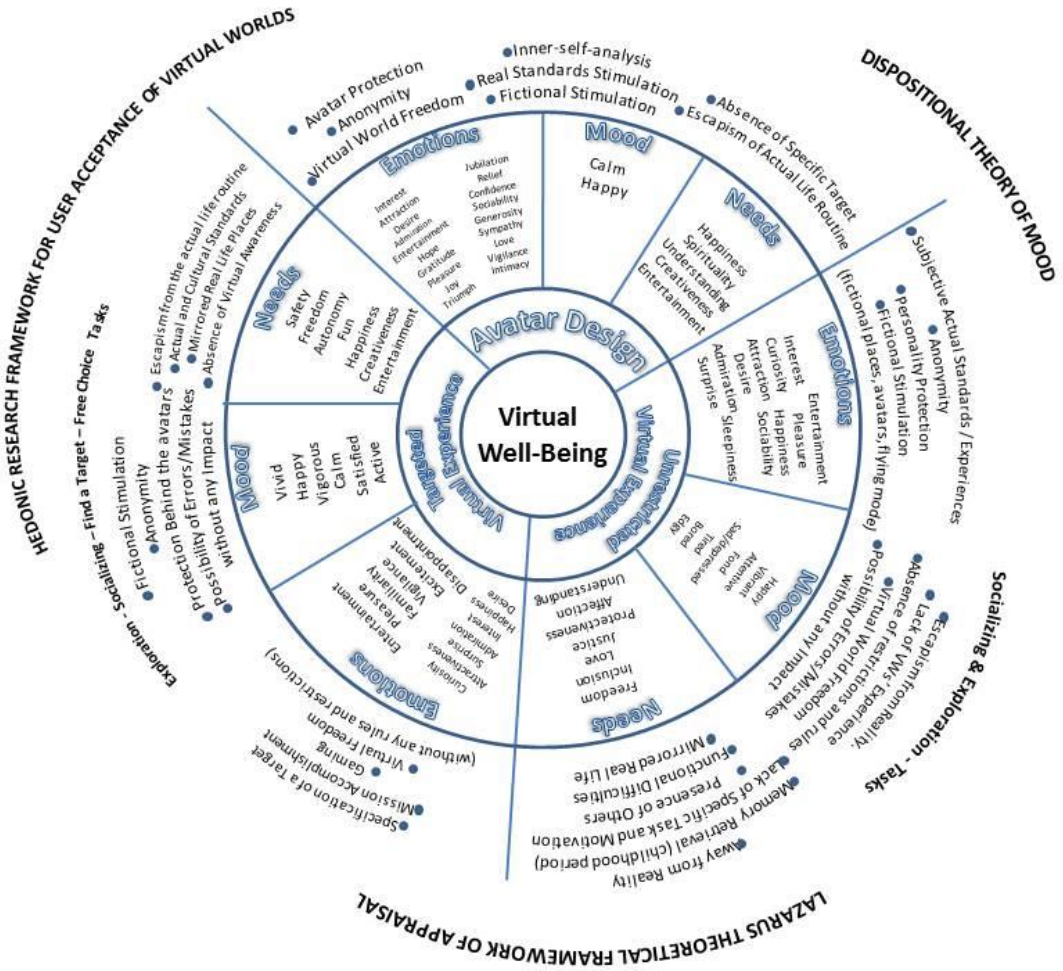


Figure 41. An Overview of the Current Dissertation Research Findings

7.1. Research Contributions

The intent of this dissertation is to provide with new knowledge and understanding of VWs experience contributing to a universal awareness that can be value to others. Overall, the current thesis outcome furthered the understanding of (1) virtual well-being, (2) emotional engagement in VWs, (3) evaluation of positive technology, positive computing and well-being technology, (4) the impact of technology used for well-being and (5) media psychological research, which are expected to supply designers, instructors, researchers and practitioners, with better comprehension of the affordances of the positive behavioral virtual experiences.

7.1.1. Researchers

Recent research has shown that emotional patterns are important for learning (Spitzer, 2002). In recent years, there is a wide utilization of VWs, especially SL, as an effective learning tool, offering many opportunities for gaining more educational skills. The current research outcome can be operated as a tool to increase the participation in VWs, beginning with education and expanding into other fields (people with disabilities). As well, an environment such as SL can be considered as an instrument investigating people with depression or as a tool for individuals who have other psychological problems (exploring healthy identity formation).

Moreover, the current research offers a new avenue for researchers to capture the relationship between emotional and behavioral patterns underlying the user acceptance of VWs. By using the appraisal approaches from the emotional and behavioral perspectives, a valuable insight is gained for the utilization of VWs towards supporting and promoting the well-being activities. This type of experiential perspective can be im-

plemented across multiple fields such as, HCI, VWs, positive technology, positive computing and well-being technology. The rich description of the virtual, emotional and behavioral engagement adds to the body of HCI, UX knowledge, promoting also a further understanding of the media psychology based on VWs.

The evaluation approach also contributes to further awareness in these research areas. The results of the study demonstrate a positive impact of virtual life towards the support of a well-being behavior, contributing to the knowledge of assessing and achieving a positive immersive experience. Furthermore, the investigation of not only the emotions, but the inclusion of mood-state and the need-items generates an integrated overview of the user's experience of VWs, giving an in-depth analysis that can be used to improve the management, and evaluation of 3D experience.

The methodological sequence of the present research is an additional contribution, since other researchers can use it for the examination of different VEs, aiming at the identification of human well-being, thus providing new guidance on VWs acceptance. Additionally, the current methodology can be utilized in the evaluation of several technology applications, in the analysis of several well-being activities, enhancing the connection between positivity and technology. Also, the current methodological procedure can be applied across multiple fields like reality games, augmented realities, or mobile games, benefiting positively.

Furthermore, through the current research is provided the contribution since it looks into the relationship and the correlation of the emotions and behaviors/actions in a virtual experience, offering a guidance and unique perspective for exploring, support-

ing and enriching the quality of 3D environments, addressing the issue of user acceptance of the particular VW being developed, managed or evaluated.

The combination of the Hedonic Research Framework for User Acceptance of VWs (Holsapple and Wu, 2007), the Dispositional Theory of Moods (Siemer, 2009) and the Lazarus Theoretical Framework of Appraisal (Lazarus 1991) in the analysis of an immersive experience in a VW and especially in Second Life (SL) offers new knowledge for further exploration of individual's emotional and behavioral profile in different spaces.

7.1.2. Practitioners

Our results are also important for practitioners and especially to companies entering VWs to either attract, retain, or interact with existing or new customers as well as promote or sell existing or new products or services. Business models through the VWs experience can provide clear and attractive value proposition to the individuals. In particular, they have to address the need for community building elements such as communication, collaboration, and cooperation functionalities in order to fully take advantage of VWs as a new channel to interact with customers.

Furthermore, the research results can be utilized on e-commerce, on management of information systems, participating in global projects and team works or to build and run online industry reflecting and using interdisciplinary communication strategies. Online branding and promotion of products or systems can be fruitful and informative for a company to investigate the positives and the negatives without any real influence, specifying the needs of the target group.

Considering the virtual world usage as a learning environment, taking into account the current outcome, educators and instructors can enrich and support their work with synchronous learning tools and techniques including different virtual manners, through the sense of virtually presence, eliciting the positive attitudes. Moreover this new approach allows to students to act remotely in different activities, increase their personality senses, to work collaboratively and to learn from presentations, gaining awareness and belongings into a community. Consequently, the learning tasks can be transitioned into learning experiences, with positive influences on individuals, without risks or negative consequences, creating capabilities for using the VEs as a learning tools relied on students perceived usefulness and on the importance of aligning learning activities, strategies, making them more relevant, realistic, and collaborative.

7.1.3 Designers

The outcome of this dissertation can be valuable for the designers to development spaces that provide different functionalities, whereby visual cues and metaphors are used to improve the individuals' well-being. According on, that VWs are implemented as educational tools, the design of inherent characteristics and tools can be helpful on pedagogy, course goals, or building an interactive learning experience, combing the gaming with the education, improving the individuals' learning skills, and, at the same time, the virtual positive elicitation.

The product/system and services' design through the absence of risks and negative real impact, can be beneficial for the designers to determine and investigate the positives and the negatives of their products/services, without real costs and effects.

Summarizing, the identification of the virtual well-being indicates a new awareness of possible implementations of such environments in areas like business, education, product design, market research, branding, retailing and services, organizational management, management information systems and organizational collaboration.

7.2. Limitations and Future Work

The findings of this research provide a strong support for grounding the VWs utilization under three theoretical frameworks. Yet, it is kept that the current study pertains to generalizability. The sample size could have been expanded by including broader range of participants, separating into age-groups, investigating their emotional and behavioral preferences and configurations. The number of participants should have been more evenly distributed across gender, age or multiple groups/universities/etc. Furthermore, the current analysis can be re-conducted taking into consideration cultural backgrounds, including and analyzing different philosophies and beliefs according to emotional and behavioral activities in SL experience. Moreover, the separation of the sample into novice and expert users would allow a useful investigation on how these two groups of users perceive virtual immersion, through the analysis of the emotional and behavioral attributes emerging from the activities in SL.

According to SL potentials, it will be helpful, for more comprehensive interpretation, to enrich the virtual experience with a variety of tasks, covering, as much as possible, all the spectrum of SL opportunities. Furthermore, it would be interesting to explore the human well-being throughout the virtual collaboration on avatar design and virtual interaction.

Additionally, the implementation of the current methodologies can be enriched with additional methodological tools like ethnographical studies, to create and improve a concrete outcome, including and investigating, in the same time, different measurements of appraisal methods, like the comparison of the verbal emotions with the non-verbal (gestures, and face expressions).

7.3. Conclusion

In this dissertation I provided a comprehensive understanding of the emotional and behavioural experience in an immersive involvement. The implementation of current theoretical frameworks, User Acceptance of VWs (Holsapple and Wu, 2007), the Dispositional Theory of Moods (Siemer, 2009) and the Lazarus Theoretical Framework of Appraisal (Lazarus 1991) helped to interpret, and recognize the potentials of VWs' experiences underlying the individuals emotional and behavioral patterns, offering a unique perspective of VWs' involvement, management, or evaluation. As a result, the dissertation provides the identification of the VWB that is based on four significant factors, (a) Fictional Stimulation, (2) Virtual Freedom, (3) Anonymity and (4) Specification of particular tasks or targets, which improve the fundamental senses of virtual participation: (a) sense of escapism from real life and (b) the sense of immersion, achieving intensive emotional and behavioral appraisal patterns, resulting into continuous virtual interaction. Throughout the current thesis outcome are provided insights, and fruitful material for further research in similar environments, or for designing hybrid environments, enhancing the positivity of virtual immersion.

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APPENDICES

Appendix 1: The Satisfied Needs Due To Avatar Design Procedure

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Security_pre – Security_post	,79167	1,47381	,30084	,16933	1,41400	2,632	29	,015
Pair 2	Love_ pre – Love_ post	,54167	1,55980	,31839	-,11698	1,20031	1,701	29	,102
Pair 3	Self_esteem_ pre - Self_esteem_ post	,25000	1,42188	,29024	-,35041	,85041	,861	29	,398
Pair 4	Integrated/ Personality_pre Integrated/ Personality_ post	,08333	1,38051	,28179	-,49960	,66627	,296	29	,770
Pair 5	Intergity/Eveness/ Perfection_pre Integrity/Evenness/ Perfection_ post	,45833	1,53167	,31265	-,18843	1,10510	1,466	29	,156
Pair 6	Autonomy_pre Autonomy_ post	,62500	1,43898	,29373	,01737	1,23263	2,128	29	,044
Pair 7	Game_ pre Game_ post	,12500	1,11560	,22772	-,34608	,59608	,549	29	,588
Pair 8	Mourning_sadness pre Mourning_sadness_ post	,45833	1,10253	,22505	-,00723	,92389	2,037	29	,053
Pair 9	Happiness_pre Happiness_ post	,83333	1,27404	,26006	,29535	1,37131	3,204	29	,004
Pair 10	Spirituality_pre Spirituality_ post	1,16667	1,37261	,28018	,58706	1,74627	4,164	29	,000
Pair 11	Sociability_pre Sociability_ post	,75000	1,62186	,33106	,06515	1,43485	2,265	29	,033
Pair 12	Conservatism_ pre Conservatism_post	,16667	1,52277	,31083	-,47634	,80968	,536	29	,597
Pair 13	Protectiveness_ pre Protectiveness_ post	,87500	1,51263	,30876	,23627	1,51373	2,834	29	,009
Pair 14	Affection_pre Affection_ post	,87500	1,56906	,32028	,21244	1,53756	2,732	29	,012
Pair 15	Understanding_ pre Understanding_ post	1,29167	1,65448	,33772	,59304	1,99029	3,825	29	,001

Pair 16	Creactivness_ pre Creativeness_ post	1,00000	1,35133	,27584	,42938	1,57062	3,625	29	,001
Pair 17	Inertia_ pre-Inertia_ post	,62500	1,09594	,22371	,16222	1,08778	2,794	29	,010
Pair 18	Entertainment_pre Entertainment_ post	,95833	1,16018	,23682	,46843	1,44823	4,047	29	,001

Appendix 2: The Emotions with Significant Difference before Virtual Interaction via One-Sample *T*-Test Analysis

Emotions - Before Virtual Experience	M	SD
Positive Emotions		
Attraction**	1.9979	.71553
Surprise*	1.9521	.96945
Elation**	1.9167	.78704
Triumph**	1.7738	.77324
Intimacy**	1.9333	.65631
Negative Emotions		
Panic**	1.4021	.44850
Aversion**	1.1438	.18868
Disgust**	1.0646	.11310
Repulsion**	1.0979	.14925
Indifference**	1.4813	.42931
Fear**	1.2229	.34023
Anger**	1.2917	.32510
Sadness**	1.4021	.45624
Frustration**	1.2229	.22842
Disappointment**	1.5313	.42159
Embarrassment**	1.1604	.19537
Shame**	1.0604	.09062
Guilt**	1.0814	.12938
Qualms**	1.0688	.11053
Greed**	1.0542	.14094
Misery**	1.0646	.17562
Begrudge**	1.0292	.07474
Jealousy**	1.0688	.11053
Hardness**	1.1375	.20657
Hatred**	1.0583	.12493

***p< .001, *p<.005*

Note. M = Mean. SD = Standard Deviation. The feelings range from 1 (not at all) to 5 (very much)

Appendix 3: The Emotions and their Significant Difference after Virtual Experience

Emotions - After Virtual Experience	M	SD
Positive Emotions		
Interest**	3.1601	.73314
Entertainment**	3.4354	.80131
Pleasure**	3.2339	.80928
Happiness**	3.1646	.84229
Triumph*	1.9250	.92476
Sociability*	2.9667	.84504
Negative Emotions		
Panic**	1.2854	.41219
Aversion**	1.1354	.19838
Disgust**	1.0750	.12106
Repulsion**	1.0688	.13370
Indifference**	1.3583	.39764
Intimacy**	2.0958	.66585
Fear**	1.1222	.14552
Anger**	1.1604	.23367
Sadness**	1.2688	.35361
Frustration**	1.1521	.17111
Disappointment**	1.3500	.35454
Embarrassment**	1.1938	.25657
Shame**	1.0688	.11053
Guilt**	1.0458	.08358
Qualms**	1.0417	.07028
Greed**	1.0333	.11220
Misery**	1.0333	.10082
Begrudge**	1.0125	.03026
Jealousy**	1.0375	.05590
Hardness**	1.0521	.09722
Hatred**	1.0188	.04686

***p< .001, *p<.005*

Note. M = Mean. SD = Standard Deviation. The feelings range from 1 (not at all) to 5 (very much)

Appendix 4: The emotional elements before and after SL interaction

	Virtual Expe-rience						
		Before		After		F-value	P
		M	SD	M	SD		
Emotions	Interest	2,5563	0,7445	3,1601	0,7331	75,2380	.000
	Curiosity	2,3482	0,7443	2,8410	0,9357	28,1110	.000
	Attraction	1,9979	0,7155	2,4542	0,9655	22,1160	.000
	Desire	2,2896	0,8600	2,7458	1,0301	24,605b	.000
	Admiration	2,0250	0,9060	2,6083	1,0390	27,9170	.000
	Surprise	1,9521	0,9695	2,5229	1,0455	33,0260	.000
	Entertainment	2,6167	0,7689	3,4354	0,8013	74,8490	.000
	Pleasure	2,6563	0,7546	3,1750	0,7526	45,4630	.000
	Happiness	2,7417	0,7847	3,1646	0,8423	42,4070	.000
	Sociability	2,7063	0,7744	2,9667	0,8450	10,5760	.003
	Sleepiness	2,7458	0,5488	2,0458	0,4188	40,2590	.000
Mood	Happy	2,3021	0,4146	2,6854	0,6599	12,5900	.001
	Sad/Depressed	1,6750	0,5071	1,2688	0,3471	16,3260	.000
	Vibrant	1,3708	0,4513	2,3354	0,6658	61,1030	.000

	Tired	2,2896	0,5393	1,5146	0,4580	53,3970	.000
	Attentive	2,1771	0,8066	3,1771	0,7287	49,8920	.000
	Fond	2,4786	0,8718	1,5918	0,4900	25,3960	.000
	Bored	1,8417	0,6399	1,4646	0,4633	17,7220	.000
	Edgy	1,6292	0,5583	2,3000	0,7781	12,9330	.001
Needs	Love	3,1271	0,9947	2,1646	0,9592	29,3450	.000
	Justice	3,0542	1,1290	2,4500	1,0527	13,8290	.001
	Protectiveness	2,6460	0,9906	2,2583	0,9441	9,5210	.004
	Affection	2,8062	1,00368	2,0847	1,04647	24,587	.000
	Understanding	3,1146	1,00109	2,3063	1,00274	22,998	.000

p< .005

M: mean. SD: standard deviation. P: P-value. The feelings, needs and mood range from 1 (not at all) to 5 (very much).