STUDENT PARTICIPATION IN PROJECT-BASED INDUSTRIAL DESIGN EDUCATION

SEVİ MERTER

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ABSTRACT

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Merter, Sevi

Ph.D. Program in Design Studies

Advisor: Prof. Dr. Özgen Osman Demirbaş

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This dissertation aims to develop a student participation model by utilizing individual learning differences for enhancing project-based design learning (PBDL) in industrial design (ID) education and accepts learning styles as the main indicator of the diversity of students' individual differences in how they approach to learning tasks. Previous studies suggest that student participation improves both the content and process of learning, which takes place in the design studio, incorporating a student-led, semi-structured experiential learning process. Drawing upon Kolb's Experiential Learning Theory and participatory design literature, which has extended to learning sciences,

accommodating individual learning differences through active student participation, especially in pedagogical planning, is quite beneficial for more effective learning. Based on this viewpoint, the methodology of the study was developed so as to be inclusive of the two main actors of PBDL. A survey was conducted with 119 ID students in order to explore the student diversity through learning styles and opinions on active participation. Simultaneously, semi-structured interviews were conducted with 30 instructors in order to explore the main considerations and participatory practices in pedagogical planning in PBDL. Based on the findings, a student participation model has been proposed, which enables partial student control with systematic instructor guidance in developing, implementing, and assessing an action plan for learning in each year of study in ID education. This model provides both students and instructors with the opportunity to participate at their own level of experience and expertise and have substantial influence on pedagogical planning through engaging in negotiation and co-decision.

Keywords: Experiential Learning Theory, learning styles, student participation, project-based learning, design pedagogy, industrial design education

ÖZET

PROJE TABANLI ENDÜSTRİYEL TASARIM EĞİTİMİNE
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Bu tez, endüstriyel tasarım eğitimi kapsamında, proje tabanlı tasarım öğreniminde bireysel öğrenme farklılıklarından yararlanarak bir öğrenci katılımı modeli geliştirmeyi amaçlar ve öğrenme biçemlerini, öğrencilerin bireysel farklılıklarının ana göstergesi olarak kabul eder. Önceki çalışmalar, öğrenci katılımının öğrenmeyi hem içerik hem de süreç açısından geliştirdiğini öne sürer. Bu öğrenme, öğrenci tarafından yönlendirilen, yarı yapılandırılmış deneyimsel bir öğrenme sürecini barındıran tasarım stüdyosunda gerçekleşir. Kolb'un Deneyimsel Öğrenme Kuramı'na ve eğitim bilimlerine de yayılmış olan katılımcı tasarım literatürüne dayanarak, bireysel

öğrenme farklılıklarının aktif öğrenci katılımı ile özellikle pedagojik planlamaya dahil edilmesi, daha etkin bir öğrenim için oldukça faydalıdır. Bu görüşe dayanarak, bu çalışmanın metodolojisi, proje tabanlı tasarım öğreniminin iki temel aktörünü de dahil edecek biçimde geliştirildi. Öğrenci biçemleri üzerinden öğrenci çeşitliliğinin ve aktif katılıma yönelik görüşlerin keşfedilmesi amacıyla, 119 endüstriyel tasarım öğrencisiyle bir anket yapıldı. Eş zamanlı olarak, proje tabanlı tasarım öğreniminde pedagojik planlamanın temel unsurlarının ve katılımcı uygulamaların keşfedilmesi amacıyla, 30 ders yürütücüsü ile yarı yapılandırılmış görüşmeler gerçekleştirildi. Bulguları temel alarak, endüstriyel tasarım eğitiminde her öğrenim yılı için, ders yürütücülerinin sistematik rehberliği ile, bir eylem planı geliştirme, yürütme ve değerlendirme süreçlerinde kısmi öğrenci kontrolüne olanak sağlayan bir öğrenci katılımı modeli önerisi geliştirildi. Bu modelin hem öğrencilere hem de ders yürütücülerine kendi deneyim ve uzmanlık düzeylerine göre katılım sağlama ve pedagojik planlamada uzlaşarak ve birlikte karar vererek önemli bir etki sahibi olma fırsatı sunması hedeflendi.

Anahtar kelimeler: Deneyimsel Öğrenme Kuramı, öğrenme biçemleri, öğrenci katılımı, proje tabanlı öğrenim, tasarım pedagojisi, endüstriyel tasarım eğitimi

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DTGSYO: Devlet Tatbiki Güzel Sanatlar Yüksek Okulu

ELT: Experiential Learning Theory

ID: Industrial design

Int: Interviewee

LSI: Learning Style Inventory

KLSI: Kolb's Learning Style Inventory

METU: Middle East Technical University

PBDL: Project-based design learning

PCA: Principal component analysis

RQ: Research question

SP: Subpart

Y/N: Yes/No

YÖK: Yükseköğretim Kurulu

CHAPTER 1: INTRODUCTION

> *"…there is no such thing as a general education in design. To ask a question like 'What competencies and skills should a designer have?' is not that different from asking 'What shape, material and color should a chair have?' The answer in both cases would have to be that it depends on who it's for, what it will be used for, where it will be made, and so on and so forth. To answer such questions, we need to engage in design—we need to actively start choosing between which options we have, based on what we aim for. And we need to negotiate a number of conflicting needs in order to come up with a meaningful whole that is something more than the sum of its parts…"(Redström, 2020, p. 93)*

1.1 Problem Statement

The design learning process is embodied in a format of design project, delivered to students with the majority of decisions made by instructors. However, project-based design learning (PBDL) is a student-led, semi-structured experiential learning process (Lawson and Dorst, 2009; Crowther, 2013), in which students have direct and/or indirect influence on instructors' decisions. It is also a process of developing a complex, personal system of preferences (Schön interviewed by Goldhoorn, 1991). The previous studies (Schön, 1987; Uluoğlu, 1990; Teymur, 1993; Lim, 1996; Brusasco et al. 2000; Nussbaumer and Guerin, 2000; Demirbas and Demirkan, 2003; Bender, 2004; Kban and Yunyan, 2005; Demirbas and Demirkan, 2007; Tucker, 2007; Carmel-Girfilen, 2012; Crowther, 2013; Tovey and Osmond, 2014; Ayalp and Özdemir, 2016; D. Demirbaş, 2018), addressing the flexible design studio pedagogy and the diversity of learning styles, and the researcher's personal experiences and observations indicate that both students and instructors approach differently to this complex and nonlinear process.

Despite the continual dialogue between instructors and students (Schön, 1983; Green and Bonollo, 2003), PBDL is criticized for being inefficient due to repetitive work, the lack of clarity about what is exactly learned by students, the ill-structured nature of the student design problems, and students' lack of explicit verbal expression about what they learned (Dorst and Reymen, 2004). There is also an inconsistency between what is being done and how it is perceived, which can be due to the lack of communication

between instructors and students and/or the inability to make suitable course/project plans that fulfill students' needs. Individual differences in the learning process make it challenging to respond to the needs emerging from the diversity of these differences. Therefore, there is a need for exploring and accommodating the diversity and richness of individual differences in pedagogical planning processes for more effective PBDL.

Learning styles is a good indicator of this diversity, which is an invaluable resource for all students and instructors to learn from each other, develop different viewpoints, and make sense of the academic obligations, pedagogical considerations, and the design process. The literature suggests that student participation in university experiences increases the possibility to develop higher understanding and ownership of learning experiences in students, in terms of both content and process (Bovill and Bulley, 2011). Therefore, active student participation in pedagogical planning, establishing a common ground for students and instructors, can be a powerful and effective way to explore and accommodate this diversity in the design studio, independent of any of its physical and spatial connotations. Even though the idea of collaborating with students in pedagogical planning is not a new proposal in higher education (Dewey, 1916), the previous studies, concerning with enhancing PBDL, mostly focus on certain stages of the design process or the methods used in student projects in industrial design (ID) education, rather than pedagogical planning, the diversity of learning styles or the needs emerging from this diversity. There is a limited number studies relating experiential learning and ID education (Anderson and Jackson, 2005; Chang, 2015; Parisi, Rognoli and Sonneveld, 2017) and alternative design studio applications (Green and Bonollo, 2003; Lawson, 2004; Webster, 2008; Khorshidifard, 2011; van Dooren et al., 2014; Rodriguez, Hudson and Niblock, 2016). None of these studies demonstrates a general overview of ID students' learning styles nor is concerned with active student participation in pedagogical planning. Therefore, it is intended to delve into this unexplored area of research in this study.

1.2 Aim and Scope of the Dissertation

This dissertation aims to develop a student participation model in PBDL in ID education and concerns with how individual learning differences can be utilized. The study has an exploratory standpoint and has adopted a participatory approach, drawing upon Kolb's Experiential Learning Theory (ELT) and the participatory design

literature. The research questions and methodology of this dissertation were formulated so as to investigate the diversity of learning styles and opinions on student participation, along with the main considerations in pedagogical planning in PBDL with the aim of understanding how to utilize this diversity for more effective learning. Supported by TÜBİTAK 2214-A International Doctoral Research Fellowship Program, the researcher spent a year (September 2019-August 2020) as a visiting scholar at the Department of Design at The Ohio State University (Columbus, OH, USA), which provided the opportunity to observe PBDL in a foreign context and broaden the researcher's perspective on participatory and generative design practices. Even though this study was conducted in the field of ID and primarily concerned with the educational context in Turkey, it is expected to set an exemplary model for the educational practices of other design disciplines in different higher education institutions and cultural contexts as well.

The rationale behind developing a democratic, sustainable model is to enable students to establish new power relations with their instructors (Kuh, 2008; Bovill, Cook-Satherand and Felten, 2011; DiSalvo and DiSalvo, 2014). In design learning, individual experiences are transformed into a design work during a project, which involves a continuous process of doing, making explicit, and gaining deeper understanding, i.e. "learning" in the act of designing (Kolb, 1984; Schön, 1984). A wide range of activities are practiced in design projects in order to complete the learning cycle described in Kolb's ELT (Kolb, 1984; Rutgers, 2015). Students' preferences and flexibilities in the selection of learning modes vary while completing this learning cycle. The diversity of these learning preferences is explored through the learning styles of Kolb's ELT within the scope of this dissertation.

The two strategic aspects of participation have been found important for the dissertation: participation as a democratic right and participation for knowledge elicitation (Ehn, 2008). The process of exploring and understanding the student diversity and pedagogical planning in PBDL has been approached from a democratic viewpoint, which necessitates being inclusive of the main actors of PBDL as a social resource (Manzini and Rizzo, 2011). Therefore, both students and instructors, who are the two main actors in PBDL, were involved in the exploration of individual differences and participatory practices in pedagogical planning. Regarding that participatory practices have extended to learning sciences and refer to an extension of

the set of methods, practice of engagement, and commitment to set of democratic values to design infrastructures for learning (DiSalvo and DesPortes, 2017), the participatory approach has been found appropriate for the study both in the selection of the methodology and in the model proposal to improve learning.

Aimed at developing a student participation model, two research questions were asked in the study, subquestions of which are presented in Chapter 5:

1. What is the relationship between ID students' learning styles and opinions on student participation in project planning in PBDL?
2. How is the diversity of individual learning differences are accommodated in pedagogical planning in PBDL?

During the course of this study, the COVID-19 pandemic that started to spread around the world in March 2020 has caused inevitable transformations in design education. Upon the directives of the Turkish Council of Higher Education (*Yükseköğretim Kurulu [YÖK]*), there was a radical, immediate transition to online platforms. It required immediate adaptation to remote teaching and other changing circumstances, such as limited or no physical gathering, lack of access to computers/internet, lack of access to workshops, tools and/or materials for physical modelling, and the digitalization of collaboration/communication, which limited the physical aspects of ID considerably. Therefore, the unexpected occurrence of the pandemic pointed out the importance of approaching the design studio not only as a physical environment, but also rather as an experiential learning process that does not necessarily take place in a physical design studio. Regarding that the implications of this extreme situation for ID education and participation are still unexplored, it was deemed critically important to touch on how the pandemic has effected pedagogical planning and student participation in PBDL within the scope of this dissertation as well. This provided the opportunity to re-evaluate PBDL from a different viewpoint and open up new discussions for design researchers and academics.

1.3 Theoretical Framework of the Dissertation

Conventionally, the design studio implies both a learning process and a physical space. There are alternative approaches intended to expand the physical, technological, and social barriers of the conventional (physical) design studio as the main educational setting, such as virtual design studio and live projects taking place outside the physical

design studio, utilizing different educational tools, methods, and approaches (Green and Bonollo, 2003; Lawson, 2004; Webster, 2008; Khorshidifard, 2011; van Dooren et al., 2014; Rodriguez, Hudson and Niblock, 2016). However, regardless of the spatial limitations of the design studio, design students engage in diverse learning activities, coinciding with Kolb's ELT, including:

> *"research, conceptual thinking, creative problem solving, visual language, project presentation, modelling, and relevant technical instruction" (Rutgers, 2015, p. 64).*

Kolb's ELT, based on social psychology, philosophy, and cognitive psychology, is one of the most frequently studied theoretical models to assess learning styles and enhance individuals' understandings of the learning process through experience and their individual approach to learning (Kolb, 1984). ELT uses the Learning Style Inventory (LSI) to assess learning styles. The theory and inventory are distinctive in terms of their applicability and validity across disciplines and cultures (Kolb, 2015). Among the learning style assessment instruments that have been studied over the years, LSI is the only inventory that has been applied in various fields and that has stimulated the development of its variations by large number of theorists and practitioners in many different fields (Hickcox, 1995; Coffield et al., 2004). The theory argues that even though every learner has one type of dominant learning style, it is not a fixed trait, but rather a dynamic state that may shift through time, development, and situation (Kolb and Kolb, 2005). As students gain experience and engage in more advanced learning processes, their primary preferences for learning are affected by those experiences, which may cause a shift in their learning style (Demirbas and Demirkan, 2003; Demirbas and Demirkan, 2007). Moreover, some students with certain dominant learning styles are better at certain stages of the design process, since their approaches to the design process, production, and evaluation meet the needs of those particular stages (Carmel-Girfilen, 2012). They also perform differently in different phases of the learning process, have different preferences for the delivery of knowledge and acquisition of skills, and show varying levels of interest in different learning activities. Therefore, individual needs of these students vary in both the design and learning processes. It is important to ensure their engagement in appropriate learning activities and development of required skills throughout their learning process.

ELT suggests that the most effective learning environment is where all learners with diverse learning styles are supported and provided with learning through experiencing, reflecting, observing, and experimenting (Kolb, 1984). The design studio supports this diversity, as being a good example of a balanced learning environment, where all modes of Kolb's learning cycle are incorporated (Nussbaumer and Guerin, 2000; Demirbas and Demirkan, 2003; Bender, 2004; Kolb and Kolb, 2005; Kvan and Yunyan, 2005; Demirbas and Demirkan, 2007; Tucker 2007; Carmel-Gilfilen, 2012; Ayalp and Özdemir, 2016). Both as a learning environment and a learning and teaching methodology, the design studio is inclusive of all types of learners and supports various modes of learning through exploratory, reflective, and critical-thinking activities. It is the core of design education, where learning how to design and the actual practice are intertwined (Schön, 1987). Learning design is not only limited with learning how to design and solve a problem, but also how to define an actual design problem (Uluoğlu, 1990; Teymur, 1993; Demirbas and Demirkan, 2003). It is a project-based teaching and learning process that occurs through experience and reflection-in-action with a reciprocal and continual dialogue between the instructor and the student, which characterizes the learning process in design education (Schön, 1983; Green and Bonollo, 2003).

Design projects are an important part of teaching both practical and theoretical aspects of designing (Teymur, 1993). It starts with the instructor's introduction of the course and the design project through a design brief and then continues with developing solution proposals for specific design problems and evaluating them by a jury (Demirbaş and Timur Öğüt, 2018). Design instructors often rely on their past personal experiences, skills, and specialties, and make predictions about what students need in the learning process during the course of projects (Cross, 1982; Green and Bonollo, 2003; Lawson, 2004; Khorshidifard, 2011; van Dooren et al., 2014). Although not totally didactic, it implies a certain level of didactic attitude, despite the flexibility of design pedagogy. However, it is of great importance to utilize students' learning styles by involving them in pedagogical planning processes in order to increase the effectiveness of learning as much as possible, rather than adopting a didactic approach. It also has the potential to facilitate instructors in designing learning experiences and developing instructional methods and/or models that are more suitable to students' needs.

In learning sciences, there are research on and practices of student participation in pedagogical planning, which indicate a positive link with more effective learning (Carini, Kuh and Klein, 2006; Kuh, 2008; Bovill, Cook-Satherand and Felten, 2011). However, there is a lack of practice enabling the active involvement of *all* students with a sustainable infrastructure, which can maintain or adapt itself to changing circumstances and/or participants. The key for such active student participation is to understand and make use of the diversity of all students' individual differences. Since learning is a process at an individual level based on experience, each individual has his/her own strengths and challenges in the process that may shift or change in time. Through the years in PBDL, the level of structure, complexity, and ambiguity of design projects changes and students adapt their learning styles to the demands of these projects, various stages of which require the mind and body to function in different ways in each (Carter and Doorley, 2018). These are important aspects to take into account, which implies a need for flexibility and adaptability when developing a model for student participation in pedagogical planning in PBDL.

Grounding on this theoretical framework, this dissertation has been structured so as to consist a comprehensive literature review and a mixed method research, conducted with students and instructors, with the aim of developing a student participation model. Along with the literature review, a two-day workshop as a preliminary study was conducted on 11-12 October 2018, which gave direction to the ongoing literature review, helped clarifying and validating the problem statement, and was utilized in developing the survey conducted with ID students. The data was collected from students between November 2020-January 2021 and from instructors between December 2020-January 2021. Then, the datasets were analyzed in a four-month period, between January 2021-April 2021.

1.4 Structure of the Dissertation

There are nine chapters in the dissertation, organized as follows:

Following this Introduction chapter, the second, third, fourth, and fifth chapters provide a solid theoretical foundation for the study. Chapter 2 provides detailed information on experiential learning, specifically focusing on the concept, diversity, and importance of learning styles in formal education, and examines it through the lens of Kolb's ELT. Chapter 3 starts with the participatory approach, with a focus on the

concept of participation, the democratic and knowledge elicitation aspects of participation, and forms of participation particularly in decision-making processes. It continues with the importance of diversity in participatory practices, student participation in pedagogical planning, and its benefits and challenges in educational practices. Chapter 4 explains the unique design pedagogy thoroughly, reviews the history and concept of the design studio, and delves into PBDL, focusing on design projects, the function of the design brief, and the feedback mechanism in the design studio. It continues with the review of ID education, including the definition of ID, the history and general curricular structure of ID education, and future implications. Then, the design studio is examined as an experiential learning process, followed by an overview of the ELT and learning styles research and participatory practices in ID education through the previous studies and examples found in the literature.

Chapter 5 presents the methodology of the dissertation. After providing a methodological background for the study, the research questions are presented. Then, the research approach and each method that was employed in the study are described in detail. This chapter is followed by the findings and discussion, presented thoroughly in Chapter 6. The proposal for the student participation model is introduced in Chapter 7, describing the stages of the model and discussing its potential benefits and possible challenges.

Lastly, Chapter 8 is the concluding chapter that provides an overview of the dissertation and discusses the limitations and the potential directions for further studies.

CHAPTER 2: EXPERIENTIAL LEARNING

The meaning of experiential learning is vague and it is difficult to make a clear definition of the term. Warner Weil and McGill (1989, p. 27) point out that:

> *"Both the experiential theorist and the educational practitioner seem to agree on what experiential learning is not. It is definitely not the mere memorizing of abstract theoretical knowledge, especially if taught by traditional formal methods of instruction such as lecturing and reading from books."*

Similarly, the term "experiential" is often used as *in-context experiencing and action*, whereas in Kolb's Experiential Learning Theory (ELT) it implies:

> *"a theoretical perspective on the individual learning process that applied in all situations and arenas of life, a holistic process of learning that can aid in overcoming the difficulties of learning from experience" (Kolb, 2015, p. xx).*

The term "experiential learning" is also mistakenly used interchangeably with the term "experiential education" (Mughal and Zafar, 2011). Whereas experiential education refers to a process, which occurs between a teacher and a student, infusing direct experience with the learning environment and content (Itin, 1999), experiential learning is a process of knowledge creation and sense-making from direct experience (Kolb, 1984), which is a part of experiential education.

The process of experiential learning is based on the integrity of theoretical knowledge and practical experience in education. Theories are put into practice and the practical experience tests and informs the theory, which leads to the revising of existing theories or development of new theories (Beard and Wilson, 2006). Whereas some scholars draw attention to the limitations of formal education and the necessity of de-schooling to link theory and practice through experience (Dewey, 1938; Illich, 1971; Freire, 1993), there are also scholars who acknowledge the criticisms about the delivery and practical application of theoretical knowledge in formal education and yet recognize its importance to develop core skills in students and its potential to link most aspects of learning to some form of experience (Beard and Wilson, 2006; Kolb, 1984). Given that experience is subjective and that people have their own unique ways of

interpreting the experience they have undergone based on their previous experiences, the process of learning is similarly unique and personal to each individual (Dewey, 1916; Kolb, 1984; Boud, Cohen and Walker, 1993; Sims and Sims, 1995; Beard and Wilson, 2006). These differences are observed in individuals' typical, patterned, and characteristic ways of thinking, behaving, feeling, perceiving, and processing information in learning situations, which can be described and assessed in many ways based on cognitive, affective, and physiological dimensions (Campbell, 1991; Sims and Sims, 1995). Therefore, the recognition and acknowledgement of individual differences in learning is critically important both for educators and learners.

2.1. Experience and Learning

Many scholars point out the importance of experience in the process of knowledge creation, theory building, and learning. Experience is the interaction that occurs between the self and the external environment, which is the basis of learning (Beard and Wilson, 2006). Boud, Cohen and Walker (1993, p. 8) state that:

> *"We found it to be meaningless to talk about learning in isolation from experience. Experience cannot be bypassed; it is the central consideration of all learning. Learning builds on and flows from experience: no matter what external prompts to learning there might be – teachers, materials, interesting opportunities – learning can only occur if the experience of the learner is engaged, at least at some level. There external influences can act only by transforming the experience of the learner."*

The meaning of experience is slippery, since there is no consistency among people who have undergone and been affected by a similar event (Dewey, 1925; Beard and Wilson, 2006). Experience has a subjective nature and is unique to each individual, having unique interactions with an event and perceiving and processing information in different ways (Beard and Wilson, 2006). Therefore, there is an unlimited number of interpretations of the same thing or event, which is also affected by the individual's previous experiences. In that sense, experience is multifaceted and multi-layered both temporally and spatially so that the learning flows from these multiple layers of experiences (Boud, Cohen and Walker, 1993).

Kolb (1984) defines learning as the knowledge creation process through the transformation of experience. Experience is the bridge connecting the person and

object that are in interaction and is the link between action and thought (Dewey, 1938). Elaborating on this perspective, Beard and Wilson (2013, p. 27) state that:

> *"Our theories are abstract conceptualizations of how thoughts and external objects relate to one another in a consistent manner. They inform and guide us in our practice, and enable us to gain insights into the various events in which we are involved. If our practical experience does not match our theory of how we think things should be, then we often revise our theories or sometimes revisit the experience in order to see if it can be fitted into our weltanschauung – our way of seeing the world. Thus there is a continual interaction of theory and practice in which each informs the other."*

Even though experience lies behind all learning, it does not always result in learning if the individual does not fully engage with the experience and reflect on what happened as well as how and why it happened. Therefore, it necessitates a sense-making process of active engagement between the inner world of the person and the outer world of the environment in order to incorporate them within a broader conceptual framework through this transformation (Beard and Wilson, 2006). Action and thought are two inseparable aspects of experience that inform each other continually throughout this sense-making process, so that learning and creation of knowledge can occur by relating it to experience (Dewey, 1916; Dewey, 1938). Dewey (1916) argues that thinking is an intentional attempt to discover specific connections between what we do and its results and thus, it leads to a unified, developing situation due to this continuity. In this continual process, he acknowledges the connection of dualities, such as person-nature, subject-object, knowing-doing, and mind-body, rather than considering them as polarized entities, in order to show how the concept of experience creates an organic whole of continuities, processes, and situations (Cuffaro, 1995). Based on this viewpoint, the action and thought dualism – two complementary concepts that lead to meaning and knowledge creation by creating a meaningful unity – underpins the process of learning (Kolb, 1984). Similarly, Freire (1993) emphasizes the importance of continuous inquiry of individuals not only in the world, but also with the world and with each other for new meanings and knowledge to emerge. When people interact with a situation, a person, information, or an idea, they think about it, react to it, and act upon it in different ways. Therefore, the process of knowledge

creation is different for each individual.

2.2. Learning Styles

Individuals perceive, think, feel, and behave differently in relation to a particular occurrence to make sense of it (Guild and Garger, 1998). The act of learning differs from one individual to the other due to these diverse internal factors, i.e. *learning styles*, which provide understanding of particular patterns, characteristics, and norms about individual learning preferences.

2.2.1. The Concept of Learning Style

Based upon Dewey's and Kolb's perspectives on individuals' unique experiential backgrounds, Hickcox (1995) emphasizes the difficulty of describing one singular construct of learning style and the necessity of multiple constructs to define the term, since each individual is unique, despite the particular patterns that exist among the diversity. A learning style is unique to the individual and is a component of many factors, such as personality, brain-dominance, prior learning, aptitudes, and abilities (Sims and Sims, 1995). It is described as characteristic cognitive, affective, and physiological behaviors as relatively stable indicators of how an individual perceives, interacts with, and responds to the learning environment (Keefe, 1979). The term is often used interchangeably with the term "cognitive style" in the literature (Campbell, 1991). However, cognitive styles imply the general modes and structural properties of cognitive systems (Renzulli and Dai, 2001), whereas learning styles are individual preferences and approaches to learning tasks that are based on:

- sensory modality,
- content features (abstract vs. concrete),
- degrees of structure in the learning process,
- physical and social characteristics of the learning environment,
- types of instructional activities, and
- degrees of student involvement.

Learning style has *cognitive*, *affective*, and *physiological* dimensions (Keefe, 1979; Campbell, 1991). It includes *cognitive* style within itself, reflecting the process of cognition and how information is processed. The *affective* dimension cannot be directly observed, but rather detected in an individual's interaction with environmental

factors, such as school, people, and culture. It is reflected in emotional and personality characteristics, such as motivation, attention, control, interests, responsibility, willingness to risk-taking, persistence, and sociability. The *physiological* dimension, on the other hand, includes the individual's sensory perceptions, such as visual, auditory, kinesthetic, taste, smell, environmental characteristics of sound, light, temperature and room arrangement, as well as optimum times for learning, desire for food during study, and sex-related differences.

Given the abovementioned dimensions, learning styles research provides an understanding of individual differences, preferences, strengths, and weaknesses in the learning process from multiple directions.

2.2.2. Categorization and Assessment of Learning Styles

There are many instruments that have been developed to assess learning styles with specific intent and focus on measuring specific types of factors (Sims and Sims, 1995). Due to the variety of the factors, none of these instruments provides complete data, but rather a diagnosis of a limited aspect of the entire process, despite the accuracy of that particular instrument. For that reason, the selection of the instrument needs to be made with an awareness of its strengths and limitations and according to the specific data intended to be measured. Ideally, it is suggested to triangulate methods and utilize at least three measures with reasonable psychometric standards, each corresponding to the individual's instructional and environmental learning preferences, information processing preferences, and personality-related learning preferences (L. Curry, 1987).

Renzulli and Dai (2001) suggests that the methodology of learning style research primarily relies on self-report measures with a phenomenological research approach, accepting learning styles as subjective. Self-report inventories are one of the most commonly used learning style assessment methods and known for providing the opportunity to receive direct information about learners through various questions or preferences and respondents often feel comfortable with this type of assessment (Hickcox, 1995). Including self-report inventories, there are mainly five major methods of learning styles assessment (Guild and Garger, 1998):

- Inventories – direct/indirect self-reports
- Tests (of a particular skill or task)
- Interviews – open-ended conversations, self-report inventory questions, writing

one's own profile as a learner

- Observation (during a task or learning situation) – checklists, anecdotal records
- Analysis of products of learning – achievements, errors

As a result of a psychometric survey of 21 learning style conceptualizations and instruments from North America, Europe, and Australia, L. Curry (1987) suggests a three-layer system to organize the learning styles instruments. Hickcox (1995, p. 29) explains this system as follows:

> *"Curry's system has three layers like an onion. The first layer (or core) presents learning behavior as controlled at a fundamental level by the central personality dimension. The middle layer centers around a theme of information processing dimensions. The outer layer, influenced by the interaction with the environment, is based on the theme of instructional preferences. The outermost layer of the model, and the most observable, is the instructional preference learning style conceptual approach. The three-layer connection between the personality layer and the outermost instructional preference layer, she claimed, is analogous to the trait and state concepts of personality theory."*

Therefore, the learning styles and the associated inventories falls in to three categories based on L. Curry's studies (Hickcox, 1995):

1. *Instructional and environmental* – The inventories of this category provide results in relation to the learner's study or work setting needs and may assist educators in the arrangement of the learning environment.
2. *Information processing* – The inventories of this category give learners critical in-class learning mode preferences and cues for being aware of possible teacher learning style preferences. The information may be used by educators to develop better curriculum and process planning as well as more inclusive classes.
3. *Personality related* – The inventories of this category provide learners with information for self-knowledge and how it related to learning settings. This information may also be useful for educators or advisors to assist students in selecting academic majors or careers.

There are also similar categorizations of learning styles and their assessment on the basis of cognition-centered, activity-centered, and personality-centered approaches

(Sternberg and Grigorenko, 2001). Moreover, the characteristics of learning styles have been examined at five levels behavior, which are personality types, early educational specialization, professional career, current job role, and adaptive competencies, in the research on adult learning since 1970s (Kolb, Boyatzis and Mainemalis, 2001). Based on the L. Curry's three-layer onion model, a more recent review of the learning styles literature examines 13 of the most influential models to assess learning styles among 71 identified approaches and inventories (Coffield et al., 2004). The study illustrates "five families" of learning styles and inventories, drawing upon L. Curry's categorizations:

- genetic and other constitutionally-based learning styles and preferences, including sensory modalities;
- cognitive structure, including patterns of ability;
- stable personality type;
- 'flexibly stable' learning preferences;
- learning approaches, strategies, orientations, and conceptions of learning.

Despite the categorizations presented above, the ultimate goal of learning styles research is not to provide categories of certain learner stereotypes, but rather to enable both educators and learners to make use of this information to make more rational and objective decisions for one's self and others.

2.2.3. Importance of Learning Styles Research in Formal Education

The assessment and understanding of learning styles does not intend to label individuals, but rather to (Hickcox, 1995; Sims and Sims, 1995; Kolb, 2015):

- help individuals increase self-knowledge by raising awareness of their own approaches in learning situations and enhance the way they use these approaches for lifelong learning;
- help individuals increase their range of learning, possibly with the intention to help each individual to have a fully integrated range of learning styles;
- help educators develop instructional methods and curriculum that provide diverse learning opportunities appropriate to all learning styles;
- help educators form more effective learning groups;
- help educators, counselors, and supervisors establish more effective communication.

Learning styles are particular ways of directing the intellect that an individual finds comfortable (Sternberg, 1990; Renzulli and Dai, 2001). They address:

> *"a fundamental strength of each person contributes to the development of self-esteem and, ultimately, to achievement" (Sims and Sims, 1995, p. 207).*

Therefore, it is one the main responsibilities of educators to find ways to recognize and understand this diversity and to relate it to diverse learning opportunities. Learning styles research suggests that it is important to accommodate all learning styles in educational programs for the enhancement of learning. However, formal education is criticized for lacking this in daily practice and for the selection of instructional methods based on the learning preferences of instructors, which exhibits a hierarchical manner (Sternberg, 1990; Guild and Garger, 1998).

There are many models, with a focus on a certain dimension of learning styles, to be applied in formal education. Guild and Garger (1998, p. 146) point out that:

> *"When teachers are ready to apply a model, their own style plays a role. Some study theory carefully; others gain deeper understanding through application. Some people jump right into total application following a structured format; others begin with a limited application and build from there".*

The authors also emphasize the importance of studying the chosen model in depth, being knowledgeable of more than one model, and being patient to see the results in student outcomes and behaviors, which may take approximately five years, to be successful with a specific model. Moreover, Campbell (1991) emphasizes that it is a challenging task for educators to accommodate all students, especially who are not interested in a subject, which is often the case due to the diversity and mismatch of learning styles of students and instructors. He draws attention to many studies arguing that students with certain learning preferences that match the learning preferences of the instructor are more likely to be successful in the class. On the other hand, the mismatch of the learning styles of the student and instructor can be a valuable learning opportunity as it requires the student to stretch the boundaries of his/her own learning preferences and learn to be flexible by using non-preferred learning modes (Sims and Sims, 1995).

It is also important for educators to be aware that no individual falls entirely into one single category (Sims and Sims, 1995) and an individual's learning preference is situational. Kolb (1984) points out that current situational demands affect the development of a learning style as much as the hereditary factors and previous learning experiences. Moreover, learning styles are not fixed traits and can be enhanced, developed, and adapted, even though they are stable and self-consistent (Kolb, 1984; Sims and Sims, 1995). Therefore, it is equally critical to empower students by making them knowledgeable about their own strengths and weaknesses in the learning process and to foster their ability to use their learning styles flexibly and shift from one style to the other as the situation necessitates (Sternberg, 1990; Fleming and Mills, 1992; Kolb and Kolb, 2015).

In learning styles research, Kolb's Experiential Learning Theory (ELT) and Learning Style Inventory (LSI) are among the most frequently studied theoretical models and assessment instruments that acknowledge and provide a ground for accommodating the individual differences in learning.

2.3. Experiential Learning Theory of Kolb

ELT provides:

> *"foundation for an approach to education and learning as a lifelong process that is soundly based in intellectual traditions of social psychology, philosophy, and cognitive psychology" (Kolb, 1984, p. 3).*

In order to assess learning styles, LSI was created as an educational tool to enhance an individual's understanding of the learning process through experience and their individual approach to learning (Kolb, 1984; Kolb, 2015).

2.3.1. Intellectual Foundations and Applications of Experiential Learning Theory

ELT provides a holistic model of the learning process and a multilinear model of adult development, linking education, work, and personal development, with an emphasis on experience as the basis of learning (Kolb, 1984; Kolb, 2015). The intellectual origins of ELT are rooted in the experiential works of Dewey, Lewin, and Piaget. Kolb, Boyatzis and Mainemalis (2001, p. 227) explain that:

> *"The theory is called experiential learning to emphasize the central role that experience plays in the learning process, an emphasis that*

distinguishes ELT from other learning theories. The term experiential is used therefore to differentiate ELT both from cognitive learning theories, which emphasize cognition over affect, and behavioral learning theories, which deny any role for subjective experience in the learning process."

Kolb (2015) summarizes seven themes that have guided experiential learning in contemporary applications of the theory, based on Dewey's philosophical pragmatism, Lewin's social psychology, and Piaget's cognitive-developmental genetic epistemology (Figure 1). With the aim of bringing theory and practice together for personal and organizational development, Lewin and his followers founded T-groups (training groups) and action research. The articulation of democratic values underlying experiential learning is both emphasized in the works of Lewin and the educational philosophy of Dewey. Dewey has a pragmatist perspective, placing personal experience in the center of learning. Piaget's works, on the other hand, make contributions to the description of the learning process as the dialectic relationship between assimilation and accommodation to transform experience into concepts and vice versa as well as his work on epistemology, illustrating the relationship between the structure of knowledge and how it is learned. Additionally, all three perspectives make an emphasis on the development towards a purpose and self-direction as the organizing principle for education.

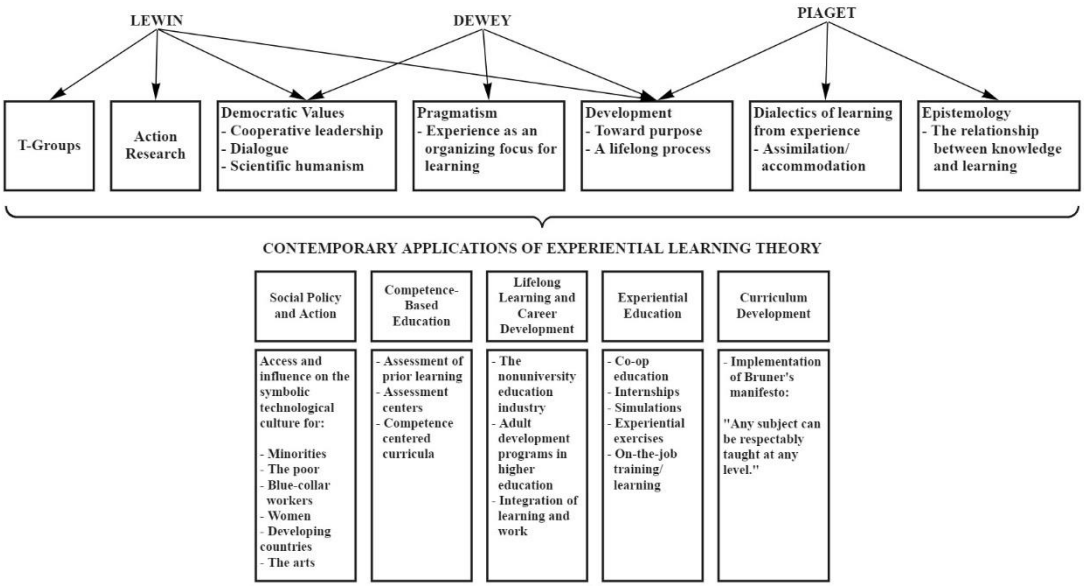

Figure 1. Three traditions of experiential learning (Source: Kolb, 2015).

These philosophical, psychological, and physiological perspectives explained above have provided a theoretical ground for understanding the structural dimensions of experiential learning and how these dimensions function within that structure in ELT. Rooted in these previous works, Kolb has built the first systematic and comprehensive theory of experiential learning, detailing its characteristics and the structural foundations of the learning process, contributing with a new typology of individual learning styles distinguished from cognitive styles, and creating its assessment tool (Coffield et al., 2004).

2.3.2. Learning Cycle in Experiential Learning Theory

ELT defines learning as:

> *"the process whereby knowledge is created through the transformation of experience" (Kolb, 2015, p. 67).*

It emphasizes the combination of experience, perception, cognition, and behavior in learning, which is a dynamic process starting with the engagement of people in experiences. Kolb and Kolb (2005) list the main propositions of ELT:

- Learning is best conceived as a process, not in terms of outcomes.
- All learning is relearning.
- Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.
- Learning is a holistic process of adaptation to the world.
- Learning results from synergetic transactions between the person and the environment.
- Learning is the process of creating knowledge.

The theory explains the process of experiential learning through a four-stage learning cycle, which involves four adaptive learning modes that require opposite sets of abilities that are continually chosen by learners in learning situations (Kolb, Boyatzis and Mainemalis, 2001). The learning cycle (Figure 2) has two structural dimensions (*prehension* and *transformation*) and four dialectical modes of learning (*concrete experience*, *reflective observation*, *abstract conceptualization*, and *active experimentation*). The knowledge is formed and learning results through the learner's continuous act of resolving the dialectic conflicts between the two opposed modes of

each dimension as s/he moves through the stages of the learning cycle (Kolb, 2015).

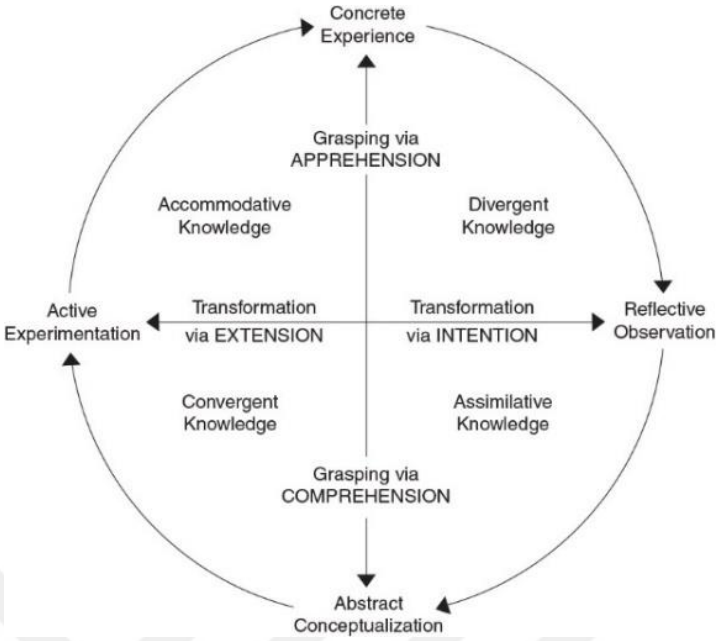

Figure 2. Structural dimensions underlying the process of experiential learning and the resulting basic knowledge forms (Source: Kolb, 2015).

The concrete experience-abstract conceptualization (CE-AC) dialectic is of the prehension dimension, which stands for how experience is grasped, either by relying on tangible, felt qualities of immediate experience (*apprehension*) or relying on conceptual interpretation and symbolic representation (*comprehension*). On the other hand, the active experimentation-reflective observation (AE-RO) dialectic is of the transformation dimension, which represents how experience is transformed, either through internal reflection (*intention*) or active external manipulation of the external world (*extension*). In summary, immediate, concrete experiences provide a basis for observations and reflections, which are assimilated and distilled into abstract concepts for new actions to be actively tested and serve to create new experiences (Kolb, Boyatzis and Mainemalis, 2001). Depending on how experience is grasped and transformed, four forms of knowledge are likely to result:

> *"Experience grasped through apprehension and transformed through intention results in what will be called divergent knowledge. Experience grasped through comprehension and transformed through intention results in assimilative knowledge. When experience is grasped through comprehension and transformed through extension, the result is*

> *convergent knowledge. And finally, when experience is grasped by apprehension and transformed by extension, accommodative knowledge is the result." (Kolb, 2015, p. 67)*

Each individual has certain strengths and challenges in each stage of this learning cycle, depending on their learning styles.

2.3.3. Learning Styles in Experiential Learning Theory

Each dimension of the learning cycle presents a choice and there are particular, characteristic ways of how individuals make those choices to resolve the dialectic conflicts, based on hereditary factors, previous experiences, and demands of the present situation (Kolb, Boyatzis and Mainemalis, 2001). These patterns are defined as *learning styles* in ELT.

2.3.3.1. Learning Styles and Learning Flexibility in Experiential Learning Theory

As ELT suggests, individuals approach learning situations differently by continually making choices among the set of abilities they have to use for prehension and transformation as they move through the stages of the learning cycle. These dominant prehension and transformation preferences imply the individual learning style. In ELT, there are initially four basic learning styles that underlie the learning process, which have been expanded to nine learning styles in Kolb's recent studies (Kolb, 1984; Kolb, 2015; Kolb and Kolb, 2005). These learning styles and their characteristics are briefly explained as the following (Kolb, Boyatzis and Mainemalis, 2001; Coffield et al., 2004; Kolb and Kolb, 2005; Kolb, 2015):

- *Divergent Learning Style*: The dominant learning abilities are CE and RO. Individuals with this learning style are highly imaginative, creative, open-minded, aware of meanings and values, and feeling-oriented. They adapt by observation rather than by action and take various different perspectives on concrete situations. They are good at gathering information, generating alternative ideas and implications of ambiguous situations, such as in brainstorming sessions. They value social interaction and tend to specialize in the arts, prefer group works, and are open to criticisms and personal feedback.
- *Assimilative Learning Style*: The dominant learning abilities are AC and RO. Individuals with this learning style assimilate disparate observations into an

integrated explanation due to their inductive reasoning and ability to build conceptual models and theories. They are good at organizing information and analyzing data. They have a symbolic understanding of the world. They rely more on ideas and abstract concepts, rather than people. Their main concern is the logicalness and preciseness of theories, not their practicality. They prefer readings and lectures, and tend to choose careers in science.

- *Convergent Learning Style*: The dominant learning abilities are AC and AE, exact opposite of divergent learning style. Individuals with this learning style are pragmatic, logical, and unemotional. They are good at quantitative analysis, setting goals, problem-solving, decision-making, and applying theories in practice. They concern with technical tasks, rather than interpersonal issues. They do best in situations such as conventional intelligence tests that require a single correct answer or solution. They prefer to learn through simulations, laboratory works, and experiments and often have careers in technology-related disciplines.
- *Accommodative Learning Style*: The dominant learning abilities are CO and AE, exact opposite of assimilative learning style. Individuals with this learning style learn through hands-on experience, i.e. learning by doing. They are doers and like taking risks. They are good at adapting themselves to new, changing, and challenging situations and getting involved in new experiences. They tend to discard a plan or theory, if it does not fit the facts. They are good at committing themselves to objectives, carrying out plans, and dealing with people. They have an intuitive trial-and-error manner while solving problems and rely on other people for information, rather than on their own analytic ability. They can influence and lead others but may be seen as impatient and "pushy". Action-oriented careers are suitable for this type of learners. In learning, they prefer working in groups to accomplish tasks, fieldtrips, setting goals, and testing out different approaches in their works.

Expanding the four learning styles of Kolb's ELT, Hunt and his associates identified nine distinct learning styles that can be placed on a nine-region learning style grid: *Northerner (N), Easterner (E), Southerner (S), Westerner (W), NE, NW, SE, SW,* and *Balancing (C)* (Hunt 1987 in Kolb and Kolb, 2005). N emphasizes CE and balancing AE and RO; E emphasizes RO and balancing CE and AC; S emphasizes AC and

balancing RO and AE; and W emphasizes AE and balancing AC and CE. The balanced learner at the center of the nine-region grid and rely on acting, feeling, reflecting, and thinking. In addition to the specialized learning styles, Mainemelis, Boyatzis and Kolb (2002) also identified a *balancing learning style*, which has the ability to learn by integrating all four learning modes. Moreover, recent studies and feedback from users have revealed that individuals who are close to the boundary lines of the four-region grid have distinctive styles as well. Therefore, with the recent updates, ELT suggests nine individual learning styles in order to better define the unique patterns of learning on a nine-region grid, based on the four dialectics of the learning cycle (Kolb and Kolb, 2013; Kolb, 2015) (Figure 3).

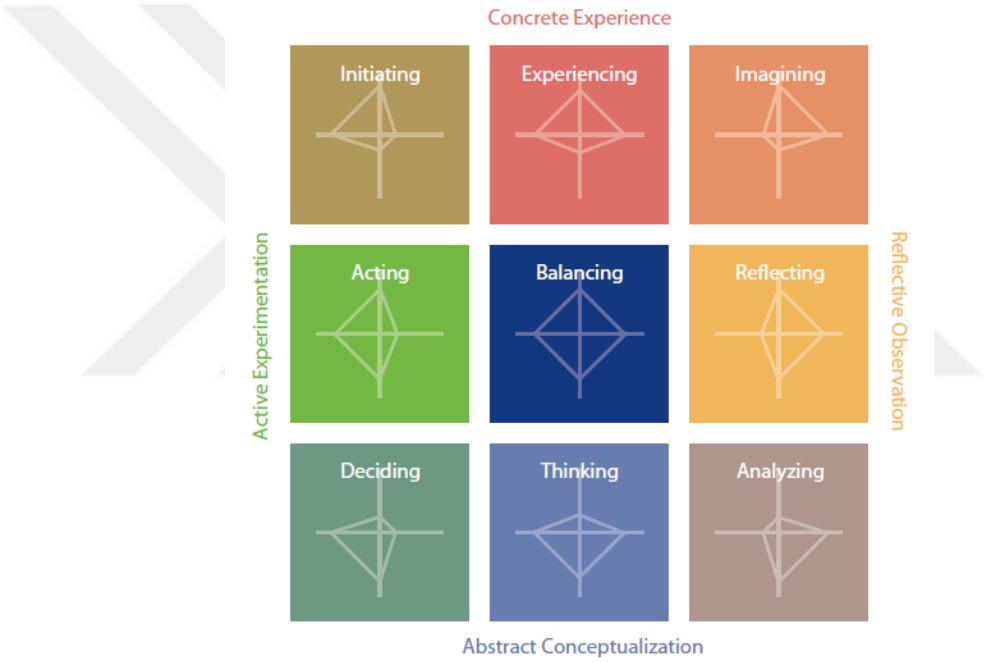

Figure 3. The nine learning styles in the KLSI 4.0 (Source: Kolb and Kolb, 2013).

The brief descriptions of these learning styles along with their learning strengths and challenges are shown in Table 1 (Kolb, 2015; Korn Ferry and Kolb, 2018).

Table 1. Strengths and challenges of the nine learning styles in ELT.

Learning Style	Characterized by…	Learning Strengths	Learning Challenges
Initiating	…the ability to imagine possibilities by observing and reflecting on experiences. It relies on CE and AC.	- Committing the individual self to objectives - Seeking new opportunities - Influencing and leading others	- Controlling the impulse to act - Listening to others' views - Impatience
Experiencing	…the ability to find meaning from deep involvement in experience. It relies on CE while balancing AE and RO.	- Building deep personal relationships - Strong intuition focused by reflection and action - Open to new experiences	- Understanding theory - Systematic planning - Critical evaluation
Imagining	…the ability to imagine possibilities by observing and reflecting on experiences. It relies on CE and AC.	- Awareness of people's feelings and values - Listening with an open mind - Imagining the implications of ambiguous situations	- Decision making - Taking leadership
Reflecting	…the ability to connect experience and ideas through sustained reflection. It relies on RO while balancing CE and AC.	- Understanding others' points of views - Seeing 'what's going on' in situations - Converting intuitions into explicit explanations - Gathering information	- Taking action - Rumination - Speaking up in groups
Analyzing	…the ability to integrate and systemize ideas through reflection. It relies on RO and AC.	- Organizing information - Being logical and rational - Building conceptual models	- Risk taking - Socializing with others - Dealing with lack of structure
Thinking	…the capacity for disciplined involvement in abstract and logical reasoning. It relies on AC while balancing AE and RO.	- Logical analysis - Rational decision making - Analyzing quantitative data	- Working with people - Keeping an open mind about ideas - 'Lost in thought'
Deciding	…the ability to use theories and models to decide on problem solutions and courses of action. It relies on AC and AE.	- Problem-solving - Evaluating ideas and solutions - Setting goals and making decisions	- Thinking 'out of the box' - Sensitivity to people's feelings - Dealing with ambiguity
Acting	…the ability a strong motivation for goal directed action that integrates people and tasks. It relies on AE while balancing CE and AC.	- Combining technical knowledge and personal relationships - Focused on getting things done - Leading work teams	- Taking time to reflect - Solving the right problem - Gathering and analyzing information

Table 1. (continued)

Balancing	**…the ability to adapt: weighing the pros and cons of acting versus reflecting and experiencing versus thinking. It balances CE, AC, AE and RO.**	- **Flexibility in moving around the learning cycle** - **Ability to work with diverse groups of people** - **Creative insights**	- **Indecisiveness** - **'Jack of all trades, master of non'** - **Sustained commitment**

ELT also suggests that learning style is not a fixed personality trait but rather a dynamic state that may shift through time, development, and situation (Kolb and Kolb, 2005). It is a habit of learning that is shaped by experience and also by individual choices (Kolb and Kolb, 2013; Kolb, 2015). It is further described that the effectiveness of preferred learning modes are limited with the situation that requires these strengths. Therefore, modification or adaptation of approaches may be needed for an individual in some learning situations. This flexibility may be either an automatic and unconscious or an intended and conscious mode of adaptation to the learning situation. Whereas some individuals are often consistent in their preferences, there are also "flexible learners", who exhibit a tendency to change their preferences depending on the task or situation. This learning flexibility presents a more holistic learning process.

2.3.3.2. Kolb's Learning Style Inventory

Learning Style Inventory (LSI) serves as an educational tool that aims to increase individuals' understanding of the process of learning from experience and their unique individual approach to learning and provides a research tool for investigating ELT and the characteristics of learning styles (Kolb and Kolb, 2013). It is not intended to be used for inter-individual comparisons, but rather to provide information about intra-individual differences. Regarding the categorizations of learning style assessment instruments, KLSI falls into the *information processing category* of L. Curry's (1987) onion-model, *activity-centered category* of Sternberg and Grigorenko's (2001) categorizations, and *flexibly stable learning preferences family* of Coffield et al. (2004). It is based on individuals' self-reported learning preferences in order to increase their self-awareness and develop more effective instructional methods and curriculum (Kolb, 1984; Kolb, 2015).

There are four objectives that guided the development of the instrument (Kolb, 2015):

- Having respondents to respond to it in the same way they do in a learning situation;
- Designing the instrument in a self-description format, since the learning process relies on conscious choice an decision;
- Being valid with the hope that measuring learning styles would help predicting behaviors in a way consistent with ELT;
- Practicality; being brief and straightforward.

Given that ELT is a holistic, dynamic, and dialectic theory, the inventory has been constructed in a way that allows individuals to rank their preferred modes in learning situations in a forced-choice format, instead of rating them on a normative Likert scale. The underlying viewpoint for ranking in a forced-choice format is the interrelatedness of the four learning modes. It is also further explained that ranking overcomes the social desirability response bias, in which respondents may say they prefer all learning modes, as well.

Most of the critiques of ELT and LSI are centered around the psychometric properties of the inventory so that it has been revised in 1985, 1999, 2005, and 2011 based on these critiques (Kolb, 2015). The most recent paper-based version of LSI is Kolb's Learning Style Inventory 3.2 (KLSI 3.2), which maintains the high scale reliability and external validity of the previous version as it offers higher internal validity. KLSI 4.0 is the most recent version that is available online with the same content. It also integrates the Adaptive Style Inventory (ASI) into the instrument for the assessment of learning flexibility.

Additionally, among the learning style assessment instruments that have been studied over the years, LSI is the only inventory that has stimulated the development of its variations by influencing and inspiring large number of theorists and practitioners in many different fields (Hickcox, 1995; Coffield et al., 2004). In that sense, both the theory and inventory are applicable and valid across cultures (Kolb, 2015). Therefore, given the solid theoretical foundation that ELT provides to the study, focusing on the importance of understanding and accommodating individual learning differences to enhance learning, participatory approach is an appropriate way to enable this and give voice to individuals, who are affected by both the learning process and outcomes, in developing such sustainable infrastructures for learning.

CHAPTER 3: PARTICIPATORY APPROACH AND LEARNING

Drawing upon the participatory design literature, participatory approach is inclusive and pluralistic, by which fundamental human needs are met and individuals' values are reflected, and thus improves the effectiveness of decision-making (Sanoff, 2000). Participatory approach, initially started as a Scandinavian tradition in the field of design, has been recently extended to various contexts, including learning sciences (DiSalvo et al., 2017). DiSalvo and DesPortes (2017) emphasize that participatory design practices in learning sciences are an extension of the foundational set of methods, practice of engagement, and commitment to set of democratic values through design thinking and methods that aim to design infrastructures for learning.

3.1 Participatory Approach

In this dissertation, the terms "participatory approach" and "participation" are adopted from the field of design. Therefore, these terms are used as they are defined mainly in the participatory design literature. Regarding this, it is worth touching on the definition of participatory design before delving into the concept of participation and the strategic aspects and forms of participation.

3.1.1 Participatory Design

Participatory design is a process of generating continuous insights and knowledge through the direct involvement of users in design and decision-making processes, especially in the early stages, through its own approach and techniques that are beyond a collection of design methods and have a social dimension (Luck, 2003). It is not only a design process, but also a collective and democratic research and implementation process, intending a social change. DiSalvo and DesPortes (2017) indicate the application of participatory design in learning sciences with a focus on enabling learners to bring their own values and abilities into the design of learning experiences through a set of methods and practices. Sanoff (2007, p. 213) portrays a description of participatory design that is inclusive of all disciplines adopting this approach:

> *"Participatory design practitioners share the view that every participant in a participatory design project is an expert in what they do, whose voice needs to be heard; that design ideas areas in collaboration with participants from diverse backgrounds; that participatory design*

practitioners prefer to spend time with users in their environment rather than ''test'' them in laboratories. Participatory design professionals share the position that group participation in decision-making is the most obvious. They stress the importance of individual and group empowerment. Participation is not only for the purposes of achieving agreement. It is also to engage people in meaningful and purposive adaptation and change to their daily environment."

There are contradictory views on whether participatory design is a method or an approach in the literature. Some researchers acknowledge that participatory design is not only a design method or an approach, but rather a research methodology that has its own methods and techniques for co-researching and co-designing, having its roots in the traditions of participatory research and participatory action research, which regard research subjects as active participants with equal engagement in defining and solving the problem (Couto, 1987; Spinuzzi, 2005; Blessing and Chakrabarti, 2009; Greenbaum and Loi, 2012). It is based on the view that all participants are equal and are both researchers and learners at the same time (Couto, 1987; Bergold and Thomas, 2012). Despite sharing this similar viewpoint, other researchers argue that participatory design is a research approach, which is not significantly different from other empirical research procedures in social sciences, but rather has similarities in terms of the qualitative methodologies and methods that are used (Bergold and Thomas, 2012). Participants are considered as experts of their own experiences (Sleeswijk Visser et al., 2005) and play an active role in the process of setting requirements, generating ideas, developing concepts etc. through expressive and generative tools (Stappers and Sleeswijk Visser, 2007; Sanders, 2002).

Despite the diversity of views on participatory design and practices, participatory design values the participation of individuals in a process with their individual differences. This concept of participation forms the basis of the participatory approach that has been adopted and examined in this dissertation.

3.1.2 The Concept of Participation

In the participatory design literature, the term "participation" is defined as a mutual and continuous learning process for both the designer and participants, engaging in collective activities of exploration, reflection, understanding, action, and

implementation (Robertson and Simonsen, 2012). It is a social and empowering process, extending beyond designers' activities and drawing on diverse perspectives (Sanoff, 2007; Björgvinsson, Ehn and Hillgren, 2012; Muller and Druin, 2012). Initially, the notion of participation dates back to Ancient Greece, when citizens had been given a voice in political decision-making processes through participation (Ehn, 1992; Glenn, 2003; Sanoff, 2006). Wulz (1986) states that citizen involvement in planning processes started in the US in 1870s and affected European countries via the UK. Influenced by the democratic movements in the 1950s and 1960s in the US, the participatory approach has started to be seen in different contexts, such as community participation in social development, improving social services, civil rights, urban planning, community art projects, and citizen action programs, with the aim of making strategic plans and taking collective actions (Sanoff, 2000; Sanoff, 2006; Robertson and Simonsen, 2012). In the 1970s, worker unions started an industrial democracy movement towards computerization in workplaces in Norway, Scandinavia, which triggered the design of computer-based systems through workers' participation with the aim of balancing power relations in workplaces and improvement by appropriate tools and techniques, preventing deskilling and loss of managerial control of workers and possible work reductions due to the full-computerization of work tasks (Bødker, Grønbæk and Kyng, 1993; Kensing and Blomberg, 1998; Björgvinsson, Ehn and Hillgren, 2012; Greenbaum and Loi, 2012; Robertson and Simonsen, 2012). This approach also inspired other projects and practices in various other disciplines, such as design, architecture, political science, and communications studies, in North America and European countries in the 1980s (Gregory, 2003). Starting from the 1990s, various consulting and research associations, groups, and firms have been founded that mainly focus on participatory and collective actions, empowerment through engagement, mutual and continuous learning, self-reflection and critical reflection of practitioners, inclusion of minorities, use of generative, evaluative, and experiential research methods, and developing and/or improving human-centered products, systems, and services both in developed and developing countries through specific research methods and tools (IAP2, 2018; IDEO, 2018; PyGyRG, 2018; SonicRim, 2018).

3.1.3 Strategic Aspects of Participation in Decision-Making Processes

Participatory practices ensure an in-depth investigation of a problem and more effective and sustainable solutions to problems with a democratic attitude. All participants of a participatory process are accepted equal and the actual source of knowledge and information about both existing circumstances and future possibilities. Therefore, there are mainly two strategic aspects of participation: (1) the democratic right of participants and (2) the elicitation and incorporation of their tacit knowledge in the design process (Ehn, 2008).

3.1.3.1 Participation as a Democratic Principle

The democratic principle is enacted through involving a diversity of participants in the design process with their potential for equal contribution to the outcomes (Luck, 2003). Participants are encouraged and enabled to contribute to the social and/or physical environments and circumstances that they experience by engaging in meaningful and purposive activities intending adaptation and/or change (Sanoff, 2007). Not only the outcomes, but also the process of participation is empowering and emancipatory for participants, since it is a social process that extends beyond the designer's superiority to non-designers and encourages collectivity, collaboration, and equal contribution of all participants in any field of study and practice (Luck, 2003; Björgvinsson, Ehn and Hillgren, 2012; Muller and Druin, 2012; Robertson and Simonsen, 2012). Participatory practices acknowledge the participation of individuals, who are often considered less powerful, marginalized, and excluded in the design process, in order to ensure more suitable, sustainable, and satisfactory solutions to their problems through in-depth understanding of their experiences (Demirbilek and Demirkan, 2004; Zaphiris, Sustar and Pfeil, 2008; Lindsay et al., 2012). Such processes provide a democratic ground for individuals to participate with their own skills, abilities, expertise, and inner knowledge, which gives them the opportunity to have a voice in the process and a sense of ownership. Therefore, the outcome is not only a functionally enabling and satisfactory product, but also a socially and emotionally supportive and empowering experience throughout the entire process. However, Wulz (1986) draws attention that the lack of clarity in the definition of participation, which may be conceived differently, such as well-meaning listening, discussion or do-it-yourself concept, may cause the use of participation by experts as an alibi for a negative side of

their traditional roles, i.e. an authoritarian approach to decision-making. As the process allows more active user participation, the level of user's authority increases and the process becomes more democratic.

Regardless of the form of participation, it is also critical to be aware that the context may affect the type, intensity, degree, and frequency of the participation of individuals (Sanoff, 2000). The nature of participation may also vary due to the human aspect or social, cultural, religious, financial, temporal, and organizational aspects in different cultures and hierarchical social structures in different geographies (Puri et al., 2004; Hussain, Sanders and Steinert, 2012). Therefore, depending on the context and profile of participants, the clarity of the role of participants and the form of their participation is crucially important in order to provide a democratic process with positive experiences and outcomes for participants. It necessitates approaching participants in appropriate ways and with appropriate methods and tools while maintaining the democratic attitude.

3.1.3.2 Participation as a Research Approach

Participation is a methodological intent and a tool for social sciences to have a deeper understanding of people and establish a ground for engaging in an effective dialogue through more causal methods, typically involved in traditional research approaches that tend to generalize user requirements (Wulz, 1986; Sanoff, 1988). By bringing their own knowledge and skills into the process as a social resource, users with some needs and problems are transformed into "actors" in participatory processes, which consist of a sequence of actions and specific design devices used for triggering new actions and sequences of events (Manzini and Rizzo, 2011). The transition from user-centered processes to participatory processes has brought the need for new tools and methods to elicit knowledge from people (Sanders, 2002). The main difference between the tools of traditional user research and participatory design research is the focus of these tools. For instance, traditional user research methods and tools, such as questionnaires, focus groups, and interviews, focus on what people say and think, whereas participatory design research focuses on what people can do and create by using toolkits. These toolkits, consisting of various types of two- and/or three-dimensional tools, aim to enable people to express their thoughts, feelings, and dreams, which help them using their own creativity, skills, and abilities in identifying their

latent needs and aspirations (Sleeswijk Visser et al., 2005). There are various forms of knowledge elicitation techniques through participation, illustrated in relation to their abilities to access different types of user experience in Figure 4:

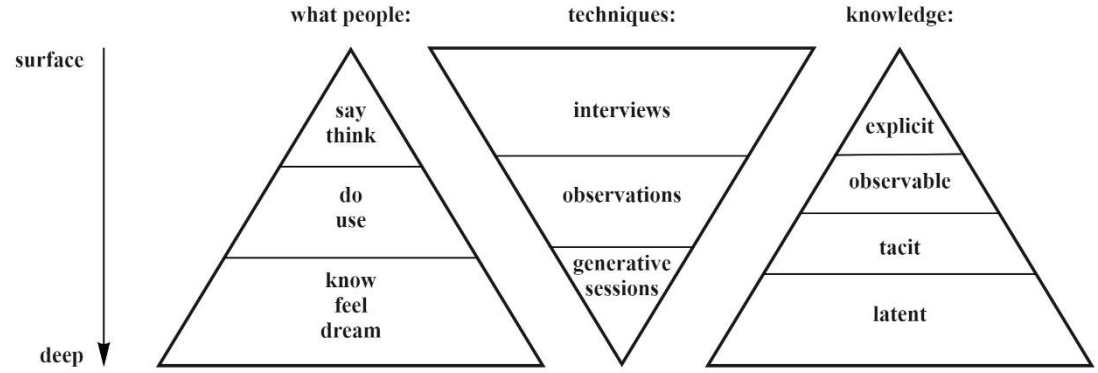

Figure 4. Different levels of knowledge about experience, accessed by different techniques (Source: Sleeswijk Visser et al., 2005).

There are also some challenges in participatory design research as well. It is often taken for granted that participants are available, willing to participate actively, and have the necessary skills and abilities for contribution as planned. If the participant is not interested in or motivated for participation or not have time to participate at all stages of the process, it may result in shifting towards a less active and less democratic participation process (Wulz, 1986). Despite the egalitarian principle underpinning participatory processes, Hussain, Sanders and Steinert (2012) point out that there is always the possibility of limited availability and/or accessibility of participants, lack of willingness to participate, and limited skills and abilities for engagement. Such cases may require different ways of approaching participants to establish close relationships, built on mutual trust, common language, and understanding, which often takes more time than traditional research approaches and requires engagement both with intended users and with existing and/or potential stakeholders. Participatory practices are always contextual; therefore, it is crucially important to understand that particular context in order to plan not only a well-organized, but also a flexible process to encourage and facilitate participation, reveal tacit knowledge, and enable the transfer of that knowledge (Luck, 2003). In that sense, the flexibility and adaptability of participatory processes are essential to overcome possible challenges and unexpected situations by restructuring the process when needed, developing and/or selecting specific methods and tools, and engaging in activities that are appropriate to the

relevant situation.

3.1.4 Forms of Participation in Decision-Making Processes

Wulz (1986, p. 39) states that:

> *"participation is a general concept covering different forms of decision making by a number of parties."*

There are various conceivable forms of participation. When considering the levels and forms of participation in decision-making processes, a model of citizen participation is informative in the sense that it shows the relations between powerholders and the less powerful.

Arnstein's (1969) "ladder of citizen participation" in community planning (Figure 5) has been a reference for studies in various disciplines concerning with participation in decision-making processes (Bovill and Bulley, 2011). The ladder consists of eight rungs from the bottom upwards: *manipulation*, *therapy*, *informing*, *consultation*, *placation*, *partnership*, *delegated power*, and *citizen control*. These eight rungs are grouped under three forms of participation: *non-participation*, *tokenism*, and *citizen power*. Whereas the objective is to educate participants in two levels of non-participation, there are three degrees of tokenism that allow people to be heard in the process and yet not involved as active participants in the decision-making process. Lastly, there are three levels of citizen power with increasing degrees of participation in decision-making and the highest degree is that participants obtain full control on the process. Similarly, referencing Arnstein's ladder of participation, Silverman (2005) provides a continuum of citizen participation with two ends: *grassroots participation* (populist forms of participation; e.g. community boycotts, referendums…) and *instrumental participation* (expert-driven forms of participation; e.g. survey research and charrettes), with a number of intermediate forms of participation with varying ways and degrees of involvement as well.

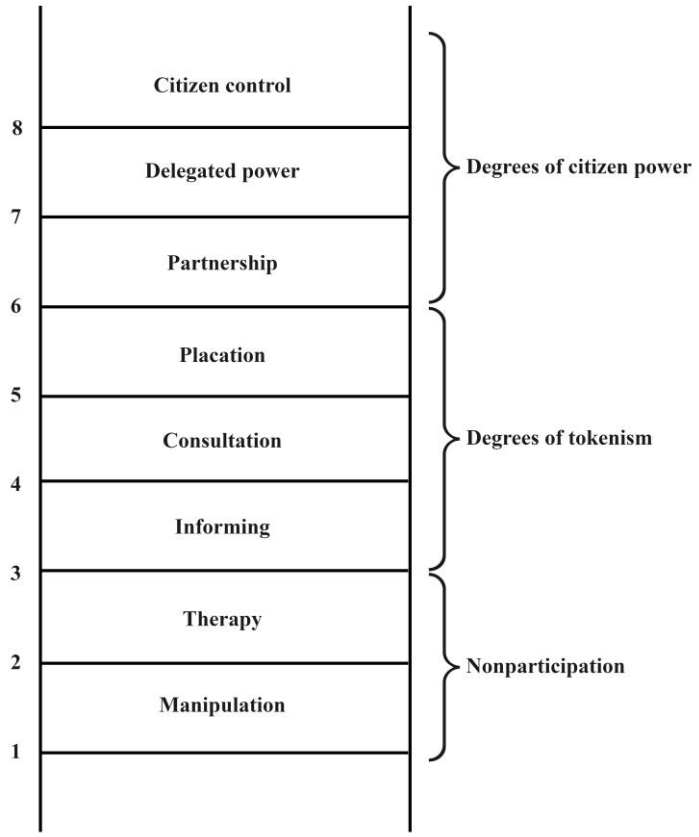

Figure 5. Arnstein's ladder of citizen participation (Source: Arnstein, 1969).

Arnstein (1969, p. 216) argues that:

> *"participation without redistribution of power is an empty and frustrating process for the powerless" and "it maintains the status quo".*

In the design field, the power between the designer and the user is not always distributed equally during the process either. Between the poles of designer autonomous and user autonomous decision-making processes, Wulz (1986) identifies seven forms and stages of participation in the field of architecture, which are also representative of the forms of participation in other design disciplines:

- *Representation* is the most passive form of participation. The designer represents the anonymous user via his/her personal and subjective interpretation of the user's explicit and/or implicit needs, desires, ambitions, dreams, and situations etc.
- *Questionary* is an anonymized passive form of participation with a systematic gathering of a user population's requirements. It provides a more objective, observable, and statistical data, which can be generalized but yet questionable in terms of simplifying and uniforming assumptions.

- *Regionalism* is a combination of representation and questionary, making an inventory of the local population's preferences in relation to specific and cultural heritage of a geographically limited area.
- *Dialogue* is based on informal face-to-face conversations between the designer, who shares information about the proposal, and the user, who comments and shares his/her viewpoint, while the design process is already in progress. It aims to democratize the planning by informing the local population earlier in the stage, to receive feedback and suggestions on the design work, to know more about the specific region, and to establish a non-anonymous dialogue with the user.
- *Alternative* participation allows users to be more active in the design process by giving them the choice of several alternatives within a fixed frame to select among. The user is not anonymous and makes alternative selections individually, based on individual preferences. The majority decision can be acceptable, if each person participates; however, the participation and the sense of ownership of minority groups over the final decision is questionable in this form of participation.
- *Co-decision* takes part in a balanced decision-making situation, in which the user is a direct and active participant from the beginning of the design process, balancing the influence of the designer's authority. It is presupposed that the participants are known as individuals, who have interest, motivation, and time for participation at all project phases, and that any extra costs are somehow covered. If these conditions do not exist, the active form of participation changes to a passive form.
- *Self-decision* is a form of participation where the user has more authority in decision-making over the designer's authority. The user is considered as a creative entity and independent from all forms of authoritative intervention. The designer primarily influences the process by making related choices for sites and structural and service systems, then engages in the later phases as a consultant. In principle, this form of participation requires avoiding and abolishing the intervention of any local or state authorities by regulations, norms, rules, laws, and orders. Practicing participation as self-decision necessitates a limited number of participants, which can be overcome with selecting representatives. However, this is contrary to the principle of self-decision being a direct and active participation of every individual.

The purpose of participation, such as generating ideas, identifying attitudes, providing information, reviewing proposals or resolving conflicts, is important to be made clear in order to decide on the form of participation and the appropriate methods, tools, and techniques to facilitate that form of participation. Regarding participatory design processes, design charrettes and workshops with design-oriented tools are customary. They typically include bottom-up, visual, interactive, and generative tools and techniques to engage participant groups, facilitate collaboration, and consider diverse issues from multiple perspectives (Sanoff, 1983; Girling, Kellett and Johnstone, 2006; Ahn and Park, 2007; Stappers and Sleeswijk Visser, 2007; Sanders, Brandt and Binder, 2010; McLaughlin, 2013; Sanders and Stappers, 2016). They are useful to generate outcomes that are often readily available for implementation (Sanoff, 2006). The appropriateness of the generated outcome is more likely to be achieved as the diversity of participants is ensured so as to engage in the process with equal, individual contributions.

3.2 Diversity in Participatory Practices

Fischer (2000, p. 527) states that:

> *"Complex design problems require more knowledge than any one single person can possess, and the knowledge relevant to a problem is often distributed and controversial. Rather than being a limiting factor, "symmetry of ignorance" can provide the foundation for social creativity. Bringing different points of view together and trying to create a shared understanding among all stakeholders can lead to new insights, new ideas, and new artifacts."*

The participatory approach enables expert decision-makers to elicit knowledge from users and utilize them in the process, to the extent that it is relevant and of interest (Wulz, 1986). Each individual is a social resource in participatory processes with their different viewpoints, opinions, abilities, skills, and unique experiences (Sleeswijk Visser et al., 2005; Manzini and Rizzo, 2011). The diversity and richness of individual experiences and opinions is a valuable input for making decisions for those who will benefit from the process and its outcomes. Despite the difficulty of coming to a common decision due to different viewpoints, Wulz (1986, p. 48) states that:

> *"Participation…can unify opposing views in as much that certain differences of opinion can be cleared up before they become too inflamed and cause destructive conflicts".*

In terms of knowledge elicitation, the diversity of any type of contribution made by users provides expert decision-makers with more relevant and up-to-date information (Sanoff, 1988). Therefore, the relevance and effectiveness of decisions increases as more participants are given the opportunity to have a voice in the process. This diversity is also important to reveal the patterns of needs and desires of individuals, as well as potential problem areas and solutions to be explored further. Moreover, since participation is a learning process that aims to increase people's awareness about issues being tackled, it is inevitable that the overall influence of the proposed improvement, development or change becomes greater for future users as more people become aware of these issues (Sanoff, 1983; Sanoff, 1988). This also results in an increased sense of having influence on the decision-making process, which is a more satisfactory experience for users regardless of the degree to which their needs have been met, and an increased awareness of the consequences of decisions. This requires transparency in the process, reflecting the diversity of participants, in order to arrive at acceptable decisions with participants' equal right to contribute and to ensure that all participants understand each other's viewpoints and consequences. It strengthens not only the outcome, which is more relevant, sustainable, and positively influential, but also the participants of the process by learning more about themselves and others through active involvement.

In order to plan and implement effective participatory processes, inclusive of all potential user profiles, it is important to acknowledge the diversity of participants and understand their individual differences. It necessitates appropriate methods and tools to facilitate participation in a format, which allows flexibility in the methods of application, depending on the context and purpose of participation.

3.3 Student Participation in Learning

Simon (1955, p.206) states that:

> *"Significant changes in human behavior can be brought about rapidly only if the persons who are expected to change participate in deciding what the change shall be and how it shall be made".*

Within this context, encouraging and facilitating student participation has the power to bring a positive change and improvement in learning processes with deeper understanding and empowerment. Freire (1993) advocates the active role of students in education, which requires educators and students exchange roles, to overcome the common approach, which perceives the student as lacking knowledge and the educator as the owner of that knowledge. There are many studies, concerning with the student participation in learning, which are mostly related with developing teaching approaches, instructional strategies, course, and curriculum. Some studies also focus on designing learning technologies and environments. The previous research indicate different results on students' preferences for teaching and learning environments (Baeten et al., 2015). Whereas some studies indicate students' preferences for student-centered teaching styles and learning environments (Drew, 2001; Wierstra et al., 2003), others show preference for teacher-centered teaching styles and learning environments (Sadler-Smith and Riding, 1999; Van Petegem, Donche and Vanhoof, 2005), an approach taking a middle position between student-centered and teacher-centered styles (Hativa and Birenbaum, 2000), or both (Chang and Chang, 2010).

A positive link is also found between active participation and learning. For instance, a comprehensive research at university-level shows that the achievement of learning outcomes, such as critical thinking and grades, increase as the student participation increases (Carini, Kuh and Klein, 2006). Similarly, the study of Könings, Seidel and van Merriënboer (2014) also shows that there is a positive link between student participation and academic achievement, focusing on the participatory design of learning environments. The authors indicate the lack of students' involvement in the design of learning environments and state the importance of students' perspectives in shaping educational practices, environments, and policies, rather than being shaped by them. Their findings are supportive of previous studies and show that it is more likely to improve student learning, when there is a congruence between students' perspectives and other stakeholders, who create the learning environment, such as teachers and instructional designers. There are also other research on the participatory building design, which is limited compared to the research on participatory design of curriculum, learning, teaching, and assessment (Könings, Bovill and Woolner, 2017). In addition to these studies, there is also a Ph.D. research, which is based on the participatory design of a new design brief model for new millennium learners in ID

education (D. Demirbaş, 2018).

Participatory design is defined as:

> *"a set of methods, a practice of engagement, and a commitment to a particular set of values—all enacted through design" (DiSalvo and DesPortes, 2017, p. 177).*

It has also been extended to learning sciences, concerning with learners' abilities to bring their own values into the design of learning experiences. The term "design" is used for describing a diversity of methods for planning, developing, testing, and iterating learning programs in the learning sciences, even though there is only a little connection with participatory design as it is defined in the field of design. However, there are still a number of similar efforts, such as learner-centered design, design-based research, and community-based design research, grounded in the tradition of participatory action research (DiSalvo and DiSalvo, 2014). It provides a powerful initiative to bring the student perspective into decision-making processes in relation to learning experiences through systematic inclusion and empowerment of students (Mitra and Gross, 2009; Jagersma and Parsons, 2011). It does not only include a shift in the role of students, but also builds pedagogical content and structure.

3.3.1 Student Participation in Pedagogical Planning

The idea of collaborating with students in pedagogical planning is not a new proposal in higher education (Dewey, 1916). Students' active participation in learning is considered crucially important for their academic success by enhancing the learning processes and outcomes through engaging in meaningful learning, new power relations between students and staff, and experiences to become critical thinkers (Kuh, 2008; Bovill, Cook-Satherand and Felten, 2011). It brings about new roles for students, instructors, academic developers, and other stakeholders and encourages students to take on a more active role as co-creators of learning (Davis and Sumara, 2002; McCulloch, 2009). It does not only imply students shifting from a passive to an active role, but also developing meta-cognitive awareness about what and how they are learning and why they are learning it.

Bovill, Cook-Satherand and Felten (2011) provide three possible forms of student participation in pedagogical planning with the examples based on their educational

practices at three universities in the US, Scotland, and Ireland:

1. *Students as co-creators of teaching approaches*: The faculty and students engage in reflective dialogue about what is and what could be happening in higher education classrooms. Activities involved are weekly meetings of the faculty, weekly blog posts, mid- and end-of-semester feedback, portfolio, and partnership with student consultants. Student consultants meet with faculty members for establishing goals and plans, make weekly visits to class sessions, survey/interview students in the class, take and discuss their observation notes and other feedback with the faculty, participate in weekly meetings, and visit one or more faculty seminars during the semester.
2. *Students as co-creators of course design*: A selected number of the faculty, students, and academic developers collaborate in course design teams in order to co-create/re-create a course syllabus. There are typically one or two faculty members, two to six undergraduate students, and one academic developer. The faculty initiates the process and invites others to participate. Students apply to participate in the team to contribute to a course that they have previously taken or is important to the curriculum of their discipline. The team collaboratively develop the course goals and build relevant pedagogical strategies and learning assessments accordingly. This approach aims to challenge the customary and passive role of students in undergraduate education, as well as the assumption about the complete authority of the academic staff over the learning process, by prompting both parties to confront fundamental questions about the nature of learning and teaching. Teams usually have weekly meetings for two or three months to develop a successful partnership, which takes time, since students need time to make sure that they are taken seriously, as well as to develop a proper language and confidence to express their pedagogical ideas clearly.
3. *Students as co-creators of curriculum design*: Students and academic staff co-create some of all aspects of the planning, implementation and evaluation of the learning experience. In the first example, the program coordinators advertise for third-year students among 400 students to co-design the first-year geography curricula with the academic staff. The selected students were paid to design a new virtual learning environment based on case studies covering important themes for the first-year curricula content, and produced written, audio, and video resources for that learning

environment that the first-year students could interact and use to support their learning. These case studies were discussed among small groups of students online and in the class. Then, the third-year students collaborated with the program coordinators to select examples of good student works that could be used as a basis for teaching sessions. In addition to this direct influence and contribution, another example includes designing of a curriculum framework with certain modules by the academic staff. Students and the academic staff co-create the content of these modules by negotiating through discussion, compromise, and agreement on the curriculum decisions, depending on what students need to learn to become more competent.

Based on these three forms of student participation, Bovill, Cook-Satherand and Felten (2011) suggest the following characteristics to create a change towards the effective integration of participatory approaches in pedagogical planning and development:

- *Invite students to be partners* (active and authoritative collaborators) with academic staff in pedagogical planning, thus challenging traditional hierarchies and roles.
- *Support dialogue across differences* (of position and perspective), which yields fresh insights and deeper engagement in teaching and learning.
- *Foster collaboration* through which both academic staff and students take more responsibility for teaching and learning and adopt new views of both.
- *Serve as intermediaries,* facilitating new relationships between students and academic staff.

In another study, focusing on student empowerment through active participation in curriculum design, Jagersma and Parsons (2011) argue that student participation is the core of learning and that students should not be marginalized in curriculum design. The authors discuss the relations between student participation and participatory design with a focus on the importance of student involvement in curriculum planning and implementation at the class, school, and provincial level. Similarly, Bovill and Bulley (2011) investigate the desirability and possibility of active student participation in curriculum design in higher education as a way to achieve co-created learning experiences. They offer a ladder of student participation (Figure 6), illustrating the possible levels and forms of participation, based on the Arnstein's ladder of citizen participation in community planning. Bovill and Bulley (2011) indicate that even

though the upper rungs of the ladder implies more active participation, it is not necessarily better or more preferable, depending on the context. The lower rungs may be more desirable in some contexts. However, the authors emphasize their opposition in principle to the lower levels of student participation involving either manipulation of students or empty claims of participation.

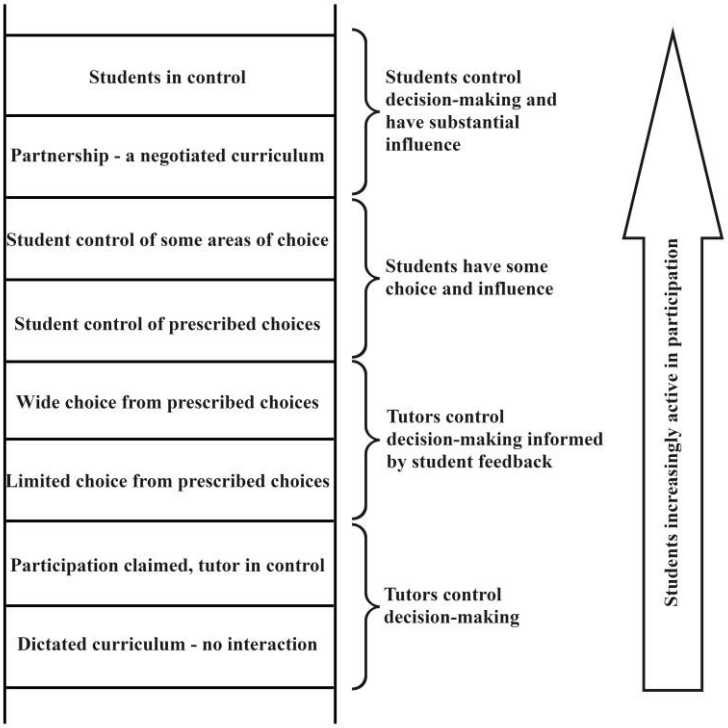

Figure 6. Ladder of student participation in curriculum design (Source: Bovill and Bulley, 2011).

Institutional support is essential for providing such participative opportunities and participatory infrastructures to students (Delpish et al., 2010). One of the examples of institutional support to participatory curriculum design is the Department of Industrial Design at the Ontario College of Art and Design (OCAD) in Canada, which applied a series of design thinking methods to redesign the curriculum with the active participation of instructors and graduated students in consideration of experiential learning (Rutgers, 2015). The department identified its core themes and collaborated with former students to understand what they had learned, how they had learned, and what they felt was relevant in their current jobs as designers in order to develop an experiential curriculum based on three types of students that they had identified (*the design maker*, *the UX/UI designer*, and *the design entrepreneur*) and the competencies they acquired. They regularly interview and track their graduates to remain the

curriculum up-to-date and resonate with industry trends through a competency-driven education model, allowing flexibility and adaptability to ongoing change.

Considering the abovementioned participatory practices in pedagogical planning, student participation provides various benefits to students, instructors, and academic institutions in general, despite some challenges, mostly emerging from individuals' attitudes and institutional barriers.

3.3.2 Benefits and Challenges of Student Participation

Bovill and Bulley (2011) argue that providing participative opportunities to students early in their university experiences increases the possibility for students to develop a deeper understanding and ownership of their learning experiences in terms of content and process. It enables students and academic staff to relate differently and experience enhanced engagement, motivation, and enthusiasm by taking part in a co-creation process (Bovill, Cook-Satherand and Felten, 2011). Students' active participation in the planning and implementation of learning activities also helps them make sense of the learning processes/structures and feel more connected to the curriculum/course objectives (Rudduck and Flutter, 2000). Therefore, the previous research indicate a positive correlation between student participation and achievement of learning outcomes (Carini, Kuh and Klein, 2006).

Moreover, participatory methods and tools that can be adapted to educational practices are powerful in terms of understanding students' learning processes (DiSalvo et al., 2017) and developing more democratic and sustainable infrastructures for learning. DiSalvo and DiSalvo (2014) reflect on what participatory design can offer to the research in learning sciences and their outputs in terms of methods, practices for engagement, and democratic goals:

1. democratic practices for defining research and learning goals,
2. practices that consider multiple participants in design,
3. practices for establishing participatory living labs for design research,
4. developing infrastructure for sustainable participation, and
5. using participatory design as a way to seek transferable rather than generalizable outcomes.

The context, timing, and adequate institutional support are important factors for successful and powerful student participation (Delpish et al., 2010). However, despite the number of benefits and long-term gains of student participation, there are some barriers and challenges adapting and implementing the participatory approach in learning. The main challenges are in relation to handing over the control over pedagogical planning, time investment, meeting professional requirements, and gaining access to students (Bovill, Cook-Satherand and Felten, 2011). A process involving student participation requires a clear definition of the concept and communication of expectations that need to be understood and agreed upon by all parties involved in the process (Jagersma and Parsons, 2011). It is of great importance to set a boundary for students claiming power by ignoring the involvement of academic staff and for academic staff resisting to hand over the authority and power to students or share it with them. Setting boundaries also avoids insincere approaches, empty promises and false claims of participation that lead to a sense of student disengagement and alienation (Mann, 2001; Mitra and Gross, 2009). Otherwise, artificially introduced student participation may cause harm in learning environments rather than providing any benefits (Jagersma and Parsons, 2011). Students often have doubts about not being taken seriously in the process and need time to develop the language and the confidence to participate actively (Bovill, Cook-Satherand and Felten, 2011). It is essential, both for students and instructors, to recognize and acknowledge that students have responsibility and capability to participate in order to maintain healthy communication between these two parties and to avoid their interaction becoming controlled by the instructor (Thompson, 2009).

Jagersma and Parsons (2011) indicate that there are also barriers to participatory design due to the lack of support by the educational system. Despite their awareness of long-term gains, some students may also be reluctant or resistant to learn a new system after they have become used to a system they learn how to be successful in. They become comfortable with a system that is constraining and guiding through a surface learning process based on external expectations and internalize its rules, which makes it difficult for them to invest time in involving in the process as an active participant for deeper learning (Albers, 2009; Jagersma and Parsons, 2011).

Moreover, new experiences may feel uncomfortable for some students and academic staff. Delpish et al. (2010, p. 111) state that:

> *"students are accustomed to, and often comfortable with, assuming a relatively powerless role in the classroom, just as faculty are trained to believe that their disciplinary expertise gives them complete authority over the learning process".*

Inexperienced students, on the other hand, may get confused and uncomfortable when the instructor hands over the total control to them without preparation or guidance and may resist to change the norm (Shor, 1992).

Therefore, the willingness to participate is an individual preference and some participation levels and/or forms may be more preferable for some students. It is also important to be aware that students' views that they bring to learning are based on different motivations and experiences and this diversity is fundamentally important to be recognized, acknowledged, and accommodated (Bovill, Cook-Satherand and Felten, 2011). However, it is a difficult task for instructors to understand students' various preferences and learning needs and to adapt their teaching to this diversity for creating a productive learning environment (Tubić and Hamiloğlu, 2009). This requires instructors to be trained for creating participative opportunities and learning environments with the necessary philosophical understanding and coaching skills.

Given the benefits and challenges of student participation in learning, Bovill, Cook-Satherand and Felten (2011) suggest the following:

- Consider the academic context carefully and work with academic staff to identify appropriate co-creation opportunities,
- Try to create liminal spaces outside of typical structures and relationships where students understand they are taken seriously,
- Ensure meaningful participation and that neither academic staff nor students feel forced to participate,
- Ensure the diversity of students and academic staff and that their positions are brought into structured dialogue, in which they are valued as peers,
- Recognize that pedagogical planning is an ongoing process, which cannot be transformed at once after a single participatory activity,
- Value and encourage participants to value not only the product of the process, but also the collaborative process itself,
- Support academic staff to take small steps in collaborative pedagogical planning,

e.g. not starting with an entire curriculum, but with trying out something more contained and manageable, and

- Evaluate co-created pedagogical design and approaches to build a growing evidence base for the impact of the processes and outcomes of this work.

As suggested, allowing student participation in pedagogical planning has a lot to offer to improve learning. It is a potential area of research to investigate the ways of enabling this participation in PBDL, which is still unexplored in the design education literature.

CHAPTER 4: PROJECT-BASED DESIGN LEARNING

The design studio, where tacit design knowledge is uncovered, produced, and made conscious through reflection-in-action (Schön, 1983), is the central pedagogy of design education, which implies both a project-based learning process and environment. It is physically, socially, and pedagogically different from the traditional classroom of higher education. Influenced by Dewey's experimentalist understanding of reflective practice in education, such as engaging in scientific inquiries, Schön developed a more constructivist view of reflective practice in education, which takes place in the design studio rather than the scientific laboratory (Waks, 2001). It has been the core of design education throughout its history, where process-oriented and project-based teaching and learning occurs through engaging in a free, sociable, and informal discussions and exchanging knowledge by means of design projects (Green and Bonollo, 2003; Lawson, 2005).

4.1. Design Pedagogy

Lawson (2005) states that design education has some very common features that transcend countries and design domains. The way it is taught and learned is similar to a considerable extent, in terms of its flexible pedagogical strategy and learning space, in any design department anywhere in the world (Lawson and Dorst, 2009; Crowther, 2013). It is based on mimicking the professional practice through design exercises with varying complexities in order to prepare students as professional designers for the industry (Dorst and Reymen, 2004; Lawson, 2005; Rowe and Wong Kwok-Kei, 2011). Students gain practical design experience throughout their education, which focuses on developing skills to accomplish a design process rather than making them a repository of specialist knowledge, and form a designer identity to be a part of the community of design practice (Tovey and Osmond, 2014). Being a designer requires engaging in a designerly way of knowing, which is the core capability of a designer in any design field, regardless of any domain-specific specialized knowledge and skills, in order to be able to tackle ill-defined problems and learn to deal with uncertainty (Cross,1982; Crowther, 2013; Tovey and Osmond, 2014; Tovey, 2015).

Regardless of domain-specific knowledge and activities, the design studio implies the signature pedagogy of design education. It refers to the types of teaching future practitioners for professions through fundamental ways that are specific to a

profession, facilitating the mastery of a complex process and transferring the specific professional identity (Shulman, 2005; Schrand and Eliason, 2011). It is unique to a profession and once learned and internalized, one starts to think with them rather than about them, which simplifies the complex challenges of professional education (Shulman, 2005). It is similar to developing a designerly way of knowing, that different thinking styles of a designer almost merge into one way of thinking, enabling to switch between analysis and creativity and between different modes of thinking on problem and solution naturally (Tovey and Osmond, 2014).

Shulman (2005, p. 52) claims that:

> *"the novices are instructed in critical aspects of the three fundamental dimensions of professional work – to think, to perform, and to act with integrity"*.

He identifies three dimensions of signature pedagogies: a *surface structure* of operational acts of teaching and learning; a *deep structure* of a set of assumptions about how best to important knowledge and know-how; and an *implicit structure*, which is a moral dimension comprising a set of professional attitudes, values, and beliefs. For the design profession, these dimensions might be considered as *thinking*, *knowing*, and *internalizing* what design is and how to design in order to be a professional designer. From this viewpoint, Crowther (2013) emphasizes three types of learning in design education, which has a complex and flexible nature, with a reference to Schön and Dutton:

- Learning *about* design (developing knowledge);
- Learning *to* design (developing and applying skills); and
- Learning *to be* a designer (learning through changing as a person).

Similarly, Ledewitz (1985) points out the three pedagogical objectives of the (architectural) design studio: (1) teaching new skills, (2) teaching a new language, and (3) teaching students to "think architecturally". Within the framework of signature pedagogies, Shreeve, Sims and Trowler (2010) support the view that the design studio is an environment for problem-based and project-based learning in art and design education and identify its characteristics through an analysis of multiple case studies:

- Learning by doing, making, and acting out;

- Experiential learning;
- Material and physical dimension of learning (engaging with materials);
- Uncertainty;
- Visible dimension of learning (discussing, critiquing, and assessing student works);
- Public performance and peripheral participation;
- Intention to develop independent and creative professionals;
- Social aspect of learning (interaction with more experienced students, instructors, experts etc.);
- Process-oriented (developmental approach in constructive dialogues and assessment); and
- Physical studio for teaching and learning as an interactive part of social learning (including buildings and classrooms, the resources and artefacts within them, and the environment they create).

Based on the physical, organizational, and attitudinal dimensions of signature pedagogies, the design studio is the signature of design education with its unique and ubiquitous characteristics. Crowther (2013, p. 21) explains this as follows:

> *"…the lack of a front to the classroom, experimentation, collaboration of students, practicing of skills, a focus on an artefact, dialogue, instruction and critique. This list however goes only part of the way to explaining the signature."*

Shulman (2005) also emphasizes that signature pedagogies are interactive and students are responsible not only to the instructor, but also to their peers. This interaction and shared responsibility is significant in the design studio due to the continual dialogue and feedback mechanism among peers in addition to that of the instructor and the student.

Design studios typically apply the semi-structured learning strategy of experiential learning (Crowther, 2013), through projects. Projects include some aspects of problem-based learning, during which students learn to define an actual design problem, deepen their understanding, create meaning of both the practical and theoretical aspect of the profession, and construct knowledge based on experience (Uluoğlu, 1990; Teymur, 1993; Demirbas and Demirkan, 2003). It is a process of transformative learning, integrating both holistic and linear ways of thinking into

practice, involving design projects, experiential problem solving, and creative experimentation (Bull, 2015; Tovey, 2015). It starts with learning the basic design principles and is centered on experience, critical thinking, and reflection, requiring both theoretical and practical knowledge. Design projects incorporate both concrete and abstract concepts, such as drawings, 3D models aiding internal thinking and communicating the cognitive process behind the realization of physical objects and vice versa in tolerating uncertainty, resolving ill-defined problems, imagination, and developing constructive thinking (Cross, 1982; Cross, 1990).

Even though they acknowledge it as a powerful method for instruction, Dorst and Reymen (2004) criticize project-based learning in design education for being labor intensive both for students and instructors and sometimes being inefficient due to repetitive work. The authors also indicate the lack of clarity about what is exactly learned by students due to the complexity of design issues and the ill-structured nature of the student design problems, and students' lack of explicit verbal expression about what they learned. They emphasize that these problems have become more prominent when design education migrated to the higher education institutions. However, Schön (1985) acknowledges the unique nature of design education in the sense that it has the potential to produce effective solutions for the pedagogical problems of other disciplines in higher education as well. Regarding the unique environment for acquiring and applying disciplinary knowledge and skills, the design studio applies an exemplary pedagogy to be borrowed by other disciplines requiring multiple perspectives and applying project-based pedagogy, due to its distinctive characteristics and a number of dimensions involved in projects (Kuhn, 2001):

- Complexity and open-endedness of the problem;
- Duration of projects;
- Requiring rapid iterations;
- Encouraging collaboration;
- Explicit incorporation of reflection through frequent critiques;
- Heterogeneity of issues;
- Requiring a variety of student skills;
- Use of diverse media for design and presentation;
- Use of precedents or exemplars; and

- Collaborative problem definition or use of a preexisting design specification.

Some researchers argue that the limitations of academic structures, in which design education is currently situated, may have influences on the design learning process. Canniffe (2011, p. 5) states that:

> *"the institution [university] continues to focus inwardly and think myopically whilst the design world requires global thinkers who are outwardly looking and able to understand complex problems".*

The culture of the design studio also tends to be more subjective both in teaching and learning and fails to meet the rational objectivity of the culture of the university as a whole (Wang, 2010). Loy and Canning (2013) argue that there is a risk of reducing the holistic and iterative nature of design and teaching of design process to a didactic systematic methodological approach, as one tries to understand and pin down the design process. In that sense, the modular organization and a week-by-week structure of conventional university teaching cause the fragmentation of process during a design project by dividing out skills, theory, and design studio. This poses a danger for the practice to lose its rigor and integrity. Therefore, it is required for a learning environment to overcome this fragmentation that may occur in modular curriculum structures and take it into consideration when structuring the learning process (Tovey, 2015).

4.2. History of Studio-Based Design Education

It is a relatively recent phenomenon that design education has been accepted as an academic study that requires formal instruction in academia in order to achieve a level of capability to function as a designer and moved from the apprenticeship system taking place in workplaces to design studios in higher education institutions (Friedman, 2002; Lawson, 2005; Rowe and Wong Kwok-Kei, 2011; Tovey and Osmond, 2014). However, Green and Bonollo (2003) indicate that project-based teaching in the design studio of the modern day is consistent with Platonism. Plato's model of teaching encouraged a free, sociable, and informal means of discussion and exchanging knowledge, which had a humanistic discourse and was also followed by many schools in Italy in the late 15th century. Following the establishment of the French Academies by Jean Baptiste Colbert, a minister of Louis XIV, in order to standardize the French architectural education, François Blondel, who was a Platonist,

was appointed as the first professor and director of the Académie Royale d'Architecture by the King in 1671 (Green and Bonollo, 2003; Cunningham, 2005). The French Academies were influenced by the French rationalism and reasoning in architectural education; therefore, theory and practice were separated.

After the Académie had become unfashionable, the École des Beaux-Arts was established by Blondel in 1743, where students held discussions with professors in the mornings and had lectures on subjects, such as painting, sculpture, masonry, mechanics, and geometry in the afternoons. However, there was no studio system (Green and Bonollo, 2003). Blondel also visited significant buildings with his students to criticize them and make exercises to correct their faults twice a week in April and May (Cunningham, 2005). Following the classical atelier system of the Académie and having its basis on this method of Blondel's, the first appearance of the design studio, which aimed to improve not only artistic, but also analytical and structural thinking skills, has flourished at the École des Beaux-Arts in 1819 (Drexler, 1984; Pasin, 2017).

The studio-based education of those years, consisting of the analysis of the precedent and the application of reason, involved both part-time theoretical studies in the classroom and design by being employed in ateliers (Eigbeonan, 2013). In the curricular structure of the École des Beaux-Arts, there was both practical and formal education and the design studio was lateral, rather than being the central of education (Pasin, 2017). The practical education was similar to craft training and aimed to enable students to learn to work with different materials by giving form to them, whereas the formal education was focused on introducing theories and the problems of architectural form through observation, representation, and composition by drawing, painting, and model-making (Balamir, 1985). Cunningham (2005) lists the methodological characteristics of the École des Beaux-Arts as follows:

- division of students into ateliers run by a Patron;
- teaching of younger pupils by older students;
- the design exercise as the core of the educational programme;
- the beginning of design studies immediately upon entering an atelier;
- systematic resolution of design problems starting with the 'esquisse' (sketch design);
- development of a competitive spirit as a pedagogic tool.

The rapid technical developments in the late 19th century England led to the emergence of the Arts and Crafts Movement with an attitude of historicism and with the aim of reuniting arts and crafts, mechanization and individual expression (Cunningham, 2005). The separation of artistic conception and realization of that period had also started to provoke the discussion on the effectiveness of theory-based education vs. apprenticeship in learning (Green and Bonollo, 2003). Therefore, it was realized that a more experience-based education that reflects the real profession, relating theory and practice, in the studio environment was needed (Gropius, 1983). Influenced by the Arts and Crafts Movement, twelve artists and twelve industrialists founded an organization, "Werkbund", which aimed to bring arts, crafts, industry, and trade together in Germany in 1907 (Whitford, 1984). In the meantime, the rapid rise of mass-production caused design to be separated from making and resulted in the realization of the importance of designers' role in manufacture, which has also led to the realization of ID as a profession and the establishment of ID education (Green and Bonollo, 2003).

With the philosophy focusing on the strong relation among all disciplines of arts and crafts, the Weimar Bauhaus School was founded by Walter Gropius in 1918, which has brought a much broader and interdisciplinary perspective, integrating various branches of art and design and theoretical studies into practical studies in material workshops (Benton, Benton, and Sharp, 1975; Pasin, 2017). The Bauhaus has introduced the master-apprentice model in design education, focusing on learning by doing, and:

> *"the educational climate was anti-academic, anti-history, mistrustful of theory, based on practical experiments and conscious of social need" (Cunningham, 2005, p. 419).*

The focus of its pedagogy was to develop students' design skills, talents, and ability to unfold their creativity, imagination, and personal expression, rather than adopting the imitation and reproduction of models and/or patterns as a mode of instruction as it had been in the École de Beaux-Arts (Whitford, 1984; Balamir, 1985). It was also aimed to train students as new kind of collaborators for both the industry and the crafts, who are both competent in technology and form (Heskett, 1980). The curricular structure of the Weimar Bauhaus School consisted of (Salama, 1995):

- the *Introductory Course* – focusing on the basic knowledge of form, composition, and color by analytical drawing, painting, observation, and bodily performance;
- the *General Course* – implying various theoretical and technical courses introducing theoretical knowledge of space, color, composition, materials and tools, construction and representation, function, economy, aesthetics, and nature; and
- the *Architectural Course* – the design studio focusing on steel and reinforced concrete buildings.

In response to the changing value systems and the technological developments due to the Industrial Revolution, the only alternative approach to the formal design education in the École des Beaux-Arts was the Bauhaus in Germany and the Vkhutemas in Russia (Salama, 2016). Parallel with the intentions of the Weimar Bauhaus School, the Vkhutemas, which is considered as the "Soviet Bauhaus", was founded in Moscow in 1920 and had a dynamic and ideologically motivated educational program (Cunningham, 2005; Pyzik, 2015). Despite the distinctive approaches and the curricular structures of the École des Beaux-Arts, the Bauhaus, and the Vkhutemas, they share an important quality that they:

> *"placed considerable emphasis on the formal and technological aspects of architecture and form fundamentals and dynamics with little or no concern for social or cultural issues" (Salama, 2016, p. 11).*

Between 1930 and 1960, the curricular structures of both the École des Beaux-Arts and the Weimar Bauhaus School were followed in various countries (Pasin, 2017). Findeli (2001) points out Gropius's catch phrase, "Art and Technology: A New Unity", and the following models for design after the Weimar Bauhaus School, with a focus on the threefold "technology-art-science" structure in the curriculum (Figure 7).

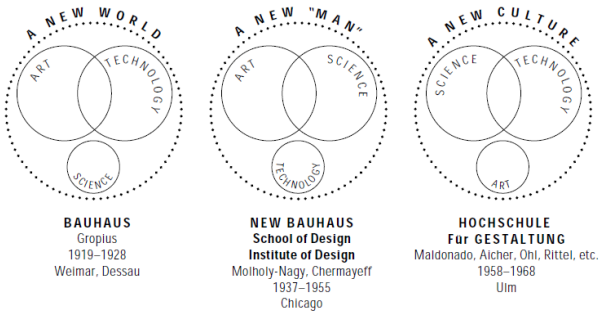

Figure 7. Three historical embodiments of curricular structures in design education (Source: Findeli, 2001).

The apprenticeship system provided a foundation for design learning, based on experience and experimentation in the design studio, in the service of industry back in the 1930s. Even though there are curricular and pedagogical differences in different geographies and education cultures, it still has its marks on today's signature design pedagogy (Whitford, 1984; Heskett, 1980; Cunningham, 2005). Signature pedagogies represent the best established teaching practices of a particular profession, but may result in rigidity and lack of responsiveness to changing contexts, when:

> *"they persist even when they begin to lose their utility, precisely because they are habits with few countervailing forces" (Shulman, 2005, p. 56).*

It is important to realize this inconsistency between changing situations and pedagogies, when it occurs, and consider it as an opportunity to re-examine these pedagogies. From this viewpoint, alternative approaches criticizing the traditional approaches intensified in the 1960s and 1970s and resulted in the emergence of alternative typologies and design studio teaching models with the intention to shape:

> *"a new design pedagogy that would commit itself to shaping and reshaping studio objectives and processes to be more integrated and inclusive" (Salama, 2016, p. 12).*

These explorations are now practiced worldwide and experiential learning, critical inquiry, process-based learning, community-based design learning, design-build, and live projects are among these alternative approaches and emerging paradigms in design education. They aim to explore what is beyond the educational practices within, across, and beyond the physical studio settings and focus on the richness, depth, and variety of human experiences. However, the design studio in many design schools around the world is either abstracted from the real life problems or directed towards the expectations of the industry (Pasin, 2017). Even though the design profession has expanded and evolved over the last 20 years due to social, economic, environmental, and technological developments, design education has not been as quick to adapt itself to these changes (Rowe and Wong Kwok-Kei, 2011). This brings about the need to improve the adaptability of the design studio further so as to meet the evolving demands of the profession and enable developing required skillsets in education.

4.3. The Concept of Design Studio

With the expansion of the profession and utilization of new tools, methods, and approaches in education, alternative learning environments with alternative pedagogical approaches have started to emerge to expand the limitations of the conventional (physical) design studio, such as the virtual design studio and live projects. These pedagogical approaches intersect with each other at certain points, as well as having distinct characteristics with their own strengths and limitations. It is also observed that there is a tendency to experiment alternative course structures using more than one of these approaches, sequentially or as a hybrid model (Asojo, 2007; Hart, Zamenopoulos and Garner, 2011; Niculae, 2011; Sara, 2011; Gül, Williams and Gu, 2012; Pak and Verbeke, 2012; Harriss and Widder, 2014; Saghafi, Franz and Crowther, 2014; Salama, 2014; Joklová and Pifko, 2015; Rodriguez, Hudson and Niblock, 2016).

4.3.1. Conventional (Physical) Design Studio

As a learning environment, the design studio conventionally implies a physical space, where design is taught. It is the core of design education since the Bauhaus period, where students gather and search for alternative solutions to a given design problem through a set of design principles and methods under the supervision of the instructor. It promotes problem-based and project-based learning, critical, creative, and pragmatic thinking, face-to-face interaction and feedback, and collaborative learning (Green and Bonollo, 2003; Lawson, 2004; Bridges, 2007; Gül, Williams and Gu, 2012; Rodriguez, Hudson and Niblock, 2016).

However, it is criticized for its dependence on the instructor's implicit understanding of design, personal experiences, skills, and specialties (Cross, 1982; Green and Bonollo, 2003; Lawson, 2004; Khorshidifard, 2011; van Dooren et al., 2014). The complexity, subjectivity, and the open-ended nature of the design activity brings other challenges for design students during education as well. Especially in their first year of their education, design students pay much more attention to the end product and fail to reflect on both their learning and design processes, since they do not have enough and/or any experience and lack in conceptualization and decision-making skills (Green and Bonollo, 2003; Lawson, 2005; McAllister, 2010). In addition to this, design students in the conventional design studio often lack practicing in real life situations,

where they apply both the theoretical and practical knowledge they acquire in courses (Green and Bonollo, 2003). Lawson (2005) states that it is assumed that design studios replicate professional design offices, but they are rather an artificial environment, where students work under the supervision of their instructors in a controlled environment and without any real problems that are encountered in the professional world. This causes detachment from the real world and exclusion of its richness in acquiring knowledge and skills (Jarrett, 2000; Rodriguez, Hudson and Niblock, 2016). Therefore, the spatial boundaries of the physical design studio may limit the intended flexibility and inclusiveness of the learning process (Webster, 2008).

4.3.2. Virtual Design Studio

The virtual design studio has emerged as an alternative design teaching and learning platform, allowing students to communicate and collaborate through synchronous/asynchronous digital tools and overcoming the geographical/spatial and temporal limitations of the physical design studio (Asojo, 2007; Schnabel, 2011; Pak and Verbeke, 2012; Krämer et al., 2015; Rodriguez, Hudson and Niblock, 2016). Structuring, managing, and transferring the information, knowledge, and course materials enable students to access them anywhere and anytime for collective understanding (Puntambekar and Young, 2003; Pak and Verbeke, 2012; Rodriguez, Hudson and Niblock, 2016).

However, there are opposing views on the effects of the virtual design studio on interaction, communication, engagement, and motivation. Despite its flexibility, accessibility, and potential for exploration and collaboration, design instructors are often resistant to incorporate virtual tools and environments due to the lack of face-to-face interaction (Meshur, Alkan and Bala, 2014). Some research studies argue that allowing too much freedom and the lack of face-to-face interaction, collaboration, feedback, and support from the instructor may reduce students' engagement and self-regulation in the learning process (Tuckman, 2007; Sun and Rueda, 2012). Other studies, on the other hand, promote the positive outcomes of using virtual tools and environments, such as supporting learning from other students, motivating collaboration, and improving the quality of group works through both synchronous and asynchronous activities in addition to face-to-face interaction (Pak and Verbeke, 2012).

The virtual design studio is also criticized for having technical and practical constraints, such as (Asojo, 2007; Niculae, 2011; Pak and Verbeke, 2012):

- lack of resources for large groups of students,
- software incompatibilities,
- system errors,
- difficulty of learning wiki syntax,
- irregular announcement updates,
- time consuming nature of scanning and uploading manual drawings,
- language and cultural barriers among participant learners, and
- time differences between different regions.

4.3.3. Live Projects

Live projects establish a link between the academy and the community/industry through field-experience the involvement of external collaborators in the learning process. They are based on practical learning experiences of students in real life situations, particularly in business, management, law, medical, and interactive media education, which has also started to be experimented in design education (Sara, 2006; 2011; Oxford Brookes University, 2012; Sheffield School of Architecture, 2013; Harriss and Widder, 2014; Meyer, 2014; Salama, 2014; Moylan, Gallagher and Heagney, 2016; Rodriguez, Hudson and Niblock, 2016). It is based on experiential and authentic learning approaches. Sanoff (2007) suggests that concrete experiences or field-experience approach to education are valuable to complement the abstract through non-formal experiences out of class as the core of learning. The action research method is acknowledged in live projects, combining theory and practice in the field. Students engage in real and tangible design problems in collaboration with real clients and/or users, rather than being imposed by the instructor. The involvement of external collaborators and higher possibility of implementation of their projects in real life help students develop a positive attitude towards the design projects. This increases the level of students' motivation, engagement, and interest in the learning process (Sara, 2011; Rodriguez, Hudson and Niblock, 2016). The spatial and temporal flexibility in live projects also allow students to become aware of the general rules and principles of their disciplines through field experience. They are more likely to acquire professional and personal skills of risk-taking, self-management, process-

management, interpersonal communication, collaborating with other people with diverse backgrounds, and both collective and self-assessment (Warren, 1995; Moon, 2004).

However, live projects require more careful time and resource management, greater administrative efforts, and increased control over the learning process compared to the conventional design studio. The complexity and unpredictability of the learning process and the changing role of the instructor, passing much of the responsibility to students and acting as a facilitator, a guide, a resource, and a support, sometimes cause resistance from design instructors (Sara, 2011; Anderson and Priest, 2012; Rodriguez, Hudson and Niblock, 2016). Some instructors see the relation of live projects and the conventional design studio as complementariness (Sara, 2011; Salama, 2014):

- reducing the dominance of the conventional design studio,
- integrating liveness within and across the boundaries of physical educational settings,
- allowing creative and critical reflection on real life experiences, and
- providing a wide range of teaching and learning opportunities.

Others, on the other hand, argue that both are valuable design pedagogies, but facilitate different skills, abilities, and competencies that are needed in different circumstances, such as risk-free and controlled environment versus complex and unpredictable conditions (Kirschner, Sweller and Clark, 2006).

The search for alternative approaches and learning environments for project-based design learning are important attempts to enhance design education. It is crucial to be aware that certain mediums, tools, environments, activities etc. may be more engaging and appropriate for certain types of learners with different abilities. From this viewpoint, being aware of the diversity of learning preferences and individual differences of students is of great importance for providing more effective learning opportunities.

4.4. Learning Process in the Design Studio

Given that the design studio as a learning environment has extended beyond the spatial boundaries of a physical space (virtual) and then evolved into the process itself (live projects), the learning process is examined on a conceptual level, independent of the

spatial connotations of the “design studio”, in this study.

4.4.1. Design Projects

Designing is a complex, personal, creative, and open-ended activity and skill, which has an unstructured process, that is related to different kinds of knowledge, developing a personal system of preferences, and using a specific 2D (sketching) and 3D (modelling) language (Schön interviewed by Goldhoorn, 1991). Learning this profession relies heavily on project work in a student-led process, taking places in social context and being about exploring and developing individual talent and creativity, in design education (Lawson and Dorst, 2009).

A design project is the structure of the learning process in design studio courses for students to exercise both practical and theoretical aspects of design (Teymur, 1993; Dorst and Reymen, 2004). A design project can be defined as a series of interrelated activities in a design process that has a start date and a deadline and that is usually carried out just for once (Vatansever Bayraktar, 2015). They often simulate a professional situation that the students may encounter after their graduation and are delivered by the means of a design brief (Rowe and Wong Kwok-Kei, 2011; Tovey, 2015). The process of a design project start with the introduction of project themes, involving the design problems to be tackled throughout the process and selected based on learning outcomes predetermined for that particular year of study and semester (T. Curry, 2014). Depending on the course hours, weekly schedule, and pedagogical purposes, there are one or more projects in a semester, the subjects of which are decided by the instructor and may involve design problems related to either more popular or recent issues, such as VR or wearable technologies, or more traditional subjects, such as seating or lighting units (D. Demirbaş, 2018).

The process starts with the introduction of projects and the distribution of a design brief. Then, it continues with the development of solutions for specific design problems, interaction between the instructor and students for feedback mostly during the weekly class hours, and evaluation by a jury consisting of academic staff and/or experts (Bender and Vredevoogd, 2006; Demirbaş and Timur Öğüt, 2018). This process is also defined as a process of generating alternative solutions by means of representation techniques, such as sketches, technical drawing, mock-ups, and computer-aided models, then selecting the most appropriate/satisfactory solution

among these alternatives, and finally creating an acceptable design/end product (Canbay and Polatoğlu, 2012). Throughout this process, students develop their own design understanding and strategies as reflective practitioners with a continual dialogue with the instructor and learn the verbal and non-verbal language of the actual professional practice in a reciprocal process in the design studio. This dialogue characterizes the learning process, throughout which the:

> *"learning and knowledge-building methods aim to balance the creative design process with a critical awareness of the more objective criteria necessary for project development as a whole" (Demirkan, 2016, p. 31).*

Considering design as a process brings about the need for the identification of its phases to make explicit how it is performed, which is a difficult task due to the nonlinearity and inseparability of these phases. According to van Dooren et al. (2014, p. 54):

> *"For experienced designers the process is not split up in separate steps and actions but the process is an undivided whole with automatic, unconscious steps, actions based on common practice or routine, and moments of reflection and exploration".*

The authors also distinguish five generic elements in the design process, which represent its main aspects, in order to make the design process more explicit in a more structured and clear way for students in design education (Figure 8):

1. *Experimenting* or *exploring* and *deciding*: It is a dialectical process of analyzing and associating, finding alternatives and finding criteria, testing and evaluating; a process of converging and diverging.
2. *Guiding theme* or *qualities*: It is the inspiring direction that one finds in the process of experimenting to hold on to during the design process and to create a coherent and consistent result.
3. *Domains*: The process of experimenting and finding guiding themes takes place in different domains, necessitating statements of the designer for each (e.g. space, form, material, site, function, and context etc. for architecture).
4. *Frame of reference* or *library*: It is the broader context that the design process is embedded and implies where all knowledge is stored (environment, books, and often designer's mind). They provide patterns, diagrams, rules of thumb, and

solutions to be used in experiments.

5. *Laboratory* or *(visual) language*: The design process has its own laboratory, in contrast to other disciplines, consisting of a visual language of sketching and modelling, which represents the mental process through externalization and reflection by different means.

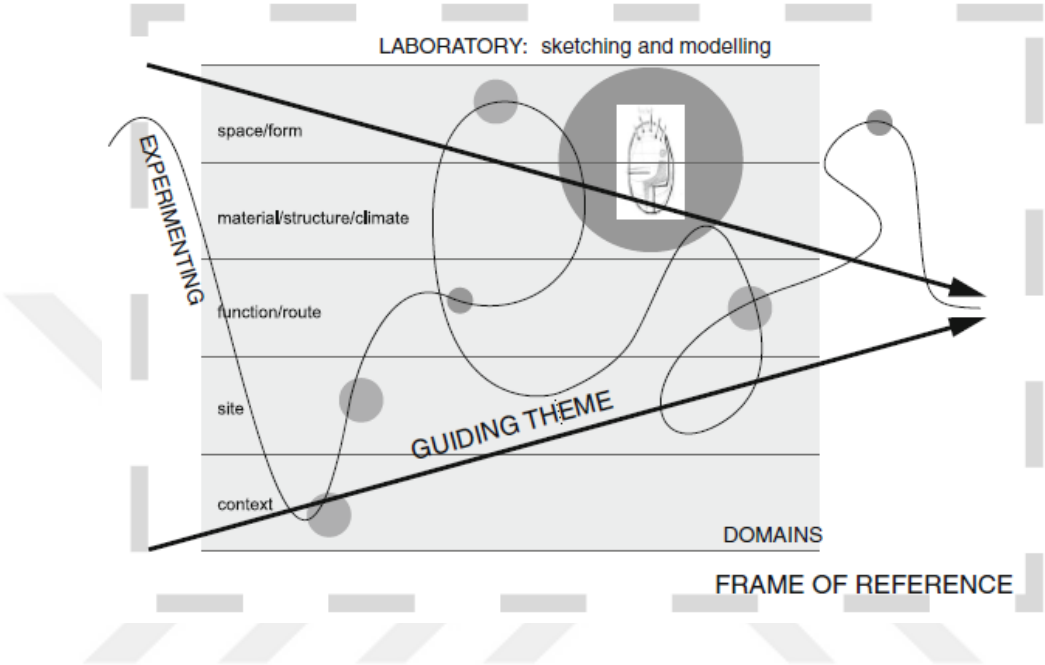

Figure 8. The five generic elements in the design process (Source: van Dooren et al., 2014).

Even though these generic elements are distinguished, they are neither separated from each other nor fixed in a step-by-step sequence. The sequence and the interrelation among the elements may differ and take different forms depending on the project, the designers, and the design discipline. Given that the design process has a personal aspect despite its general principles, PBDL is a learner-centered process by nature. The design process in each project is experienced by students from different aspects and under different conditions, while students witness the variety of their own design processes among the variety of projects (D. Demirbaş, 2018). For the individual exploration, understanding, and management of the design process in learning, design briefs and critiques are the two essential pillars of design projects.

4.4.2. Design Brief as a Learning Tool

Design activity conventionally starts with a design brief (Lawson, 2005). Sas and Dix (2009, p. 17) presents a clear definition and function of design briefs with academic

purposes:

> *"Design briefs represent concise descriptions of a required design task. The briefs offer information on the design problem and its context, and require engagement in creative problem solving activities with the purpose of providing solutions for the design problem. The key element of the design briefs developed for educational purposes, e.g. interaction design programmes, is the provision of just enough structure which should enable a strong focus on the design process and students' reflection on it, rather than on the design outcomes."*

In addition to the institutional (university, department etc.) and course-related information, a design brief in a design studio course generally involves the definition of the project, its aim, context, scope, method, duration, deadlines, timetable, resources, submission requirements, and assessment criteria etc. (Kapkın, 2010). In that sense, a design brief is a structured tool for communication between the instructor and students and functions as a contract, involving information that are unique to and required for the process. Students need the time, space, and structure to immerse in a design brief, which is usually based heavily on studio activities, to enhance their creativity and problem-solving abilities (Tovey, 2015). The instructor often fits design projects into the course timetable and conducts the process in a controlled and straightforward manner, following the design brief (Rowe and Wong Kwok-Kei, 2011). The temporal and spatial limitations of design projects and briefs are often dependent on various factors, such as the university's academic calendar, context and scope of the project, expected outcomes, and the targeted number of projects in the semester (D. Demirbaş, 2018). However, there is a need for reconsidering the delivery and structure of design briefs. Canniffe (2011) suggests to provide students with greater opportunities to work on complex projects that would challenge their comfort zones and with complex briefs that are situated in and outside of the physical design studio, especially in their senior years, in order to help them develop wider range of skills to work within a global context.

4.4.3. Critiques as a Feedback Mechanism

With the aim of applying them to liberal arts, Schrand and Eliason (2011) study feedback practices in the design studio and refer to this feedback mechanism as the

typical character of the design studio pedagogy. This feedback mechanism is an important part of acquiring knowledge and skills in design education. It involves a process of interaction and communication, which is characterized as *critiques*. The critique process is a two-way interaction, which involves (Schön, 1987; Brusasco et al., 2000):

- the instructor's representation of the necessary knowledge by analyzing each student's abilities and way of understanding in order to develop representation strategies accordingly, and
- the student's effort to understand the instructor by learning the necessary terminology and way of thinking.

Critiques are important to point out problematic situations in the design process to solve and/or develop them further, while challenging the student's capacity and design ability with the intention to expanding them. Both the instructor and the student reflect on each other's ideas, works, and feedback during the process. Schön (1987) defines this critique process with two interacting ways: (1) telling and listening, (2) demonstrating and imitating. This a reciprocal reflective process, during which the instructor (*transmitter*) tells and demonstrates what is believed to be important for the student to point out in the design process and the student (*receiver*) reflects on the critique by listening and imitating. Then, the instructor becomes the receiver, listening and criticizing, as the student tells and demonstrates the work. Ö.O. Demirbaş (2001) illustrates this process as below (Figure 9):

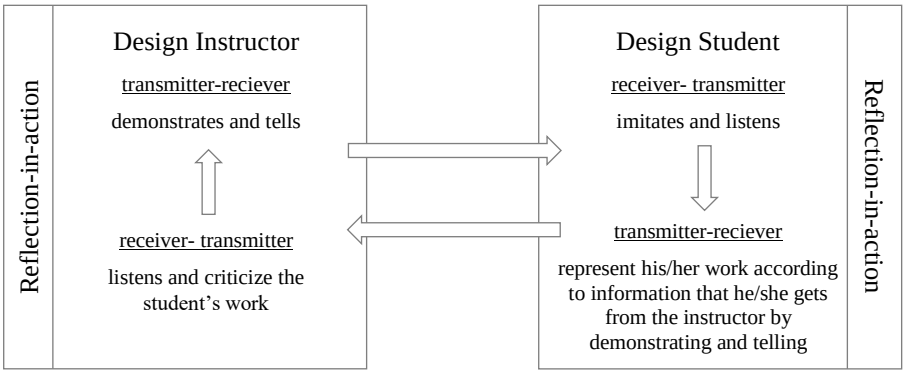

Figure 9. Critique process between the instructor and the student (Source: Ö.O. Demirbaş, 2001).

Critiques are roughly in the form of (weekly) desk critiques and end-of-semester (final) jury reviews, involving public performances and private conversations, providing oral

feedback and facilitating multiple synchronous experiences for students and instructors (Schrand and Eliason, 2011). These processes may consist of different forms of interaction: one-to-one interaction, group interaction, and jury session (Figure 10).

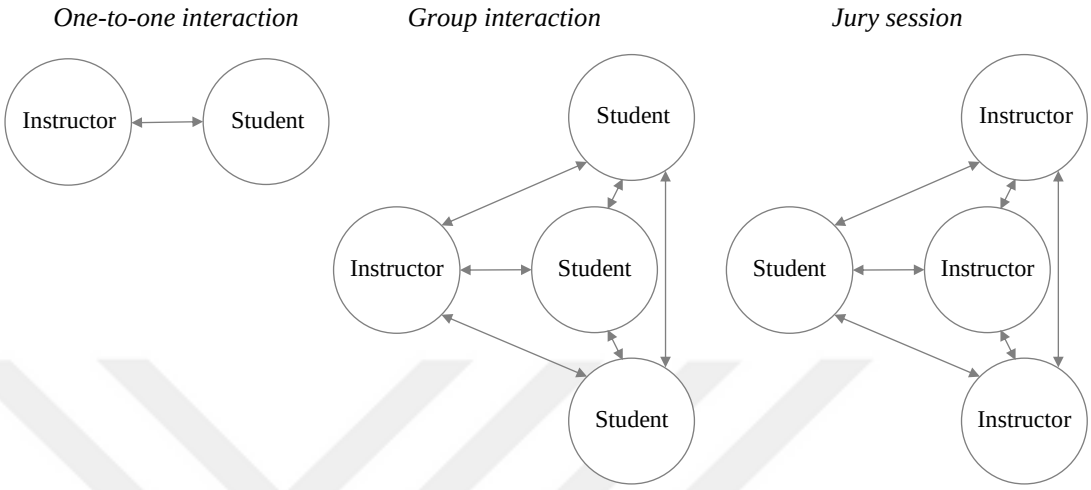

Figure 10. Different forms of interaction within the design studio (Source: Demirbaş, 2001).

Schrand and Eliason (2011, p. 60) state that, in these feedback practices:

> *"Design work is generally presented in a visual medium, which can make it quicker to comprehend and assess and easier for multiple people to experience the same piece of work simultaneously. The visual nature of the work also lends itself better to oral feedback, since details can be pointed to, and because observations can be clarified if they are not initially understood."*

The educational value of design critiques is acknowledged, since they serve as a means of feedback on students' progress on design and a socializing function, as well as helping students understand the content and the principles of design and learn to communicate like a designer (Dannels, Gaffney and Martin, 2008). In that sense, design critiques are important for providing experiences to students to think and act as a professional by relating themselves to who they are presenting to and practicing the necessary skills they acquired. Despite the pedagogical aspects of critiques, how feedback practices function in the learning process is criticized. These criticisms point out that critiques do not function effectively in terms of students' demonstration of

their understanding of the context of design, particularly in juries, during which students focus on doing well during their presentations and do not approach it as an educational experience that may support their design conceptualization or reflect on their learning honestly (Percy, 2004; Webster, 2007; Schrand and Eliason, 2011). It is argued that design juries are an initiation ritual and a hegemonic display of the power of the design profession that have shortcomings in investing in the learning performance of students (Webster, 2007). In order to overcome this hegemonic aspect of juries, Webster (2007) suggests a more supportive, collaborative, and dialogical learning environment, wherein students can be more reflexive, and proposes a few events for assessment replacing ineffective design juries:

- Exhibitions to a variety of audiences to enhance collaboration, presentation, and communication skills;
- Special tutorial days with invited relevant academic or non-academic people to enhance functional knowledge, critical reflection, and communication skills;
- Peer reviews in small groups to enhance critical reflection;
- Self-evaluation exercises to assess individual level of achievement and own design work to enhance critical self-reflection and self-management; and
- Post-portfolio assessment tutorials providing instructors' verbal feedback on individual student performance to enhance critical reflection.

Despite the characteristics of PBDL that are mostly similar in all design fields, ID education has its unique aspects that shape the general curriculum based on the requirements of the profession. Since the study within the scope of this dissertation is concerned with ID education in Turkey, the relevant literature is presented in the next chapter.

4.5. Project-Based Design Learning in Industrial Design Education

The scope of industrial design (ID) is mainly considered to be the aesthetical and functional aspects of three-dimensional products, including product characteristics such as form, color, texture, usability, user interaction, emotional and technical aspects. Even though they are indeed within the scope of the profession, ID has extended beyond designing three-dimensional products and giving shape to products or technologies. It rather expands in six key growth areas suggested by Kiernan and Ledwith (2011): design-led innovation, strategic design, interaction/user experience

design, service design, transformation design, and product service systems design. Therefore, different design fields have started to overlap, which has brought about the need for several approaches and methods to adopt within those growth areas, including but not limited to user-centered design, participatory/co-design, inclusive design, design for sustainability, and interdisciplinary/multidisciplinary teams. This holistic approach that the profession necessitates requires industrial designers to be educated accordingly in order to attain key competencies and keep up with the changes in the profession.

4.5.1. Industrial Design as an Academic Discipline

ID education has been adapting itself to the rapid transition in the highly competitive and complex professional world with a PBDL pedagogy in order to meet the needs of the profession by training designers, who are not only experts in their domain, but also good communicators, critical thinkers, skilled team members, and lifelong learners (Yang, 2010). Therefore, in order to have a comprehensive understanding of the learning process in ID education, it is important to delve into ID as an academic discipline, starting with the definition of ID and presenting an historical overview of ID education both in Turkey and in the world and its general curricular structure.

4.5.1.1 Definition of Industrial Design

Simon (1982, p. 129) defines design as to:

> *"[devise] courses of action aimed at changing existing situations into preferred ones".*

The term "design" is used in various disciplines, such as art, engineering, science, and architecture, in different meanings, which often refer to an entire process with an outcome, such as a pleasing artwork, object or an effective plan, system or a device with a particular form and/or function (Friedman, 2000; Domermuth, 2009). Similar to other professional design fields, design is the central activity of ID as well, which concerns with the combinations of art, science, and technology and requires good problem-solving and communication skills during educational and professional practices (Loy and Canning, 2013; NASAD, 2017).

ID is a bridge between user requirements, business interests, and professions that are involved in the technological development of goods and services (Rusten and Bryson,

2010; WDO, 2017). The term "industrial design" is used as a wider term than "product design", which is considered only a part of ID that offers what the product-focused ID was expected to offer in its early years, in some design communities, whereas both terms are used interchangeably in others (Karamanoglu, Bardil and Prior, 2007). It is also observed that "industrial design" is a more preferred term in the US, where the term originated, whereas "product design" is more commonly used in Europe.

The needs, preferences, and expectations of users have been essential in product development in recent years. However, most products were produced and sent directly to the marketplace during the early years of Industrial Revolution until the 1920s, when ID has started to establish itself as a formalized profession (Rusten and Bryson, 2010). Buchanan (2001, p. 5) state that:

> *"As the new liberal arts of western culture took shape in the fourteenth, fifteenth, and sixteenth centuries, design was not included, except in the general work of architecture and the fine arts. Design as we have understood it in the twentieth century was then regarded as a servile activity, practiced by artisans who possessed practical knowledge and intuitive abilities but who did not possess the ability to explain the first principles that guided their work."*

Then, ID has emerged as a profession that is separate from craft-based production. Heskett (1980, p. 10) defines ID as:

> *"a process of creation, invention and definition separated from the means of production, involving an eventual synthesis of contributory and often conflicting factors into a concept of three-dimensional form, and its material reality, capable of multiple reproduction by mechanical means".*

The ability for reproduction and the separation of form-giving and production differentiate ID from the crafts in the sense that giving shape to a product takes place before the actual making of the product, which can be repeated multiple times. Therefore, there is a sequence of actions for research, analysis, synthesis, form-giving, and production, which characterizes the design process in general. Rusten and Bryson (2010, p. 5) also state that:

"Gemser and Leenders (2001) define industrial design as the activity that transforms a set of product requirements into a configuration of materials, elements and components that comprise an artefact. Industrial design is part of the wider process of product development. This includes R&D activities undertaken by engineers that revolve around product creation, product testing and development and the interface with manufacturing production systems, as well as engagement with market research and marketing."

Industrial designers were once concerned primarily with three-dimensional objects and their internal functioning and visual forms to express that function. However, they now seek ways for (Buchanan, 1995, p.11):

"new avenues of exploration by thinking about material objects in the context of signs, actions, and thoughts,...asking new questions about how products function in situations of use and how they may contribute to or inhibit the flow of activities,...exploring material objects as part of larger systems, cycles, and environments,..."smart" products, virtual reality, artificial life, and the ethical, political, and legal dimensions of design."

Therefore, ID is more than a form-giving activity that only concerns with the aesthetic appearance of products. Standards and regulations, industrial specifications, ergonomics, safety, environmental, and social issues, as well as universal principles, cultural, and geographical dimensions of design, are of great importance (Rusten and Bryson, 2010). It concerns with all aspects of a product, such as materials, production processes, business strategy, aesthetics, commercial, social, environmental, and economic aspects as well (Heskett, 1980). Therefore, the role of an industrial designer is to develop and implement creative solutions towards problems that are not only related to form, function, usability, and ergonomics, but also to marketing, brand development, sustainability, and sales etc. (Noblet, 1993). Due to these broad responsibilities, the collaboration between industrial designers and professionals from other disciplines and/or experts from other departments within a company is crucially important. ID products are often developed by multidisciplinary teams from the beginning to the end of the product development process in order to bring the knowledge of designers, management, technicians, and marketing people, as well as

other collaborators, together (Rusten and Bryson, 2010).

Similarly, Yang (2010) points out that industrial designers are expected to participate in strategic planning, innovative product development, and interdisciplinary collaboration beyond focusing on form and aesthetics. Industrial designers are professionals, who:

> *"create and develop concepts and specifications that optimize the function, value, and aesthetics of products, environments, systems, and services for the benefit of user, industry, and society" (NASAD, 2017, p. 122).*

Yang, You and Chen (2005) also indicate that the industry favors the perception and solution to problems, creative thinking, curiosity, and motivation over the traditional design professional skills.

In parallel with these evolving expectations from the discipline and industrial designers, the most recent and extended definition of ID is provided by the World Design Organization (WDO) (formerly the International Council of Societies of Industrial Design [ICSID]) (WDO, 2017):

> *"Industrial design is a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences. Industrial Design bridges the gap between what is and what's possible. It is a trans-disciplinary profession that harnesses creativity to resolve problems and co-create solutions with the intent of making a product, system, service, experience or a business, better. At its heart, Industrial Design provides a more optimistic way of looking at the future by reframing problems as opportunities. It links innovation, technology, research, business, and customers to provide new value and competitive advantage across economic, social, and environmental spheres."*

Whether it is a product, service, or experience design, the ID process is iterative, which is similar to that of other design fields. Empathy is an essential part of this process in order to understand the user within a particular design context. For instance, industrial designers design products not only for humans "of all races, ages, demographic, social

status or ethnicity", but also for animals (IDSA, 2019). Moreover, industrial designers work with sketches, renders, 3D models, mock-ups, and prototypes to ideate solutions and develop concepts. By testing models and prototypes, design ideas are refined based on the feedback that is received from the user and/or experts in terms of the product's functionality, usability and/or manufacturability. Lastly, industrial designers collaborate with other experts "to bring their ideas to life through production, fulfillment, and marketing" (IDSA, 2019).

Regarding the abovementioned necessities in the profession, it is important to adopt a curriculum in ID education that focuses on training lifelong learners and good team members, who are competent, critical, creative, enthusiastic, and capable of dealing with uncertain, complex, and challenging situations in their professional lives.

4.5.1.2 History of Industrial Design Education

ID emerged both as a profession and as an academic discipline in the Western countries long before it did in Turkey. Even though it has continued to change and evolve in its own pace in different geographies, there are still both similar and different approaches and practices in education.

Industrial Design Education in the World

The rapid rise of mass-production during the Industrial Revolution, ID has declared itself as a separate design profession, with a significant role in manufacturing. It brought about the need for education particularly for training competent industrial designers. The historical progress of ID education mainly followed the Bauhaus, which is one of the most influential design schools of the 20th century (Green and Bonollo, 2003). Many of the acts of design, especially the physical acts, have been rooted in the craft practice and guild tradition. Therefore, the educational tradition of ID first started in the apprentice tradition of the art and craft guilds and then in the schools for craft or art, some of which became the schools of art and design afterwards (Friedman, 2000; 2002). Whereas design education remained in independent schools or art and design especially in Europe, it moved to departments of art and design under the faculties of applied arts, architecture, or engineering at universities especially in North America (Friedman, 2000; 2002). However, the discrepancy is that design education in recent years has neither the tradition of craft guilds nor the research tradition of universities and that it does not fit the rational objectivity of higher education

(Friedman, 2002; Wang, 2010).

In addition to the Bauhaus, there were also some seminal design schools in the US that shaped ID education and served the establishment of the ID profession. The Carnegie Technical College that first started ID education in 1935-1936 and Pratt Institute of Art in New York in 1936 (Green and Bonollo, 2003). Whereas more logical and systematic design methods were the trend in the 1950s and more transparent and analysis-based structure of design was favored in the 1960s and 1970s, the design educators of that period failed to adopt and integrate those new design methods in studio teaching. In the 1980s, the ID studio did not have any significant difference in terms of its structure, compared to the Bauhaus and the other schools in the US. However, different aspects of design, such as sustainability, usability, cultural issues, and emphasis on product quality, started to become the central considerations in design studio projects. By the 1990s, the design studio had become the melting pot of many considerations, setting the professional requirements of that period.

Besides the US and Europe, ID education has gone through a great transformation in newly industrializing countries, such as Taiwan, South Korea, and China (Çakıroğlu Başar and Ülkebaş, 2011). Especially China stands out with the trend towards diversifying ID education in order to train design professionals at different levels (Sheng, 2011):

- Design professionals of basic design and applications with comprehensive design knowledge, skills, and competencies for innovative potential,
- Design strategists, having a science, engineering, or other professional background, with a vision and talent in both design and management for scientific and technological innovation, market development, and industrial planning,
- Design professionals, capable of in-depth research and development, for exploring cultural resources and applying high-end technologies to accelerate creativity and innovation in the pursuit of cultural heritage and development.

Therefore, ID education has gone through different transformations in different nations. It has been either based more on art or technology and either taught in separate art and design schools or incorporated as departments in architecture, design, or engineering faculties (Friedman, 2000; 2002; Er, Korkut and Er, 2003; Çakıroğlu Başar and Ülkebaş, 2011), which is also similar to the case in Turkey.

Industrial Design Education in Turkey

The first initiatives of ID education were started in the late 1950s and 1960s in Turkey. These initiatives were within the Marshall Aid Program, which aimed to improve the craft products in Turkey and increase their market potential in advanced markets (Er, Korkut and Er, 2003). With the financial support of the Ministry of Education, the State School of Applied Fine Arts (Devlet Tatbiki Güzel Sanatlar Yüksek Okulu [DTGSYO], later named Marmara University) was founded in Istanbul in 1957, which introduced the first "basic design" education, following the Bauhaus tradition and providing education in collaboration with German educational institutions (Şatır, 2006; Irkdaş Doğu, Timur Öğüt and Er, 2015). With an international support, the first ID course was offered in the Department of Architecture at the Middle East Technical University (METU) in Ankara in 1969. The course was offered by industrial designer David K. Munro, who had come to the university to establish an ID department within the faculty (Er, Korkut and Er, 2003). Then, the first ID departments were established within the architecture faculties at the METU and later in the State Academy of Fine Arts (DGSA, later named Mimar Sinan Fine Arts University), which was mainly concentrated on art education in the 1970s (Er, Korkut and Er, 2003; Çakıroğlu Başar and Ülkebaş, 2011; Irkdaş Doğu, Timur Öğüt and Er, 2015). Even though there was not an independent ID department at the DTGSYO until 1985, the school had placed strong emphasis on handicrafts and design for industrial purposes to train experts, which resulted in providing ID education as a part of all departments at the school until then (Şatır, 2006). Due to the liberalization of the Turkish economy and the impact of the European Union, the importance of ID started to increase in the 1990s (Er, 2009), followed by an increase in the number of ID programs at universities, especially starting from 1995, with a 525% growth rate between 1995-2014 (Irkdaş Doğu, Timur Öğüt and Er, 2015).

Both "industrial design *(endüstriyel tasarım)"* and "industrial product design *(endüstri ürünleri tasarımı)*" are used in the name of the departments in Turkey. There is no difference in the structure of these departments, yet "industrial design" is the generally accepted term around the world (Enşici, 2016). There are currently 129 state and 72 foundation universities (201 in total) in Turkey (YÖK, 2019). 36 of these universities offer an undergraduate ID program, but currently, only 29 of them accept new entries (ETAK, 2019) (Table 2). Whereas the majority of the universities are state universities

in Turkey, ID programs are offered mostly at foundation universities. The dominancy of foundation universities in ID education may be related with the limited budgets and funding of state universities (Irkdaş Doğu, Timur Öğüt and Er, 2015). Since foundation universities have different funding structures independent from state resources, they are more likely to provide sufficient facilities, including both physical and non-physical requirements, and keep up with the technological improvements in education.

As shown in Table 2, the departments are located within different faculties: architecture; architecture and design; fine arts; fine arts and design; fine arts, design, and architecture; art and design; art, design, and architecture; engineering and architecture. Despite the diversity of faculties offering an ID program, there are mainly two educational traditions, based on either art or science, but the general approach is similar in their curricula. This difference in the educational tradition often appears in the application of course contents, changing from one departmental approach to another (Çakıroğlu Başar and Ülkebaş, 2011). It is also seen in the student acceptance criteria. Whereas some ID departments have accepted students based on the national central examination conducted by the Student Selection and Placement Center (ÖSYM), some of them used to make an aptitude examination, which was:

> *"performed individually by each department to evaluate candidates' skill levels to an expected degree and therefore is characteristic to each department" (Irkdaş Doğu, Timur Öğüt and Er, 2015, p. 45).*

Due to the amendment made by YÖK, the entrance examination was standardized for all ID departments in 2015, but the Marmara University and Mimar Sinan Fine Arts University rejected and continued to apply aptitude examination until 2017 (Enşici, 2016). Since then, all universities accept entries based on students' scores in central examination.

Table 2. Universities offering undergraduate ID programs in Turkey (Source: ETAK, 2019).

	Name of the University	Name of the Department	Name of the Faculty	Number of Undergraduate Students	Year of Establishment	First Academic Year of Student Acceptance	Language of Instruction	City
1	Atılım University	Industrial Product Design	Fine Arts, Design, and Architecture	110	2009	2009-2010 Fall	TR	Ankara
2	Bahçeşehir University	Industrial Product Design	Architecture and Design	187	2008	2008-2009 Fall	EN	İstanbul
3	Beykent University (en) Beykent University (tr)	Industrial Product Design	Engineering and Design	99 130	2012	2012-2013 Fall	EN TR	İstanbul
4	Bilecik Şeyh Edebali University	Industrial Product Design	Fine Arts and Design	221	2013	2013-14 Fall	TR	Bilecik
5	Doğuş University	Industrial Product Design	Art and Design	129	2005	2005-2006 Fall	TR	İstanbul
6	Eskişehir Technical University (Anadolu University)	Industrial Design	Architecture and Design	455	2000	2000_2001 Fall	TR	Eskişehir
7	Gazi University	Industrial Product Design	Architecture	305	2008	2012-2013 Fall	TR	Ankara
8	Haliç University	Industrial Product Design	Architecture	116	2005	?	TR	İstanbul
9	Işık University	Industrial Design	Architecture and Design	75	2007	2007-2008 Fall	TR	İstanbul
10	İstanbul Aydın University	Industrial Product Design	Architecture and Design	138	2013	2013-2014 Fall	TR	İstanbul
11	İstanbul Bilgi University	Industrial Product Design	Architecture	192	2011	2011-2012 Fall	EN	İstanbul
12	İstanbul Medipol University	Industrial Product Design	Fine Arts, Design, and Architecture	?	2015		TR	İstanbul
13	İstanbul Okan University	Industrial Product Design	Fine Arts	54	2007	2007-2008 Fall	TR	İstanbul

Table 2. (continued)

14	İstanbul Şehir University	Industrial Design	Architecture and Design	?	2018		EN	İstanbul
15	İstanbul Technical University	Industrial Product Design	Architecture	294	1989	1993-1994 Fall	EN	İstanbul
16	İstanbul Ticaret University	Industrial Design	Architecture and Design	19	2014	2014-15 Fall	TR	İstanbul
17	İzmir University of Economics	Industrial Design	Fine Arts and Design	121	2004	2005-2006 Fall	EN	İzmir
18	Kadir Has University	Industrial Product Design	Art and Design	97	2004	2004-2005 Fall	EN	İstanbul
19	Karabük University	Industrial Product Design	Fine Arts and Design	318	2012	2012-2013 Fall	TR	Karabük
20	Marmara University	Industrial Product Design	Fine Arts	173	1985	1985-1986 Fall	TR	İstanbul
21	Mimar Sinan Fine Arts University	Industrial Product Design	Architecture	294	1971	1971	TR	İstanbul
22	Ondokuz Mayıs University	Industrial Product Design	Fine Arts	24	2018	2018-2019 Fall	TR	Samsun
23	Middle East Technical University	Industrial Product Design	Architecture	262	1979	1979-1980 Fall	EN	Ankara
24	Özyeğin University	Industrial Product Design	Architecture and Design	164	2013	2013-2014	EN	İstanbul
25	Selçuk University	Industrial Product Design	Fine Arts	90	2013	2013-2014 Fall	TR	Konya
26	TED University	Industrial Design	Architecture	27	2018	2018-2019 Fall	EN	Ankara
27	TOBB University of Economics and Technology	Industrial Design	Architecture and Design	124	2009	2009-2010 Fall	TR	Ankara
28	Yaşar University	Industrial Design	Art and Design	111	2010	2010-2011	EN (30%)	İzmir
29	Yeditepe University	Industrial Product Design	Architecture	255	1996	1997-1998 Fall	EN	İstanbul
			Total Number of Students	**4584**				

*Only the departments that currently continue to accept students are included in the table.

4.5.1.3 General Curricular Structure of Industrial Design Education

Industrial designers engage in various aspects of design in the professional world, such Industrial designers engage in various aspects of design in the professional world, such as design research, new product development, improvement of existing products, aesthetic appearance of products, and UX/UI. However, all aspects are taught in education in order to enable students to be equipped with foundational design knowledge, acquire competency in all, and explore what they are good at or passionate about. In that sense, industrial/product design programs are often similar to each other in terms of their curricular structures, even though some schools are specialized more in one particular aspect of design or more. The programs offer Bachelor of Industrial Design, Bachelor of Science, Bachelor of Arts, or Bachelor of Fine Arts. Domermuth (2009, p. 2) state that all of these programs start with providing a series of courses focusing on design foundations, which:

> *"...present a litany of topics such as: drawing, painting, visual literacy, two-dimensional design, structural elements of art, the principles of visual organization, the psychological effects of visual decision making, color theory, historical/psychological aspects of design, principles of three dimensional design, and design vocabulary. Subsequent courses specialize in drawing, graphic design, digital imaging, web page development and manipulation, one or more courses covering Materials and Process, Computer Aided Drafting and Design, and a series of Studio courses specializing in product development."*

ID has a tangible character that requires interaction with and communication through physical 3D models, prototypes, objects etc., which is observed throughout the design process. The physical act of making has also been a focus in design disciplines rooted in the craft practice and guild tradition (Çakıroğlu Başar and Ülkebaş, 2011). Despite the accelerating importance of social and behavioral sciences and the increasing use of technology in design practices and education, direct contact with the material is still an important part of the design process and is a supplement for the digital (Norman, 2010; Milincu and Feier, 2015). This physical contact with the material and act of making necessitate active engagement in the process, which is an important part of learning design.

In ID education, students engage in diverse learning activities, including research, conceptual thinking, creative problem solving, visual language, project presentation, modelling, and relevant technical instruction (Rutgers, 2015). It combines two opposites, *art* and *engineering*,:

> *"with a constantly shifting viewpoint, requiring left brain to adopt this approach and develop strategies and right brain to map, plan, and apply problem solving techniques to complex situations" (Loy and Canning, 2013, p. 103).*

It requires varied abilities and skills for ensuring lifelong learning (Norman, 2010; Coorey, 2016; WDO, 2017). International Council of Societies of Industrial Design-ICSID (WDO at present) suggests that there are three categories of competency that should be provided in a comprehensive ID education program (Çakıroğlu Başar and Ülkebaş, 2011):

- *Generic attributes* – problem solving, adaptability to rapid changes;
- *Specific industrial design skills and knowledge* – design methodologies, visualization skills and knowledge, knowledge of product development processes; and
- *Knowledge integration* – strategies of system integration.

In order to ensure a competency and quality standard in curriculum, accreditation of educational programs is important. Whereas there is no accrediting body in Turkey for the accreditation of ID programs, there are several bodies in the world (ETAK, 2019):

- *National Association of Schools of Arts and Design (NASAD), USA*: Accreditation of arts and design schools in the US; providing substantial equivalence for schools, providing education in English, outside the US.
- *Agency for Quality Assurance (AQAS), Germany*: Independent agency with no specialized field; accreditation of both national and international schools.
- *Chartered Society of Designers (CSD), Course Endorsement Programme (CEP), England*: Accreditation of both national and international schools; low number of accredited schools by the body; assessment in three stages: CSD Validated Course, CSD Recognised Course, and CSD Accredited Course.

Among these accrediting bodies, NASAD (2017), which is widely accepted around the world, provides the basic criteria for ID education and sets specific standards and guidelines for ID programs:

- *Curricular structure*; enabling students to develop knowledge, skills, and competencies required to practice in the professional field.
- *General studies*; ranging from physical and natural sciences, the social and behavioral sciences, quantitative reasoning, and the humanities to enable students to make connections among these disciplines and their work in industrial design.
- *Essential competencies, experiences, and opportunities*; including but not limited to the foundational understanding of how products work, ability to use technologies and tools, fundamental knowledge of user- and usability-related studies, collaborative skills, business practices, verbal and visual communication skills, critical thinking etc. to be able to apply them in practice.

Even though ID education has been influenced by social, environmental, economic, and technological changes, it still focuses on transferring the necessary skills, mindsets, attributes, and knowledge to educate competent designers. Therefore, whereas design foundations and basic design skills are still an essential part of education, the abovementioned standards and guidelines aim to guide educational institutions to improve their curricular structures in relation to the expanding definition of the term "industrial design" and recent requirements of the professional world.

4.5.1.4 Implications for Industrial Design Education

There are some future trends in higher education of the 21st century that ID education should adapt itself to their formal requirements: provision of mass-education and rationalization; increased links between education and research; globalization and internationalization; and intensification of collaboration with industry and commercialization of research (Liem and Sigurjonsson, 2011). In relation to these future trends, the role of the designer is being an intelligent maker, knowledge worker, sustainable entrepreneur, and active citizen, who concerns about environmental, societal, commercial, and communication issues (Press and Cooper, 2003). Regarding this, ID students are expected to develop varied professional and personal skills for lifelong learning in order to adapt to the changing demands of the profession in time, rather than to follow a set of procedures that will soon vanish (Lawson, 2005; Coorey,

2016). This necessitates a transition from the traditional ID education that is centered around the knowledge of forms, materials, and visual representation skills towards newer approaches, valuing applied social and behavioral sciences, human cognition, and emotions etc., in order to train competent designers, who are capable of working across disciplines (Norman, 2010). Buchanan (2004) indicates the importance of working closely with experts from other disciplines, such as cognitive psychology, engineering, computer science, anthropology, drama, rhetoric, and marketing. This ongoing transition requires multidisciplinary knowledge in the design profession and education. Kiernan and Ledwith (2011) emphasize that it is not possible to mold a student to be capable in all design fields, but it is rather possible to teach transferable skills. However, even though there is a consensus on the need for a change, it is not a quick transition. For instance, a research conducted by Çakıroğlu Başar and Ülkebaş (2011) shows that ID education in Turkey does not correspond with the requirements of the interdisciplinary design paradigm yet, despite the 40 years of history of ID education.

Moreover, the transfer of tacit knowledge is a critical issue in design education, which is both related with teaching and learning. Durling, Cross and Johnson (1996, p. 1) state that:

> *"where teaching and learning styles do not match, there may be cognitive dissonance leading to poor knowledge transfer".*

Therefore, the changing, blurring, and expanding boundaries of the profession require a more adaptive approach in ID education, which is suitable for all students.

4.5.2. Design Studio as an Experiential Learning Process

Kolb's ELT (Kolb, 1984) suggests that learning occurs when the learner grasps and transforms an experience, i.e. the unconscious experiencing turns into consciousness and inner reflection transforms into action. In design learning, the experience is transformed into a design work during a project. Rasanen (1999, p. 198) states that:

> *"The form of material transformation may be anything between a small drawing and a community-based art project, but it cannot be realized without the process of mental transformation where perceptions and feelings, facts and ideas, skills and expression are integrated".*

Even though the author is concerned with art learning, it is similar to a considerable extent in PBDL as well.

Design is based on a continuous process of doing and making explicit, which is directly related with individual experiences that form the basis of learning, as Kolb (1984) describes. Van Dooren et al. (2014, p. 55) state that it is:

> *"about acquiring habits and patterns that are mostly implicitly used by an expert designer. As a student you learn by doing and by becoming aware of how to do it. The learning process arises from largely implicit knowing and acting, includes making explicit and becoming aware, and results again in largely implicit knowing and acting.".*

Designers explore various ways of thinking about design problems and alternative ways to arrive at a design solution, a deeper understanding of the problem, and the best way to the solution occurs (T. Curry, 2014). Similarly, Schön (1983) describes the iterative and cumulative process of design, involving wicked problems that can only be understood in the process of solving them. He describes design as a process of framing a problem, performing moves to find a solution, and evaluating these moves that result in a deeper understanding or new ways of seeing of the design problem, which leads new frames and new moves. This process of gaining a deeper understanding through projects in the design studio is *learning in the act of designing*.

Based on Kolb's learning cycle, Beckman and Barry (2007, pp. 25-26) examine a generic innovation process and suggest a model (Figure 11), evolved through design and learning, that can be applied to:

> *"the design and development of both hardware and software products, to the design of business models and services, to the design of organizations and how they work, and to the design of the buildings and spaces in which work takes place, or within which companies interact with their customers."*

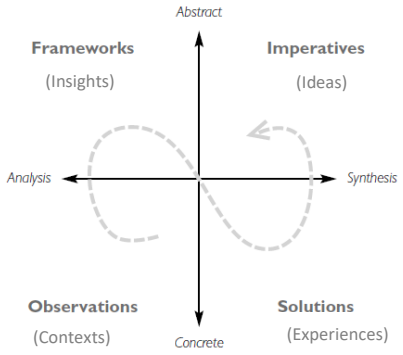

Figure 11. Model for innovation process based on Kolb's learning cycle (Source: Beckman and Barry, 2007).

The authors point out that rapid iteration between observation and solutions, i.e. express test cycle, has become popular in many engineering-driven organizations, which remain in the *concrete realm* of the innovation process. Even though this approach uncovers many use and usability needs well, it fails to discover the higher level meaning-based needs, which are crucial to the success of an innovation. Remaining in the *abstract realm*, i.e. in a state of academic isolation, has also risks of failure, since a vision with a set of imperatives for the design may not match the realities of the marketplace. Therefore, the authors suggest that it is crucial for innovation teams to move fluidly between the concrete and abstract realms in an iterative process, which does not necessarily have a fixed sequence and each stage may not take an equal amount of time. Beckman and Barry (2007, p. 50) also state that:

> *"It may, for example, go from observation to frameworks to solutions and back to frameworks again in an attempt to elicit enough information to form meaningful imperatives".*

Their research indicate that teams that progress through each stage of the process a number of times are the most effective, whereas teams that do not go through all four stages are less successful. The authors also emphasize that team members are better at one of four stages depending on their learning styles, as suggested in ELT.

Referring to Kolb's learning cycle and the innovation model of Beckman and Barry, embedding design thinking, Carter and Doorley (2018) point out the tangible and intangible abilities in design thinking education at Stanford d.school. They find framing design as a set of learnable abilities is important in order to recognize the habits they are developing. The authors present the five phases of the design thinking

process (*empathize*, *define*, *ideate*, *prototype*, and *test*), which are based on four tangible abilities (*understanding*, *modifying*, *diverging* to new possibilities, and *converging* toward clarity). They state that each of these tangible abilities "requires the mind and body to work in a unique, specific way" and give some examples from the design process (Carter and Doorley, 2018):

> *"Synthesizing information with nine students on a whiteboard is a process of converging to understand, and it's linked to the science of how our brains work. Distinct parts of the brain light up when a person engages in the thinking patterns that drive each of the tangible abilities. When you're synthesizing information and converging to understand your frontal integrative cortex lights up. If you're quickly sketching a bunch of ideas, the most rapid way to rapidly experiment, you are diverging to modify and your motor cortex takes over. All four of these tangibles map to different places in your brain. This in itself is exciting, but it's just the starting point."*

The authors relate the phase of the design process with the activities (Figure 12) as follows:

- Emphasize + Test → Learn from others (people and contexts)
- Define → Synthesize information
- Ideate + Prototype + Test → Experiment Rapidly + Build and Craft Intentionally

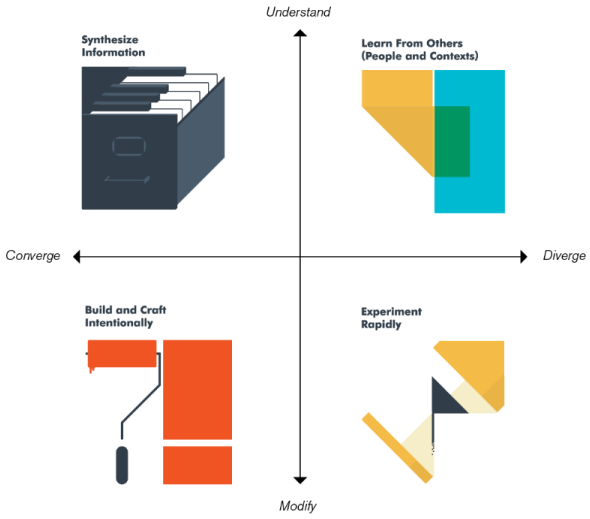

Figure 12. Tangible abilities in design education based on Kolb's learning cycle (Source: Carter and Doorley, 2018).

Based on their experiences, Carter and Doorley (2018) introduce four intangible abilities, which are important learning goals in their design courses: *moving between concrete and abstract*, *communicate deliberately*, *design your design work*, and *navigate ambiguity*. Even though these abilities are not presented on a diagram or as a process phase, these are abilities a design student acquire by engaging in design projects.

There are also scholars who focus particularly on the material experience in the design studio in industrial (product) design education through the lens of ELT. Despite the changing scope of the profession, extending beyond designing three-dimensional products, ID education still involves direct contact with materials and physical act of making. Parisi, Rognoli and Sonneveld (2017) draw attention that design education is mostly centered on envisioning, focused on the RO and AC modes of Kolb's learning cycle, in product (industrial) design courses and that students often relate the idea of hands-on projects with the development of mock-ups or prototypes in the final stage of a design project. However, the focus on the technical qualities of materials has moved towards the sensory and experiential qualities in the last 30 years (Parisi, Rognoli and Sonneveld, 2017). This change triggered the exploration of and experimenting with new tools and methodologies for materials in design education, acknowledging the direct engagement between the designers and materials (Pedgley, 2014). Based on this approach, Parisi, Rognoli and Sonneveld (2017) suggest that material tinkering, which implies hacking and manipulating physical interaction materials in a naive, playful, and creative way, is a way to cover the AE and CE modes of the learning process, to complement the more conceptual design thinking approach, covering the RO and AC modes, which are predominant in design courses. The authors emphasize that adopting only the envisioning approach has the risk of generating insights that lack tests, practical results, and physical and intuitive outputs, whereas tinkering without envisioning is mere making and crafting without any designerly intention. Therefore, they suggest material tinkering not as an alternative to a conventional design approach oriented to RO and AC, but rather to integrate these two approaches (*tinkering* and *envisioning*) to arrive at a richer and more complete development of projects.

The literature shows that the nature of the design process and learning in the design studio requires all modes of learning cycle, as described in ELT. Regarding the

individual differences, strengths, and challenges of students in learning, it is worth exploring the learning styles of ID students and how they relate to their individual experiences in PBDL.

4.5.3. Experiential Learning Theory and Learning Styles Research in Industrial Design Education

ELT is a holistic theory and highly interdisciplinary that it has been extensively used in many fields, addressing learning and educational issues, at least 30 fields and academic disciplines (Kolb and Kolb, 2013). The previous ELT research conducted in design disciplines are mostly in the field of interior design and architecture and mainly concerned with learning styles. Due to the lack of research in ID education, it is meaningful to look into the research conducted in other design fields, regarding the similarities in education. The results of these research support the assumption of the theory that students' primary preferences for learning are affected and shift as they gain experience and engage in more advanced learning processes (Demirbas and Demirkan, 2003; Demirbas and Demirkan, 2007). Shifts occur in learning styles throughout years in education and according to the pedagogical approach of problem. Demirkan (2016) suggests that this may be because of either the use of different learning style instruments or the difference in program disciplines, regarding that their study was conducted with first- and third-year architecture, construction management, and dual-degree students. Similar to Tucker (2007), Kvan and Yunyan (2005) observed a shift towards AE from RO in their study with second- and third-year architecture students. However, regarding these abovementioned findings, Carmel-Girfilen (2012) emphasizes the need for a longitudinal research in order to validate the shifts in the learning style in upper years of the study.

Shifts also occur in learning styles in different stages of the design process and depending on the context due to individuals' situational selection of learning modes, which is closely related with learning flexibility. Some students with certain dominant learning styles are better at certain stages, since they approach the design process, production, and evaluation differently (Carmel-Girfilen, 2012). It is important to ensure the engagement of students with diverse learning styles through appropriate learning activities and development of required skills.

Previous studies relating design education and ELT suggest that design students should learn by experiencing, reflecting, thinking and doing in the process of finding solutions to assigned problems and point out that design students are mostly positioned in the area of assimilating learning style type, close to the center on the grid, which indicates that they have a balanced learning style preference (Demirkan and Demirbaş, 2010). There are also other studies conducted in the field of interior design and architecture, in which the dominant learning styles of design students varied, despite the presence of all learning styles. These studies suggest that design students are dominantly:

- assimilating and converging learners (Demirbas and Demirkan, 2003; Demirbas and Demirkan, 2007; Tucker, 2007);
- accommodating and converging learners (Lim, 1996);
- diverging and accommodating learners (Nussbaumer and Guerin, 2000; Bender, 2004; Carmel-Gilfilen, 2012);
- converging and diverging learners (Kvan and Yunyan, 2005);
- accommodating learners (Ayalp and Özdemir, 2016).

Despite these studies, there is only a few studies relating experiential learning and ID education. None of these studies demonstrates a general overview of ID students' learning preferences. Whereas ELT is the theoretical framework of some of these studies that provide information about experimenting new methods, such as IDPD (innovative dynamic product design) method (Chang, 2015) and material tinkering (Parisi, Rognoli and Sonneveld, 2017), there are also others that use the term "experiential learning" only as "learning by doing" and that do not base their studies on ELT (Anderson and Jackson, 2005). There is also one distinctive example of participatory curriculum development for experiential learning in ID education (Rutgers, 2015). This study does not claim to apply ELT, but the way they approach the definition and use of the term "experiential learning" shows similarities with the dialectic modes of the learning cycle.

Given that there is a lack of ELT and learning styles research in the field of ID, it is meaningful to fill this gap by exploring the diversity of ID students and how to accommodate their differences in PBDL to improve its effectiveness. Regarding the literature on student participation in learning, the participatory approach has great potential for such exploration.

4.5.4. Participatory Approach in Industrial Design Education

There is a number of examples in ID education, integrating participatory design methods in projects in order to bring students and actual users together in the design process. For instance, Yalman and Guclu Yavuzcan (2015) integrated participatory methods in a third-year ID studio and involved users in the problem definition and idea generation sessions as co-designers to collaborate with students. The authors indicate that students' reflections supported the assumption that the efficiency of the design process increased with the participation of users, which is a critical success factor in design education. Turhan and Doğan (2016), on the other hand, present the ERM (Experience Reflection Modelling) method, emerging out of participatory and generative research approaches and developed with a student-centered approach, and their field study with third-year ID students. The method involves a set of tools and techniques (interviewing, three-dimensional modelling, and video recording and analysis) for systematic use in the design process. Similar to the previous example, the ERM method is focused on the early stages of the design process and idea generation to enable students to reveal and transfer user knowledge into the development of design solutions in combination with design knowledge. The authors put great emphasis on their intention to enrich students' active participation and engagement through the ERM method with a constructivist approach in educational design projects. However, Turhan and Doğan (2016) use the term "student engagement" in ERM as being engaged and attentive in each phase of the design process in order to gain skills, such as critical thinking, empathy, analysis, and synthesis, which does not imply active participation in pedagogical planning. Moreover, Merter and Hasırcı (2016) present a participatory product design process, involving second- and third-year ID students, users, and various other stakeholders as participants, which was conducted in a workshop format in the field as a part of a master's thesis. In that study, the non-designers were mainly involved in the early stages of the design process and evaluation of the generated ideas. Even though it was not an educational project conducted within a scope of a design studio course, the authors indicate that the format and structure of the study has the potential to be developed further as a design studio model, to be conducted in potential users' settings without the temporal and spatial limitations of the conventional design studio, in ID education. Even though these examples are valuable in terms of helping students become aware and knowledgeable of democratic

approaches and participatory/generative design research methods in design practice through experiencing them, none of them is directly concerned with the student participation in pedagogical planning and/or decision-making processes.

In addition to these examples of participatory practices in PBDL, there are also studies exploring students' perspectives in order to enhance ID education (for details see Chapter 3.3.1). For instance, D. Demirbaş (2018) conducted a Ph.D. research, using participatory design methods to determine the design criteria and requirements of an online content and learning management tool and proposed an online design brief for new millennium learners in ID education. This study is significant in the sense that it aims to understand the characteristics and expectations of ID students and o give them a voice in the development of an educational tool, *the design brief*, which is crucial to support and improve their design learning process. This study also takes into account that students may have different needs and suggests that personalization of design briefs can be a way to accommodate these differences by giving students the opportunity to manage their own processes. It shows that participation is a strong, valuable, and useful approach in order both to understand students' individual differences and to develop more suitable solutions. Whereas this study is an example of the participatory approach on a course level with potential benefits for other design courses, departments, and educational institutions, the following example approaches to student participation in a larger educational scale. The Department of Industrial Design at the Ontario College of Art and Design (OCAD) has redesigned its competency-based undergraduate curriculum with the participation of instructors and former students graduated from the department (Rutgers, 2015). The students were involved in the process through design thinking methods to redesign an experiential curriculum for the department. This study has gone further with the research of an interdisciplinary working group of design schools from Canada and the UK, exploring the co-development of future-proof curriculum design tools, the *Design Competency Futures Matrix tool*, based on a shared design language that can be used across different design education programs, situations, institutions, and cultural contexts (Rutgers, Fass and Chu, 2018). Even though it is not focused merely on ID education, the intention of this research is invaluable in terms of drawing attention to the uniqueness of design education, experimental practices in how design educators can jointly design and develop new courses based on shared language, and the ongoing

attempts to co-design design curriculum.

Considering the experiential process of learning and studies on ELT and learning styles in ID education, it is inevitable that it needs to be improved in terms of its adaptability to the current professional and thus educational demands. Social, environmental, and technological developments has led to the utilization of new tools, methods, and approaches in design education and expanded the limitation of the conventional design studio with the aim of increasing students' engagement in the learning process. However, in order to ensure this engagement, it is important to acknowledge the existence of different learning preferences and understand students' insights, needs, skills, and abilities, when developing instructional methods and/or models. Instead of relying on personal experiences, skills, specialties, and predictions about students (Cross, 1982; Green and Bonollo, 2003; Lawson, 2004; Khorshidifard, 2011; van Dooren et al., 2014), design instructors need to adapt more participatory approaches. Participatory methods and tools are deemed appropriate for understanding students' learning processes in learning studies (DiSalvo et al., 2017), which are also an essential part of contemporary design approaches. Therefore, a transition from a didactic to a more democratic and participatory approach is convenient in accommodating the diverse learning preferences in PBDL. Considering the direct relations between the design learning process and Kolb's experiential learning cycle (Kolb, 1984; Rutgers, 2015), ELT provides a well-established ground for understanding the diversity of ID students and their characteristics in order to reveal the key points for improvement.

4.6. Overview of the Theoretical Framework

Kolb's ELT, as one of the most frequently studied theoretical models to assess learning styles, is applicable and valid across disciplines and cultures (Kolb, 2015). It suggests that the most effective learning environment is where all learners with diverse learning styles are supported and provided with learning through experiencing, reflecting, observing, and experimenting (Kolb, 1984). In this regard, the design studio is inclusive of all learners and modes of learning through reflective and critical-thinking activities (Nussbaumer and Guerin, 2000; Demirbas and Demirkan, 2003; Bender, 2004; Kolb and Kolb, 2005; Kvan and Yunyan, 2005; Demirbas and Demirkan, 2007; Tucker, 2007; Carmel-Gilfilen, 2012; Ayalp and Özdemir, 2016). The design studio is both an experiential learning process and a balanced learning environment that supports the development of tangible abilities (learning from people and contexts,

experimenting rapidly, building and crafting intentionally, and synthesizing information) that coincide with the learning cycle of Kolb's ELT (Carter and Doorley, 2018). Students experience the design process through engaging in various activities, such as research, conceptual and creative thinking, problem solving, visual and verbal presentation, sketching, and making physical scaled models, in design projects in order to complete this learning cycle (Rutgers, 2015). Each stage of the design process requires the mind and body to function in different ways (Carter and Doorley, 2018). Depending on their varying levels of interests and preferences for the delivery of knowledge and acquisition of skills, students perform better or worse at certain stages of the design process and certain learning activities in the design studio (Carmel-Girfilen, 2012). It is strongly related with these students' learning styles, which are the particular, characteristic ways of how individuals approach learning, based on their hereditary factors, previous experiences, and demands of the present situation (Kolb, Boyatzis and Mainemelis, 2001). Learning styles may shift through time, development, and situation (Kolb, 1984; Kolb and Kolb, 2005). Therefore, design students may perform differently as they progress in their education, during which design projects become less structured and more complex and ambiguous towards the upper years of study.

Design projects are a means to learn the practical and theoretical aspects of design through experience and reflection-in-action of students and instructors in a reciprocal and continual dialogue (Schön, 1983; Teymur, 1993; Green and Bonollo, 2003). Design instructors often rely on their past personal experiences, skills, and specialties, and make predictions about what students need in the learning process (Cross, 1982; Green and Bonollo, 2003; Lawson, 2004; Khorshidifard, 2011; van Dooren et al., 2014). Considering that learning is a process at an individual level, there are diverse motivations and experiences that students bring to learning, which are important to be recognized, acknowledged, and accommodated (Bovill, Cook-Satherand and Felten, 2011), when designing learning experiences and developing instructional methods and/or models. However, it is a difficult task for instructors to adapt their teaching to this diversity (Tubić and Hamiloğlu, 2009).

Students and instructors are the two main actors in PBDL; hence, the main social resources in developing ways for more effective learning. The diversity and richness of viewpoints, opinions, abilities, skills, and unique experiences of each social

resource (Sleeswijk Visser et al., 2005; Manzini and Rizzo, 2011) provide valuable input into the understanding of patterns, potential problem areas, and possible solutions (Sanoff, 1988). The participatory design literature suggests employing the foundational set of methods, practice of engagement, and commitment to set of democratic values through design thinking and methods that aim to design infrastructures for learning (DiSalvo and DiSalvo, 2014; DiSalvo and DesPortes, 2017). It provides a powerful initiative to bring student perspective into decision-making processes in relation to learning experiences through systematic inclusion and empowerment of students (Mitra and Gross, 2009; Jagersma and Parsons, 2011). This participatory approach also aims to build more relevant, sustainable, and positively influential pedagogical content and structure.

Similarly, in the learning sciences literature, there are many studies on student participation in developing teaching approaches, instructional strategies, courses, curriculum, learning technologies, and environments (Sadler-Smith and Riding, 1999; Hativa and Birenbaum, 2000; Drew, 2001; Wierstra et al., 2003; Van Petegem, Donche and Vanhoof, 2005; Chang and Chang, 2010; Bovill and Bulley, 2011; Baeten et al., 2015). The literature also suggests that student participation in pedagogical planning is positively linked with more effective learning (Carini, Kuh and Klein, 2006; Kuh, 2008; Bovill, Cook-Satherand and Felten, 2011). Even though these studies involve varying levels and forms of student participation, there is a lack of practice in active involvement of all students with an infrastructure that can maintain or adapt itself to the diversity of situations and individuals. However, it is important to note that the willingness to participate is an individual preference and some participation forms and/or levels may be more preferable for some students than others. For effective learning, different levels of participation may be more preferable depending on the context (Bovill and Bulley, 2011).

Regarding the literature on ELT, participation, and design pedagogy, this dissertation proposes that developing a student participation model in PBDL can be useful for facilitating instructors to understand and accommodate the diversity of individual learning differences. Learning styles are accepted as the main indicator of this diversity in this study. It is also assumed that students' learning styles have a relationship with their choice of participation. In this respect, the participatory approach has been adopted in the study, in which both students and instructors are invited to participate

in the exploration of student participation in PBDL from multiple perspectives and aspects.

CHAPTER 5: METHODOLOGY

This chapter presents the methodology of the research, which addresses two main research questions that seek to obtain data for the development of a student participation model in PBDL. ID education was chosen as a case for the study, with the expectation of setting an example for all design disciplines by providing transferrable research outcomes. The set of methods that are employed in the study are described in detail in the following sections. All instruments of the study were approved by the Scientific Research and Publication Ethics Committee of İzmir University of Economics.

As explained in detail in Chapter 1, this study was conducted during the global COVID-19 pandemic, which has been affecting the world in all areas of life, including ID education, since March 2020. Even though it was not the main intention to investigate and/or speculate on its implications for ID education within the scope of this study, it was still deemed important to draw attention to the existing circumstances and have a grasp of how it has effected PBDL in terms of pedagogical planning and student participation.

5.1 Research Approach

Neuman (2007) states that research studies usually have multiple purposes with one dominant purpose. This research investigates the diversity of learning styles and how to accommodate this diversity in PBDL within the context of undergraduate ID education. Therefore, despite engaging with descriptive and explanatory perspectives when necessary throughout the research, it takes a largely exploratory purpose, regarding the aim of the dissertation and the associated research questions. Exploratory approach is open-minded and creative and adopts an investigative viewpoint (Neuman, 2007). Therefore, it is an appropriate research approach, especially when there is little or no research that has been conducted on the research topic or subject or when the phenomenon being studied is relatively new. This approach was deemed suitable for this study regarding its theoretical background that brings Kolb's ELT and participatory approach in learning together, none of which has been studied extensively within the context of ID education. Moreover, exploratory approach allowed discovering the effects of the recent global COVID-19 pandemic on the subject and the implications for the future of design education.

Exploratory research mainly focuses on *what* questions and often employs qualitative methods (Neuman, 2007). Creswell (2014) suggests that when there is little research that has been conducted on a concept or phenomena, it merits a qualitative approach. Qualitative approach concerns with understanding how the world is seen through the lenses of the subjects of the study (Miles and Huberman, 1994). Whereas qualitative studies are more flexible in the process (Robson, 2002), quantitative studies employ more structured methods in order to avoid bias and personal contact between the researcher and the research subjects (Creswell, 2014). There is also the mixed method research studies, in which both qualitative and quantitative methods are employed in order to provide a better understanding of the problem that cannot be provided by using only one dataset otherwise (Creswell and Clark, 2007). There are three primary major designs in mixed method research (Creswell, 2014):

- *Convergent parallel design mixed methods*: The researcher collects the quantitative and qualitative data roughly at the same time and converges or merges the datasets for a comprehensive analysis, integrating the information when interpreting the overall results.
- *Explanatory sequential mixed methods*: The researcher starts with quantitative research and the initial quantitative data results are explained further with the qualitative data collected in the following phase.
- *Exploratory sequential mixed method*: The researcher follows a reverse sequence from the explanatory sequential design, starting with qualitative data and then developing or identifying research instruments for the following quantitative phase or specifying variables for the follow-up study.

Even though exploratory studies usually tend to be qualitative, convergent parallel design has been preferred for this study as the researcher's aim was to obtain different but complementary data from different research subjects in order to draw a more holistic view in answering the research questions identified earlier within this section. In addition to the literature survey, the exploratory analysis of the preliminary study, which was initially separate from this study and included later on due to its relevance, guided the researcher to investigate both students' and instructors' perspectives and employ mixed methods to obtain the most complete data from the different aspects of the issue. Convergent parallel design allows equal prioritization of the methods, independent analysis of both datasets, mixing the results for interpretation, and looking

for convergence, divergence, contradictions or relationships of two sources of data (Razali et al., 2019). Regarding this, a survey was conducted with undergraduate ID students in Turkey in order to understand the diversity of their learning styles through Kolb's ELT and how this diversity relates to their opinions on participation in project planning. A quantitative method was preferred not only to obtain generalizable, statistical data, but also to obtain transferable, comparable, and more structured data from a relatively larger sample size compared to a qualitative method would allow. It also allowed the researcher to avoid personal contact with the students to avoid biased responses. Since the survey aimed to obtain data in relation to students' learning preferences and opinions on participation in general, rather than their past or current experiences, it did not include any questions concerning with the pandemic. Simultaneously, a series of semi-structured interviews, followed by a structured self-assessment of the interviewees, were conducted with design instructors in order to collect a broader empirical evidence of student participation in PBDL. A qualitative method was deemed more appropriate for this purpose, since it allowed gaining a deeper understanding of the context and the student participation in PBDL to draw out generalizable findings. Moreover, this method helped understanding how the COVID-19 pandemic effects PBDL, which has been a recent, unexplored area of research.

It should be noted that even though the involvement of the research subjects were only through traditional research methods, which are considered passive forms of participation (Wulz, 1986) in this study, it was structured so as to prioritize the findings for proposing participatory opportunities to enhance PBDL by adopting a participatory mindset, grounded on participatory design research. Participatory design research in learning sciences suggests that the participatory mindset offers democratic practices to define research and learning goals, considers multiple participants, establishes participatory living labs for design research, develop infrastructure for sustainable participation, and offers a way to seek transferable rather than generalizable outcomes (DiSalvo and DiSalvo, 2014). Moreover, a process that allows student participation requires the consensus of all parties involved in the process with a clear definition of the concept and communication of expectations (Jagersma and Parsons, 2011), which helps avoiding any approach or practice that may lead to student disengagement and alienation (Mann, 2001; Mitra and Gross, 2009). Therefore, it was important to involve and accommodate the perspectives of the two main actors (students and instructors) of

PBDL courses, who are often in a hierarchical relationship, in order to provide a ground for a sustainable student participation model and to avoid any possibility of disengagement or alienation in the proposed model.

5.2 Research Questions

This dissertation aims to develop a student participation model in PBDL in ID education and concerns with how individual learning differences can be utilized. Accordingly, the research questions (RQ) for the research are:

RQ1 What is the relationship between ID students' learning styles and opinions on student participation in project planning in PBDL?

- **RQ1.1** What is the distribution of learning styles of ID students?
- **RQ1.2** What are the students' opinions on the level and form of student participation in project planning?
- **RQ1.4** What are the students' opinions on being an active participant in project planning?

RQ2 How is the diversity of individual learning differences accommodated in pedagogical planning in PBDL?

- **RQ2.1** How do design instructors carry out pedagogical planning processes?
- **RQ2.2** How is the diversity of individual differences accommodated in PBDL?
- **RQ2.3** What are the effects of distance learning during the COVID-19 pandemic on pedagogical planning?
- **RQ2.4** What are the effects of distance learning during the COVID-19 pandemic on student participation in planning?

5.3 Research Model

The research involved a *preliminary study*, which gave direction to the ongoing literature review, helped clarifying and validating the problem statement, and was utilized in developing research instruments, a *survey* aiming to explore the student diversity (RQ1), and *interviews* aiming to explore student participation in pedagogical

planning (RQ2) in PBDL. The findings of the survey and interviews were analyzed and the convergence of the results was utilized for developing the student participation model. The research model is illustrated in Figure 13.

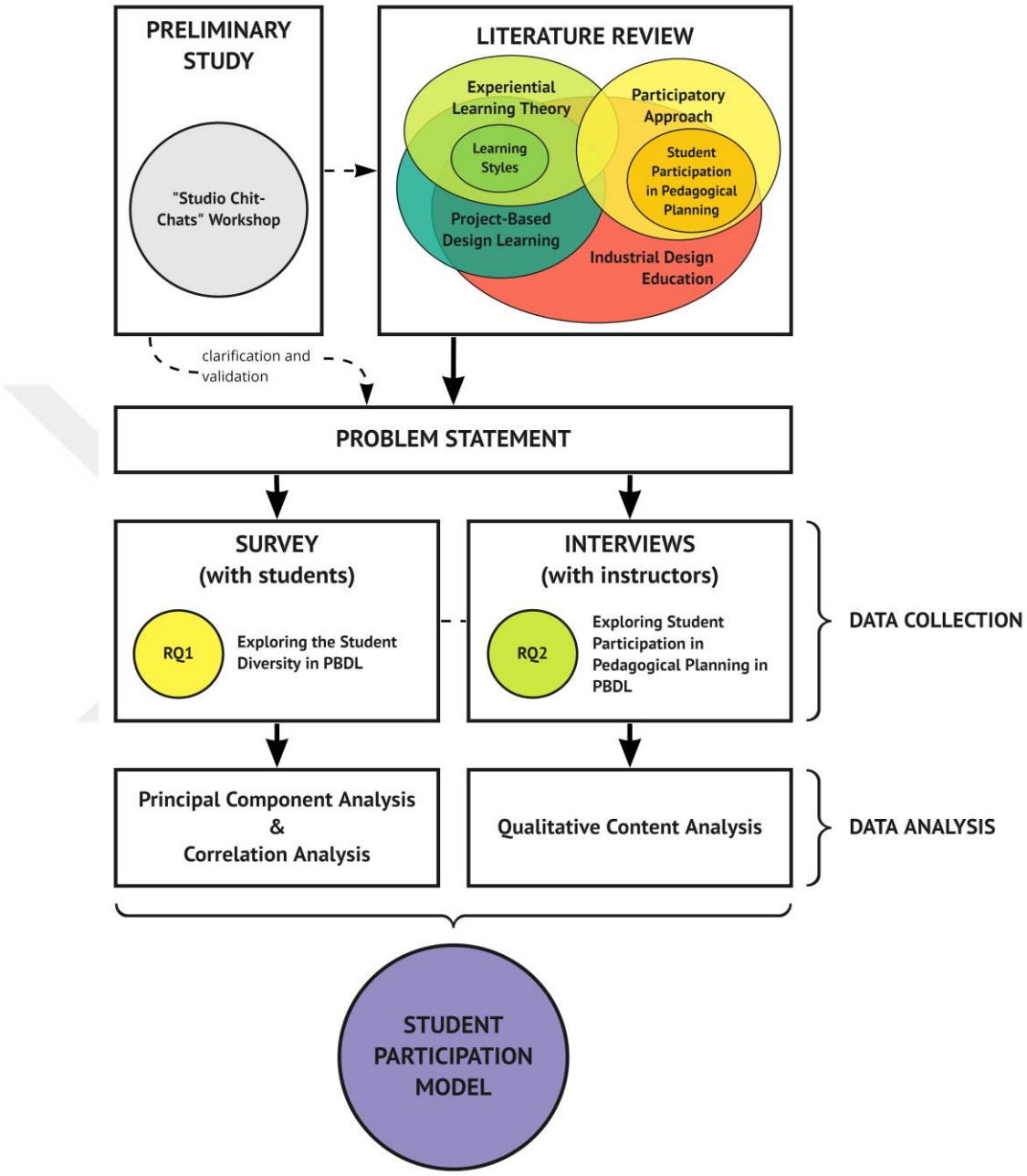

Figure 13. The research model.

5.3.1 Preliminary Study: "Studio Chit-Chats" Workshop

Studio Chit-Chats was a two-day (14-hour) workshop conducted in *Good Design İzmir 3 (İyi Tasarım İzmir 3),* which was organized by the İzmir Mediterranean Academy (İzmir, Turkey) on 11-12 October 2018 (Figure 14). Even though this workshop was

not initially planned as a part of this dissertation, the researcher's involvement in this workshop as a facilitator provided the opportunity to gain insights into students' experiences and expectations in relation to the design studio and active participation. Therefore, it was decided to include it in the study with the other facilitators' consents. It contributed to the exploration of the problem area and obtaining a general understanding of the context and the sample group prior to the following phases of the study. Thus, it helped validating and clarifying the problem statement of the dissertation.

Figure 14. Poster of the *Studio Chit-Chats* Workshop *(designed by Kardelen Aysel).*

5.3.1.1 Workshop Procedure

The aims of the workshop were:

1. to criticize and reconsider the existing design studio process through the lens of collective experiences of design instructors and students,
2. to generate alternative mindsets for the educational practices in ID education through empathizing with the new generation students, and

3. to talk about the “dream design studio”.

The workshop was conducted by six facilitators, who were instructing the design studio courses in the Department of Industrial Design at Yaşar University. The facilitators had varying levels of experience in design education (one assistant professor, three full-time, and two research assistants) and diverse design expertise. Upon an open call, eight second-year and three third-year ID students (Yaşar University) and one ID graduate (İzmir University of Economics) attended the workshop. The workshop was planned as a collective process with equal engagement and responsibility of all workshop facilitators and participants. Based on this viewpoint, each individual was regarded as an *active participant* of the workshop, sharing responsibilities and exchanging roles among themselves.

The facilitators had already had some assumptions about the possible problems, challenges, and expectations that might be stated by the participants during the workshop due to their personal experiences with students. Therefore, it was loosely structured allowing a flexible process, shaped by the participants’ involvement as it progressed, in order to avoid any biases of the facilitators. There was no duration that had been set for any of the phases. This was left for the initiative of the participants. The timeline of the workhop is presented in Figure 15.

Figure 15. The workshop timeline.

The first day of the workshop started with the *Ice-breaking* phase, in which a brief introduction was made, the workshop aims were shared, and facilitators and participants met each other (Figure 16). Then, the *Empathize* phase focused on exchanging stories and role-playing to build empathy between participants and facilitators. In the role-playing session, each participant gave an example of statements that instructors and students commonly make in the design studio. This session continued with expressing personal expectations, negative feelings and thoughts, and the things that they want to change in relation to design studio courses. Then, in the *Define* phase, the participants identified and categorized the problems by building consensus on the common perceptions of the design studio (Figure 17) and started to

brainstorm about the possible solutions.

Figure 16. *Ice-Breaking* phase.

Figure 17. *Define* phase.

The second day of the workshop started with the participants' reflections on the process and outcomes of the previous day. They generated ideas about what the "dream design studio" might be like in the *Ideate* phase (Figure 18) and prototyped it by preparing a presentation board, clustering and illustrating their ideas in the *Prototype* phase (Figure 19). Then, the participants presented their ideas, followed by a Q&A session.

Figure 18. Participants during ideation.

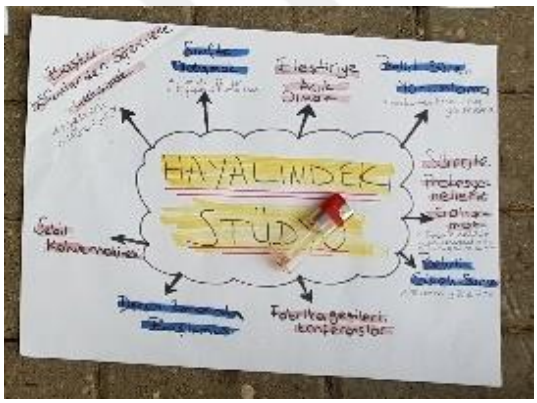

Figure 19. Participants' ideas

It was decided to create a visual manifesto, based on the participants' ideas presented at the end of the workshop, to be exhibited during *Good Design İzmir 3.* In the visual manifesto, the participants categorized their expectations as:

- Choose your own project! *(Projeni kendin seç!)*
- Work with different disciplines *(Farklı disiplinlerle çalış)*
- Think creatively *(Yaratıcı düşün)*
- Keeping quiet is not allowed! *(Susmak yasak!)*

- Ask designers and users *(Tasarımcılara ve kullanıcılara sor)*
- Manage the process yourself, determine the method yourself *(Süreci kendin yönet, yöntemi kendin belirle)*
- Go out and see *(Gezelim görelim)*
- Don't assess quantitatively! *(Nicel değerlendirme!)*
- Manage the time *(Zamanı yönet)*
- Examine, hold, touch, and feel what exists! *(Var olanı incele, elle, dokun, hisset!)*

The participants prepared boards for each category given above and placed speech bubbles around the related categories with ID students' verbal statements and ideas for solutions (Figure 20 and 21). A "Pop-Up Idea Board" was prepared for the exhibition visitors to contribute by writing their ideas as well. The visualization of the workshop process, illustrated by one of the facilitators (Aysel, 2021), was also exhibited with the aim of ensuring the transparency of the workshop process and its outcomes. After *Good Design İzmir 3* ended, an interview with the facilitators was published by the İzmir Mediterranean Academy (2019), providing detailed information about the workshop.

Figure 20. Visual manifesto of the participants *(exhibited in Hall 1, İzmir Culture Park, 19 October-30 November 2018).*

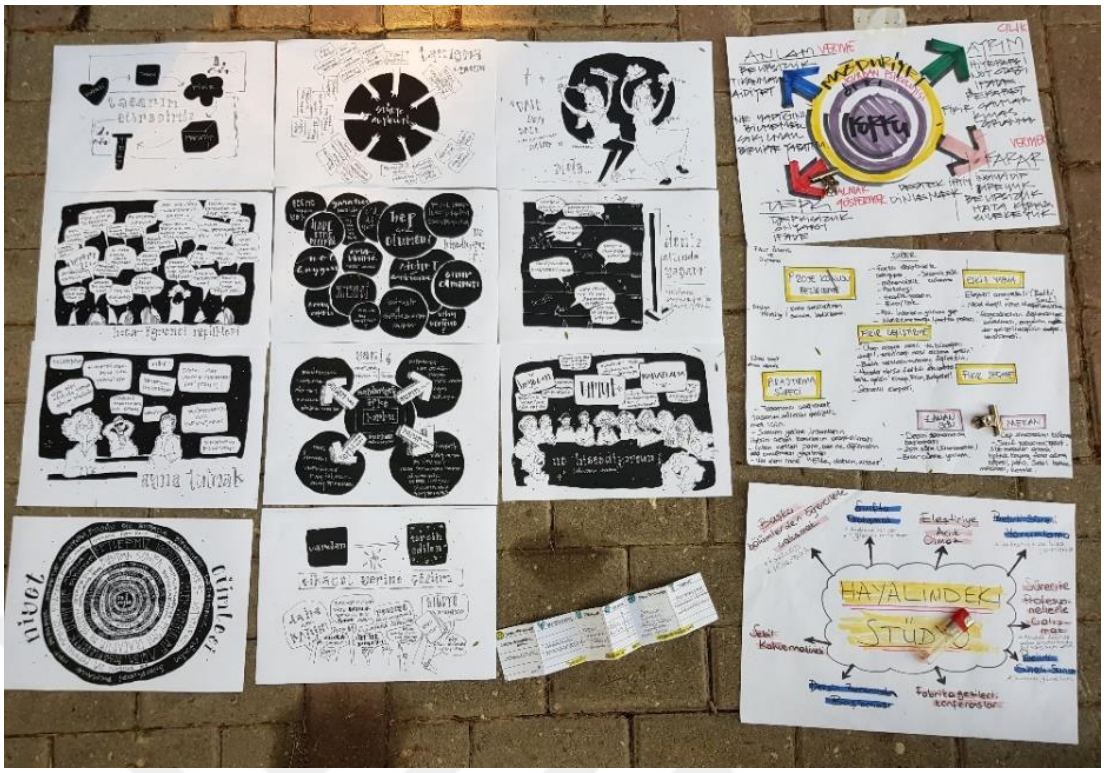

Figure 21. Illustration of the workshop process *(two diagrams on the bottom-left are participants' presentation boards).*

5.3.1.2 Reflecting on the Workshop Experience

Regarding the scope of this dissertation, the workshop process and outcomes, which were recorded through photographs, illustrations, participants' exhibition work, and the researcher's reflective notes, were examined. Then, the reflections were categorized in terms of the participants':

- feelings towards the existing design studio,
- expectations for the "dream design studio",
- motivations and feelings towards participation, and
- individual differences and decision-making.

Feelings Towards the Existing Design Studio

During the workshop, the participants made some important statements about how they perceive the design studio and how they feel during the courses, such as "I cannot study effectively", "I don't want to work on something I don't like", "You don't share the grading criteria", "I'm afraid of being creative", and "I cannot deal with the uncertainty". One of the participants stated that their focus was always on the negative

side of things and what was common in everything they had stated was about their desire to go deeper, learn why they do what they do, and be seen by their instructors in the design studio. Another participant also stated, “I guess, our problems are not necessarily academic”. This realization started a discussion about the possible causes of these feelings. It was concluded that “fear” and “sense of unjust treatment” were the core of all negative statements (Figure 22), which fell into the categories of:

- *Differences in approach* – hierarchy; focus on grades as academic evaluation; didactic statements; competition among students; plagiarism; comparisons…
- *Decision (-making)* – lack of taking initiative; individualistic; fear of making mistakes and failing; sense of suffering…
- *Reaction (giving/receiving reaction)* – unresponsiveness; biases; statements and expressions…
- *Meaning (making sense)* – uncertainties; feeling stuck; lack of sense of belonging; getting bored; lack of understanding of doing certain things and activities…

Figure 22. Categorization of student statements.

Especially the *Empathize* phase was the most dynamic and joyful phase of the workshop that triggered spontaneous and open conversations both among the participants and between the facilitators and participants. Exchanging stories and role-playing to share experiences and feelings were helpful to understand how students

perceive instructors' discourses and expressions. It provided a mutual realization and understanding, while functioning as a self-realization and self-criticism exercise for both the facilitators and participants as well. It became apparent that the issues, which the facilitators were concerned with for improving the design studio, had a lot in common with the participants' expectations.

Expectations for the "Dream Design Studio"

It was realized that the participants' ideas and expectations matched what the facilitators had already discussed prior to the workshop. They were mainly about more active student participation in the design studio, including planning, implementation, and assessment of projects. The participants stated their desire to collaborate with other disciplines, as well as with professional designers and users, and to take active part in group works/critiques and (qualitative) assessment. They also focused on taking initiatives in the selection of projects and appropriate methods for themselves and management of their own individual processes. They stated their need for better time management and fieldtrips/fieldworks as well.

Motivations and Feelings Towards Participation

The collaboration and active participation were the driving forces behind the participants' motivation, as well as sharing the responsibility of the whole workshop process. All of them stated positive feelings about this experience during the discussions and hands-on activities. Some of the statements, which were agreed upon, were "It is so joyous to create something together", "It was a relief to share my feelings and emotions", and "This process is enlightening". Moreover, the most common feelings that were stated were being "hopeful", "excited", "ambitious", and "relieved". They also expressed that they had felt themselves important, heard, and understood and that they had begun to feel more confident in participating as they progressed in the workshop process.

Another unexpected but important realization for the participants was that "not the identities, but rather feelings and thoughts mattered", as one participant stated. Before the workshop started, it was discussed that academic and formal ways of addressing each other ("hocam", "siz" etc.) affect the perception and understanding of individuals about relationships and social roles as one thinks about them. Therefore, it was decided not to use such expressions, which helped eliminating the hierarchical and formal ways

of thought about the instructor-student relationship and their traditional roles. It also provided a ground for the participants to feel more comfortable and equal, when discussing these issues and sharing personal experiences.

The *Empathize* phase was significant with the highest level of participation, which increased as the phase progressed, due to the transparent and nonjudgmental attitude of the facilitators. They were also equally engaged in the conversations with their own personal experiences. This helped the participants be more open and willing to participate in the following phases, since they realized that they were not alone in what they feel, fear of, and think and that even their instructors, who they had seen as superior, have similar experiences and struggles.

It was observed that even though most of the participants had already become more confident in participating, the equality of the level of participation decreased in the following phases. Whereas some participants became more active, others started to participate less. They engaged in varying degrees of participation. Moreover, despite the intention to maintain the equal participation of facilitators and participants, it could only be achieved in the *Empathize* phase. Then, the facilitators started to put on their former roles of being instructors. Some participants, who had started to participate more actively and became forward in leading positions, were confident and comfortable enough to state this shift to the facilitators in order to ensure the nonhierarchical workshop process. On the second day, the participants took the initiative and responsibility to plan the rest of the workshop and decided to work on their ideas as a separate group before the presentations. They got organized and managed the given time for discussions and taking action. While they were presenting their ideas, the facilitators were only in the role of listeners. In the Q&A session, only a few of the participants took the responsibility to answer the questions asked by the facilitators and engaged in the discussion.

Individual Differences and Decision-Making

The workshop process required certain decisions either to proceed further by building consensus on what to take into account, starting/finalizing a phase, an activity, etc. Since there was no prior distribution of roles, the consensus-building and decision-making took mainly three forms, influenced by the individual characteristics of participants, which were based on:

- the majority of participants' opinions,
- the opinions of certain individuals, who were more dominant and/or had taken a more active role, and
- the facilitators' guidance.

It was observed that each participant had his/her own individual approach towards the subject at issue and shared different views and opinions. They naturally started to take on different roles that suit their skills and personal characteristics, while they were working in groups. These personal characteristics and tendencies were influential in showing interest and willingness in participating and in the level of participation in decision-making.

5.3.1.3 Transferring the Workshop Experience to the Design Studio

In the workshop, it was both an opportunity and an obstacle that the facilitators and participants (except one) were from the same institution and had already been familiar with each other. Even though the focus of the discussions had shifted towards their specific experiences at Yaşar University at times, this provided the opportunity to build a consensus for transforming the learning experience at that particular university by communicating the workshop experience and outcomes to other students. They requested the implementation of the workshop outcomes in their courses during the semester. Upon the participants' requests, who were mostly second-year students, the two workshop facilitators, who were instructing the second-year design studio, agreed to transfer the workshop experience to the *INDD201 Industrial Design Studio I* course in the 2018-2019 fall semester. This consensus, based on the collective initiative of the participants, was one of the positive outcomes of the workshop.

The course coordinator (Int10) was interviewed in the following phases of this research and was asked questions in relation to this particular participatory learning experience. Int10 described a non-hierarchical process, which was co-planned and carried out by the students, and defined the class as a "project team", in which the instructors and students shared the responsibility equally. The course was an eight-hour course, split into two days in a week, in a fourteen-week semester. The course coordinator planned a framework for the course, bearing the academic requirements, such as course content, learning outcomes, and academic calendar, in mind. In this framework, the instructors decided on the duration of the three projects in the semester and specified

the project structure, milestones, deadlines, and evaluation criteria. Then, the project themes were co-decided with the students by discussing the pros and cons of the alternatives, regarding the expected project and learning outcomes. The instructors made revisions on the draft design brief after these discussions in order to align it with the academic requirements and continued to revise it when necessary during the semester. The students were responsible for planning the class hours on each course day, depending on what they needed in the process, which they decided through group discussions. In each class, a moderator and a timekeeper were chosen among the students on a voluntary basis and all instructors and students participated equally in critiques and jury sessions as a "project team". The students were also invited to take part in grading the projects, which could not be achieved due to students' hesitation to be involved.

5.3.1.4 Validating and Clarifying the Problem Statement of the Dissertation

The interpretation of what the participants had expressed and discussed in the workshop helped clarifying the researcher's viewpoint. It was realized that most of these expectations were related with what the instructors were already trying to incorporate in their courses. However, there was a mismatch between what was being done and how it was perceived. This realization pointed out the lack of students' understanding of the process, which could be due to the lack of communication between instructors and students and/or the inability to make suitable course/project plans that fulfill students' needs. It helped validating the decision to incorporate both students' and instructors' perspectives in the study with the aim of establishing a common ground for both parties. It was also decided to focus more on student participation in pedagogical planning and decision-making processes, since planning was considered to be directly related with how a design studio process is structured and carried out.

The implementation of the workshop outcomes in the second-year design studio supported the researcher's views on the potential of student participation in planning. The importance of focusing on the planning process became more clear after the interview with Int10, especially for two reasons. First, it was observed that students were struggling with making sense of the academic obligations and pedagogical considerations in the process, which can be overcome by involving them actively in a

transparent planning process. Secondly, whereas the process during the projects was tailored for each student and/or a group of students, it was a new experience for the students to have a say in planning, which helped them become more connected to the process compared to their previous experiences. Therefore, this experimentation provided the opportunity to observe its promising results, in terms of increased student engagement and motivation, as well as the empowering and enabling aspects of the process. Providing guidance to the students throughout the process also enabled making sense of the project objectives, the design process, and grading. There was also a significant improvement in the relationship between the instructors and students, who became much more outspoken in sharing their feeling, thoughts, and needs. Therefore, a more genuine communication and increased interaction were established in between. The students, who had participated in *Studio Chit-Chats*, were more self-confident in participating compared to the other students, who needed more time to adapt to this less hierarchical structure. Most of the students had a positive attitude towards taking an active part and were willing to share their perspectives to improve their learning, which supported the assumption that active student participation would be preferable for students. It was also very insightful that Int10, who was both the course coordinator and instructor at the time, stated her willingness to develop the framework that they experimented in the course further by involving students in the process before the semester starts to discuss the academic requirements with them and develop the course syllabus and the entire design brief collectively.

It was another invaluable experience for the researcher to observe that all facilitators/instructors and participants/students naturally started to participate in varying degrees and take on different roles, depending on their skills and personal characteristics, even though the equal participation was encouraged both in the workshop and in the design studio course. It validated the importance of recognizing, acknowledging, and accommodating the diversity of individual differences and attitudes towards active participation. Learning styles were not the focus of the workshop or the design studio experiment. However, regarding the literature review and the scope this dissertation, it was deemed important and validated to utilize learning styles as an indicator of individual differences.

Therefore, the researcher's experience and observations provided a better understanding of the sample group and the problem area. Following the validation and

clarification of the problem statement, the ongoing literature survey was expanded in order to delve into the forms of participation particularly in decision-making processes, student participation in pedagogical planning, and the participatory approach particularly in ID education, along with an attempt to gain deeper understanding of the diversity in learning. The insights were also utilized in developing the survey that was conducted with ID students in further phases of the study.

5.3.2 Exploring the Student Diversity in PBDL

A survey was conducted in order to determine the relationship between the learning styles of ID students and their opinions on student participation in PBDL based on students' self-reported data (Rohrer, 2014). The aim was to explore the diversity in learning styles and opinions to provide input for the development of the student participation model. Therefore, collecting self-reported data was deemed the most appropriate method to avoid any possible biases of the researcher (Scaife and Rogers, 1999; Blessing and Chakrabarti, 2009; Johnson and Christensen, 2012; Maliverni, Mora-Guiard and Pares, 2016).

5.3.2.1 Sampling

Volunteered response sampling was chosen for the survey. The population was the ID students, enrolled in an undergraduate ID program at universities in Turkey. There were approximately 4600 ID students in a total number of thirty universities, based on 2019 data, which was assumed to be increased up to nearly 5000 after the quotas had been increased by YÖK. The survey was sent to these universities via e-mail. 119 students from twenty-two universities completed the survey they received online, on a voluntary basis.

5.3.2.2 Respondents

The 119 respondents consisted of forty-three (36%) first-year, twenty-two (19%) second-year, twenty-four (20%) third-year, and thirty (25%) fourth-year students (Figure 23). The majority of the respondents (116; 97,5%) took the central examination to enter the university, whereas the others (3; 2,5%) took the aptitude test. The distribution of respondents' ages are between 18 and 24 (111; 93,3%), 25 and 34 (7; 5,9%) and over 35 (1; 0,8%).

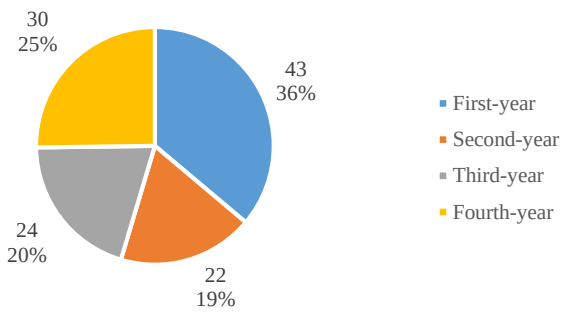

Figure 23. The number of respondents in relation to years of study.

5.3.2.3 Instrument

A structured survey (Appendix A) was designed in Google Forms to collect the data. It started with a brief explanation about the aim of the research, how the data would be used, and confidentiality issues. All explanations, instructions, and items were both in Turkish and English in order to avoid any loss in translation, especially in KLSI 3.2. The survey consisted of three parts and the estimated duration for completion was approximately 15 minutes.

The first part of the survey aimed to collect demographic data about the respondents. These 4 items involved their university, type of entrance, year of study, and age group. The KLSI 3.2 was integrated into the survey, as the second part, in order to identify the distribution of the learning styles of ID students. The inventory is in a forced-choice format, containing 12 items that ask individuals to rank their preferences for four answer choices, ranking from 4 “most like me” to 1 “least like me”, corresponding to the four modes of Kolb’s learning cycle. The third part of the survey aimed to explore the opinions of ID students on student participation in PBDL, particularly in project planning, and had four subparts. The first subpart was related to the level and form of student participation, which included 15 items that were developed based on the ladder of student participation (Bovill and Bulley, 2011) and forms of participation (Wulz, 1986). The second subpart, on the other hand, included 23 items, which were related to being an active participant and developed based on the benefits and challenges of student participation (see Section 3.3.2), as well as the feelings and opinions stated by the *Studio Chit-Chats* participants. The items in both subparts were designed to be rated on a 5-point Likert scale (1: Strongly Disagree, 5: Strongly Agree). The third subpart was a Y/N question about respondents’ previous experiences in participating in project planning, following with the fourth subpart, which was an

open-ended question for respondents, who had an active participation experience in the past. All items in the survey were required in order to avoid nonresponse error.

5.3.2.4 Pilot Study

The survey was pilot tested with ID students from each year of study in order to test the feasibility of the method and the research instrument, in terms of the clarity, readability, and appropriateness of the type and format of the questions, as well as the time required to fill out the survey (Doody and Doody, 2015; Fraser et al., 2018). The pilot study was implemented as a series of focus groups via Zoom, with the aim of creating a group discussion platform and ensuring the participants to complete the survey during the sessions.

A total number of seventeen students from the Department of Industrial Design, Yaşar University, participated in the study. Table 3 presents the participants and the duration of the survey completion and focus groups.

Table 3. The participants and durations.

Participant	Year of Study	Duration (survey)	Duration (focus group)
1	1	11 minutes	29 m 57 sec
2		11 minutes	
3		12 minutes	
4		14 minutes	
5	2	10 minutes	35 m 54 sec (part 1) 3 m 23 sec (part 2)
6		14 minutes	
7		16 minutes	
8		17 minutes	
9	3	11 minutes	42 minutes (only the last 25 m 36 sec was recorded)
10		13 minutes	
11		15 minutes	
12		28 minutes	
13		31 minutes	
14	4	14 minutes	42 m 44 sec
15*		14 minutes	
16		16 minutes	
17*		21 minutes	

* Participant 15 and 17 were repeating the third-year design studio and considered themselves third-year students in the pilot survey. They were considered them fourth-year students in this study regarding their level of experience.

The participants were chosen by the researcher among students, who were good at expressing their ideas and thoughts, based on the researcher's observations and previous experience with them. It was also paid attention that the participants had different characteristics and design skills they were good at. The researcher's

observations to evaluate these differences were helpful to reach a diversity in the participants' learning styles as well, which is presented in Figure 24. The researcher invited five students from each year of study via e-mail to participate in the pilot study. Even though all of them accepted the invitation, three students (one from each student group) could not participate on the day of the study due to personal reasons.

Figure 24. The distribution of participants' learning styles.

Focus groups for each student group were conducted in different sessions. The sessions started with welcoming the participants. No explanation or detail was given since the participants were aimed to read the written explanation about the research provided in the introduction of the survey and complete it accordingly. The researcher shared the link of the survey (Google Forms) and asked them to take notes if they had any questions or comments to share with the group later. The participants informed the researcher when they completed the survey. When all participants were ready, the researcher moderated the group discussions in order to obtain feedback on the

following issues:

- the clarity and understandability of the questions
- the adequacy of the explanation and instructions
- the use of two languages in a single version (Turkish and English)
- the length of the survey (in terms of duration) and the length of the parts and texts
- confusing, contradictory and/or irrelevant questions and/or statements
- suggestions for improvement

The time needed for completion was planned to be 15 minutes, when developing the instrument. Whereas the majority of the participants completed the survey in around 15 minutes, it took longer for some of them. It was observed that the reason for this delay was due to not reading the instructions for KLSI 3.2. Since their responses were not in the right format and not accepted by the system (Google Forms), they could not submit it before correction and continue further. In that sense, conducting an online survey via Google Forms enabled the researcher to ensure that all questions were answered and in the designed format without errors, which is often observed when completing KLSI 3.2. There was only one participant (fourth-year), who completed that section without any mistakes in the format, and one participant (first-year), who stated that he would quit, if he had not had to complete it in the session. The others were not disturbed by the time they lost in that part. However, one group discussed that when ranking the statements from 1 to 4, they felt as if they did not value the importance of what they rated the lowest, whereas another group stated a similar opinion and that they were familiar with the format where they rate a statement on a scale, but not with ranking several statements among themselves.

They stated that they progressed faster after the completion of the inventory and that the explanations, instructions, and statements were clear. There was one particular discussion about the statements about being an active participant among the third-year students. One of them stated that some statements had similar meanings or positive correlations, which he thought was quite obvious and confusing in terms of understanding the difference. He gave the example that if a project was interesting and attracting for him, it would definitely excite him. The others expressed different perspectives. One of them said that it would excite her, if she took more responsibility, but it might still not be interesting for her, whereas another participant stated that it

would make him nervous, if he took more responsibility. Therefore, the statement in the survey were not revised, since it was the participants' subjective perceptions, which indicated the diversity of views that was aimed to be revealed in the study.

Moreover, it was realized that a participatory process in a course might not be regarded or perceived the same by all students. For instance, the fourth-year students in the pilot study participated in the "*Studio Chit-Chats" Workshop* and/or took the second-year design studio, which was explained in detail in Section 5.3.1.3. However, one of them responded to the question, "Have you ever participated in project planning in a course before?", as "No", whereas another participant responded as "Yes", but described her experience in a different course in the following question. The other two participants mentioned their experiences in the second-year design studio and whereas one of them did not give any detail, rather than a collective discussion in the studio, the other provided more details about the process and mentioned a group discussion, instructors' interference, and voting as the forms of participation. In the focus group, they discussed this experience in that design studio course. It was noticed that the participants, who did not mention about it in the survey, were the ones, who believed that it had not been a participatory process, but rather a process dominated by a group of students, whose ideas had been in line with what the instructors had expected. They did not feel that their contributions had been valued and taken into consideration. However, the others were quite satisfied with the process and had engaged more than the others. None of them provided as many details as the course instructor did in the interview or evaluated the level of participation in their comments as high as she did. The difference among students' evaluations of their past experiences was a valuable realization in terms of the importance of ensuring that all students feel involved, listened, and valued.

Even though it had not been stated by the participants, an incoherency (due to wording) in one of the statements, which did not affect the meaning, was detected by the researcher in one of the sessions. It was corrected and the format of the statements was revised in the part about being an active participant to ensure consistency within the survey as well. Moreover, all participants evaluated the use of two languages positively. Some of them stated that they read the statements in English as well in order to confirm that they understood it (often a term and/or an action) right. There were also others, who did not even realize the statements in English for a while, since they

directly focused on the Turkish ones. Therefore, it was decided to keep the texts in both languages together in the actual survey as planned. There was no information provided to the participants in the introduction of the pilot survey, so it was decided to inform the future survey respondents about the use of two languages in the introduction. The participants also found the length of the survey (texts, parts, and duration) reasonable. Some of the participants stated that they enjoyed the survey, especially the parts about participation, and did not get bored. For instance, one of the second-year students expressed her excitement and curiosity, when she was filling out the part about being an active participant. She also said that thoughts and feelings in relation to the possibility that she could participate actively in a project planning process had started to pop up and that she became more excited and engaged, when she saw some similar statements.

The third-year and fourth-year students were more engaged in the discussions and contributed more comfortably, unlike the first-year and second-year students. Therefore, the researcher was more involved in the dialogues to encourage the participants to express their thoughts. Even though there may be many other factors that cause this low engagement, the reason in that case was assumed to be their lack of experience in PBDL.

The pilot study did not indicate a need for a major revision. It was decided to send out the survey to the sample group after the minor revisions.

5.3.2.5 Procedure of Data Collection

The survey was e-mailed to the heads of ID departments in Turkey and ETMK (*Endüstriyel Tasarımcılar Meslek Kuruluşu/Industrial Designers' Society of Turkey*) with a request for forwarding it to their institutional student e-mail lists. Reminders for the completion of the survey were also sent in order to maximize the number of responses as much as possible. Regarding this, the survey was accessible online during varying periods between November 26, 2020 and January 20, 2021.

5.3.2.6 Internal Consistency Reliability

Following the data collection, the internal consistency reliability of the instrument was tested through Cronbach's Alpha. Table 4 shows Cronbach's Alpha coefficients, means, and standard deviations for the KLSI 3.2 and the first two subparts (SP1 and

SP2) of the third part of the survey. The results show that the average scale reliability of KLSI 3.2 indicates good internal consistency reliability (α = 0.725), even though it is lower than that was found in Kolb's study for the internal consistency reliability of KLSI 3.1 (α = 0.80) and KLSI 4.0 (α = 0.81). The Cronbach's Alphas for the combined scores (AC-CE, AE-RO) were found to be over 0.70, which were both 0.82 in Kolb's study for KLSI 3.1 (not presented for KLSI 4.0). There may be several reasons for lower scores, such as cultural difference, sample size, translation and the use of two languages, and disciplinary differences. In addition to the results for KLSI 3.2, the results show good reliability for SP1 and SP2 as well (α = 0.701 and α = 0.878 respectively). As a result, the survey shows good average internal consistency reliability with a score of 0.768 across 119 respondents.

Table 4. Internal consistency reliability and scale statistics of the survey.

Part of the survey		Cronbach's Alpha (α)*	Means	Std. Deviations
Part 2 (KLSI 3.2)	CE	0.739	26.63	6.487
	RO	0.641	29.24	5.728
	AC	0.752	30.53	6.491
	AE	0.771	33.61	6.993
	Average (α)	0.725		
Part 3 - subpart1 (SP1)**		0.701	49.39	7.362
Part 3 - subpart2 (SP2)		0.878	84.80	13.48
Average (α)		0.768		

* $\alpha \geq 0.9$ – Excellent; $0.7 \leq \alpha < 0.9$ – Good; $0.6 \leq \alpha < 0.7$ – Acceptable; $0.5 \leq \alpha < 0.6$ – Poor; $\alpha < 0.5$ – Unacceptable (George and Mallery, 2003).
** Item 6 has been removed due to low factor loading in the PCA.

Whereas the KLSI 3.2 was already proved to be valid across cultures and disciplines (Kolb, 2015), including design, the sample sizes both in the pilot and actual studies were low to test the validity of the self-developed scales statistically. However, the instrument was assumed to be valid to measure its target, since it was developed on the basis of theoretical constructs found in the literature.

5.3.2.7 Data Analysis

SPSS 22 was used for the statistical analysis of the data collected from the sample size of 119. With the aim of answering the first research question (RQ1), "*What is the relationship between ID students' learning styles and opinions on student participation in project planning in PBDL?"*, the raw dataset was first analyzed in order to answer the subquestions (RQ1.1, RQ1.2, and RQ1.3), before relating the findings statistically. First, the correlation analysis was conducted to reveal the inter-

item correlations in KLSI 3.2 in SPSS 22, whereas the learning styles of the respondents were identified in Microsoft Excel, following the instructions in KLSI 3.2 Workbook (Korn Ferry and Kolb, 2018), provided with the purchased inventory. Then, the descriptive statistics were examined and the Exploratory Factor Analysis was conducted, using the Principal Component Analysis (PCA), in order to identify the respondents' opinions on the level and form of participation and on being an active participant in project planning. PCA is a data reduction method that generates the smallest number of derived variables (i.e. factors or components) by clustering highly correlated variables that can best represent the larger set of original variables for simplifying the subsequent analysis of the data (Landau and Everitt, 2004). In order to achieve a simple structure and interpretable factors, the Varimax Rotation with Kaiser Normalization (orthogonal rotation) method was adopted, which assumes that factors are uncorrelated with each other (Büyüköztürk, 2002; Brown, 2009; Saraçlı, 2011), since very low and insignificant correlation among factors were found when the Direct Oblimin method (oblique rotation) was applied. Following the PCA, the Pearson correlations between the combined scores in KLSI 3.2 and the items loaded in the components were examined in order to understand the relationship between students' learning styles and their opinions on student participation in project planning.

5.3.3 Exploring Student Participation in Pedagogical Planning in PBDL

In-depth semi-structured interviews were conducted with instructors, teaching ID, in order to reveal how the diversity of students' individual differences are accommodated in pedagogical planning in PBDL. It was aimed to dive deeper into the pedagogical planning processes in each year of study and gain insight into how distance learning during the COVID-19 pandemic affected these processes and student participation.

5.3.3.1 Sampling

Maximum variation (*heterogeneity*) sampling was used to select the interviewees. Maximum variation sampling is a purposive (*purposeful*) sampling method and documents diverse variations and identifies common patterns (Miles and Huberman, 1994). Rather than making generalizations, it aims to capture and describe similarities, differences, themes, and patterns that cut across a great deal of sample variation and to derive their significance emerging out of heterogeneity (Patton, 2002; Yıldırım and Şimşek, 2018). The researcher identified four key dimensions to maximize the sample

variation (Suri, 2011): (1) institutional affiliation, (2) year of teaching experience, (3) academic research interests, and (4) opinions on student participation. The first three dimensions were helpful in selecting potential interviewees based on their academic resumes. The websites of ID departments in Turkey were visited and the resumes of the full-time academic staff that teach undergraduate level design studio courses were reviewed. A total number of forty-four instructors were e-mailed and invited to participate. It was also paid great attention to involve samples with diverse levels of participatory mindset, regarding student participation in PBDL, in order to maximize the diversity in the sample group. Therefore, the fourth dimension was the key determinant of the sample size. The data collected through the verbal statements of the interviewees as well as the self-assessment forms enabled the researcher to evaluate when the saturation of findings were reached (Yıldırım and Şimşek, 2018). After twenty-two interviews, it was realized that the depth and richness of information were satisfactory in terms of validity, meaningfulness, and insightfulness (Patton, 2002). Regarding that the data being collected had started to repeat itself immensely, the sample size was limited to 30 interviewees, who had already been interviewed.

It should be noted that even though a diversity in the interviewees' learning styles were reached along with diverse opinions on student participation, it was decided to rule out learning styles as the measure of the sample variation, since no direct relationship was observed between the interviewees' learning styles and the participatory practices in their courses. For instance, the interviewees, who had the same learning style, often had different participation levels in their courses.

5.3.3.2 Interviewees

The twenty-eight full-time and two part-time instructors from fourteen different universities (six public and eight foundation) participated in the research. The interviewees' academic titles varied. Some of the interviewees were more experienced in teaching than others (one to forty-one years of experience) and some of them had sectoral experiences as well. They were teaching and/or had taught different levels of ID studio courses in undergraduate programs at the universities they were affiliated with. Some of them were teaching multiple PBDL courses. The majority of them also had experiences at different higher education institutions. Moreover, there was a wide range of expertise and academic research interests, including but not limited to

semiotics, design anthropology, creative industries, systems thinking, entrepreneurship, development of design profession in Turkey, design research methods, design history and criticism, material culture, consumer culture, product identity, packaging design, furniture design, ergonomics and human factors, prototyping technologies, materials and technological innovation, craft and innovation, social design, ecological design, design for health and wellbeing, gender studies, practice-based education, design pedagogy. There was also a diversity in how the interviewees perceive their roles as educators and the level of student participation in their courses, as well as their learning preferences (based on twenty-five responses in self-assessment forms).

5.3.3.3 Instruments

An informed consent form (Appendix B) was utilized in order to communicate the aim and scope of the interview, how the data would be used, confidentiality issues, as well as the duration and flow of the interview through simple, straightforward, and understandable statements prior to interviews (Patton, 2002). It was in an online format (Google Forms) and in Turkish.

The interview guide approach was adopted for the interviews, since it allows systematic data collection in a limited period of time with a focus on a particular subject (Patton, 2002). In this approach, the topics and issues that will be covered are specified in advance and in an outline form and then the interviewer decides the sequence and wording of questions during the interview (Patton, 2002). Therefore, an interview guide (Appendix C) was developed based on the principles listed by Yıldırım and Şimşek (2018). These principles include developing easily understandable, focused, and open-ended questions while avoiding leading and multi-dimensional questions, preparing alternative questions and probes, including different types of questions, and organizing questions in a rational manner. Regarding these principles, the interview guide involved questions in relation to the interviewee's design teaching experience, pedagogical planning processes and student participation in their project-based courses, and the effects of distance learning during the COVID-19 pandemic on these issues.

Moreover, a self-assessment form (Appendix D) was developed for the interviewees to reflect on their own responses they had given during the interviews and to ensure

the sample variation. The form consisted of:

- a multiple choice question with 16 statements, based on the educator profiles of ELT in order to enable the interviewees to reflect on their roles as the instructor of that particular course,
- 3 items about the level of student participation in projects in that course, to be rated on a 5-point Likert scale (1: Very Low, 5: Very High), and
- KLSI 3.2 (see Section 5.3.2.3), since the learning styles literature suggests that instructors' learning preferences may influence their teaching styles, which was assumed to have an effect on their opinions on student participation in pedagogical planning.

The self-assessment form could not be tested for internal consistency reliability due to the limited sample size. It was in an online format (Google Forms) and in Turkish. However, the KLSI 3.2 was available both in English (original version) and Turkish (translated by Demirbas and Demirkan, 2003; Demirbas and Demirkan, 2007), assuming that the bilingual interviewees could prefer to complete the original version because of the possibility of any loss in translation.

With the aim of sharing the results of KLSI 3.2 with the interviewees, a pdf document was prepared by the researcher for each learning style (Appendix E). This document included the learning strengths, learning challenges, and personal characteristics in relation to learning of the particular learner type. The document also included a brief introduction to Kolb's ELT, learning cycle, and the nine most common learning styles in order to familiarize the interviewees with the theoretical background of the research and raise awareness of the diversity of their students' learning styles.

5.3.3.4 Pilot Study

Two pilot interviews were conducted via Zoom, utilizing the interview guide that was developed by the researcher. Both interviews were video-recorded. The aim was to receive direct and/or indirect feedback for the appropriateness of the questions, receive possible suggestions on the viability of the research, and enhancing the necessary skills in conducting interviews within the context before the larger study (Doody and Doody, 2015).

The first interviewee was a full-time lecturer and had taught the compulsory second-year design studio course and an elective third-year/fourth-year project-based course in the Industrial Design Program, Department of Design, The Ohio State University. Even though she was affiliated with a foreign educational institution, which is out of the scope of this research, she was Turkish, educated in Turkey, and also had part-time teaching experience in design studio courses in the Department of Industrial Design, İzmir University of Economics. The other interviewee was a part-time lecturer and taught one of the compulsory first-year design studio courses and an elective third-year/fourth-year project-based design course (both departmental and university elective) in the Department of Industrial Design, Yaşar University. None of the interviewees had had experience in remote teaching prior to the COVID-19 pandemic. However, both of them had experience in online education as learners/participants, since they had taken some design-related online courses before.

Since the pilot interviews were conducted in August 2020, after the 2019-2020 spring semester had ended, both interviewees were asked to share their most recent project-based design teaching experiences. There were a few important realizations during the interviews. First, both interviewees had been teaching more than one project-based course in that semester. It was observed that both interviewees had different approaches and processes in different courses they taught. They tended to talk more about the courses they were experienced with the most. This indicated the possibility to come across the same situation in the actual interviews. Therefore, it was noted for further research phases in order to be prepared to guide and enable the interviewees to talk about their experiences in simultaneous courses, if any, as equally as possible within the duration of the interview.

Secondly, both interviewees tended to emphasize their educator roles during the interviews. Whereas one interviewee defined herself as “negotiator”, the other emphasized his role as being a “facilitator”. Moreover, when the researcher asked the interviewees whether they had questions or comments before the interviews ended, both of them made a self-reflection in terms of how they approach student participation in their courses. This led to developing a self-assessment form, to be completed by each interviewee at the end of their interviews, which would allow them to reflect on their educator roles and student participation in different phases of projects in their courses. Since ELT already discusses four educator profiles (Kolb et al., 2014), the

characteristics of each profile were listed in a multiple-choice question in the self-assessment form with the aim of understanding the various roles the interviewees were taking on, rather than trying to determine their exact educator profiles.

Thirdly, the two educational institutions had different academic calendars. Whereas the semester ended in April at The Ohio State University, it ended in June at the Yaşar University. Therefore, the courses of the interviewees had been affected by the COVID-19 pandemic, which had started in March 2020, quite differently. Even though the research within the scope of this dissertation would be conducted only in Turkey, it was realized that remote teaching with and without any prior experience were different in terms of planning processes, along with many other issues. Therefore, there was a high possibility that there would have been great differences in future interviewees' experiences in planning and teaching courses in the 2019-2020 spring and 2020-2021 fall semesters. This realization was noted to take into account when conducting the actual interviews and the researcher made revisions in the interview guide accordingly so as to explore how the experience in the previous semester affected the following one.

Both interviews took 45 minutes as planned. The communication platform and the scope, flow, and clarity of the questions were deemed appropriate for the actual interviews. However, the wording of some questions in the interview guide were long and distracting for the researcher to follow during the pilot interviews. The necessary revisions were made in order to simplify the interview guide and the self-assessment form was prepared before the actual interviews.

5.3.3.5 Procedure of Data Collection

In-depth semi-structured interviews were conducted with twenty-seven individual interviews and one group interview via Zoom, expect one conducted via Google Meet due to technical difficulties. The group interview was conducted with three interviewees, who were in the same team of instructors, due to their preferences and busy schedules. Each interview was planned to last 30-45 minutes. However, some of them lasted longer due to technical difficulties and/or the flow of the conversation. All sessions were video-recorded using Zoom's recording feature, except one interview that was held on Google Meet and audio-recorded using a smartphone.

Following the exchange of e-mails with volunteered interviewees, the links for the consent form and Zoom invitations were sent via e-mail to each interviewee prior to interviews. The Zoom sessions started with an opening statement by the researcher, including a brief self-introduction and overview of the information given in the consent form. The interviewees were asked if they had any questions or comments before further inquiry. After the verbal permission of each interviewee, the questions were asked by the researcher following the interview guide. The researcher took notes during the interviews when needed. These notes were helpful especially for two reasons. First, it enabled the researcher to ask spontaneous questions, when what had been told needed further investigation or clarification, without interrupting the interviewee while talking. Secondly, it helped completing the 20-25 minutes of missing data in one of the interviews, which could not been recorded due to technical problems.

The final/closing question of the interview aimed to receive the interviewees' self-reflections. They were asked to reflect on their roles and level of student participation in their courses by filling out the self-assessment form provided by the researcher. The link of the form was sent via Zoom Chat to enable the interviewees to review it as the researcher was describing it. Moreover, the reason for applying KLSI 3.2 was explained in order to avoid any confusion, since the inventory was about their learning preferences, which they could have considered out of scope. It was the researcher's suggestion to complete it before the Zoom session ended, since it was observed that interviewees could recall some experiences that they wanted to share while filling it out. However, some of them preferred to complete the form after the interview. The link was e-mailed to the interviewees, who preferred that option. The results of KLSI 3.2 were e-mailed to each interviewee, who completed the form, in two days after completion.

5.3.3.6 Data Analysis

The video- and audio-recordings of the twenty-eight interviews were transcribed in Word format for qualitative in MAXQDA 2020. With the aim of answering the second research question (RQ2), "*How is the diversity of students' individual differences accommodated in pedagogical planning in PBDL?*", the transcriptions were first analyzed in order to answer the subquestions (RQ2.1, RQ2.2., RQ2.3, and RQ2.4).

First, the interviewees' self-assessment forms were analyzed. The learning styles of the interviewees were identified in Microsoft Excel, following the instructions in KLSI 3.2 Workbook (Korn Ferry and Kolb, 2018), provided with the purchased inventory. Then, the descriptive statistics were examined in order to identify how the interviewees perceive their educator roles and level of student participation in their courses. Then, for the analysis of the interview transcripts, the directed content analysis approach was adopted, in which the initial coding scheme is developed based on an existing theory or relevant research findings prior to data analysis (Kyngas and Vanhanen, 1999) and is revised and refined with additional codes derived from the data as the analysis proceeds (Hsieh and Shannon, 2005). Therefore, the analysis started with three themes, corresponding with the four subquestions of RQ2, and the initial coding scheme was derived mainly from the ELT, participatory and design pedagogy literature, and the quantitative findings of the survey. After three coding cycles, the coding scheme was finalized, fixed with additional codes and sub-codes, and the sub-categories, categories, and sub-themes were determined.

CHAPTER 6: FINDINGS AND DISCUSSION

This chapter presents the findings obtained in the survey and interviews. The findings were discussed in relation to the research questions with the aim of understanding how to utilize learning styles in PBDL.

6.1 Student Diversity in PBDL

This section presents the findings in relation to the student diversity in PBDL and the interpretations of these findings.

6.1.1 Findings

The statistical findings obtained in the survey are presented under three titles, corresponding with RQ1 and its three subquestions. In order to provide meaningful findings for the main research question, the findings in relation to the subquestions are presented first. The findings in relation to the first subquestion (RQ1.1) address the distribution of learning styles. Then, the findings in relation to the second and third subquestions (RQ1.2 and RQ1.3), addressing students' opinions on student participation in project planning, are presented. Lastly, the inter-relation of RQ1.1 with RQ1.2 and RQ1.3 is given in the search for the answer for the main research question (RQ1).

6.1.1.1 *Distribution of Students' Learning Styles*

These findings are specifically related with RQ1.1. Five components were extracted in the analysis of SP1 through the PCA. The inter-related items were clustered in these components, representing students' opinions on the level and form of student participation. The descriptive statistics and inter-correlations were examined for KLSI 3.2. There were 119 valid responses and no missing values. According to the results of KLSI 3.2, all nine learning styles were identified. The pie chart below demonstrates the frequencies and percentages of each learning style in the distribution (Figure 25). The learning styles of the 98% of the respondents are almost equally distributed in eight learning styles (*Initiating*, *Experiencing*, *Imagining*, *Acting*, *Balancing*, *Reflecting*, *Thinking*, and *Analyzing*). The frequencies for each of these eight learning styles show only slight differences. However, three respondents have the *Deciding* learning style, which has the lowest percentage (2%) among others.

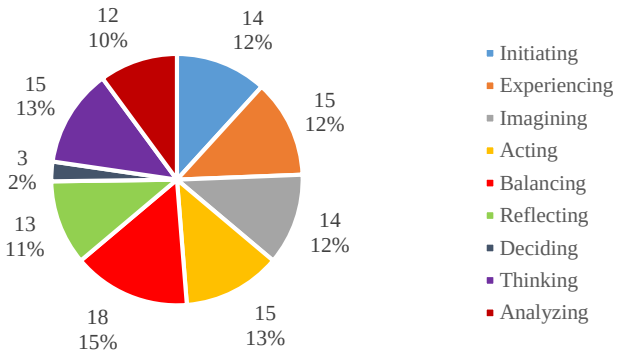

Figure 25. Frequencies of respondents' learning styles.

The scores for each learning mode were plotted on the nine-region learning style grid. Figure 26 shows that the respondents' preferences for learning are more on the CE side than AC on the apprehension-comprehension axis (perception continuum), whereas there is more balanced distribution between AE and RO on the prehension-apprehension axis (process continuum). The distribution based on different years of study does not indicate any significant clustering in any of the regions. However, there is a shift towards the *Balancing* and *Imagining* learning styles in the fourth year of study. Moreover, none of the third-year students has *Deciding* or *Thinking* learning styles.

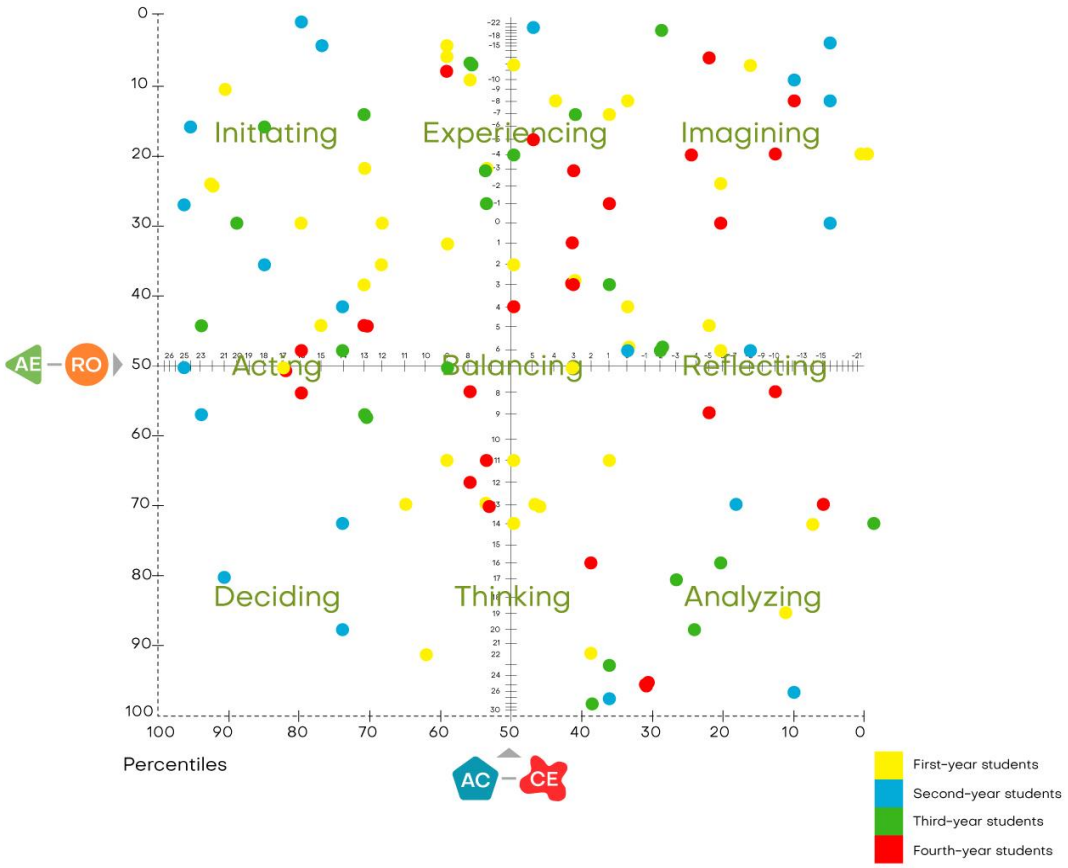

Figure 26. The distribution of the respondents' learning styles.

The inter-correlations among the four learning modes and two combined scores calculated in KLSI 3.2 are presented in Table 5. The values are evaluated on the grounds of ELT predictions and considering the values obtained for KLSI 4.0, which is the online version of KLSI 3.2. As explained in Kolb's study, CE, RO, AC, and AE are composed of two dialectic dimensions, the no correlation is expected between the AC-CE and AE-RO scores. In addition to this, the AE-RO score should not be correlated with the CE and AC scales and the AC-CE score should not correlate with the AE and RO scales. Also, the prediction is that opposite poles (CE/AC and AE/RO) should be negatively correlated, but not strongly due to the possibility of developmental integration of the opposite poles. Lastly, the cross dimensional scales (CE/RO, AC/AE, CE/AE, AC/RO) should not be correlated as highly as within dimension scales.

Table 5. Pearson correlation tables.

KLSI 3.2 in the PBDL Study						
	CE	RO	AC	AE	AC-CE	AE-RO
CE	1					
RO	-0.279**	1				
AC	-0.429**	-0.152	1			
AE	-0.301**	-0.419**	-0.406**	1		
AC-CE	0.845**	0.075	0.845**	-0.062	1	
AE-RO	-0.047	-0.807**	-0.184*	0.875**	-0.081	1
KLSI 4.0 in Kolb's Study						
	CE	RO	AC	AE	AC-CE	AE-RO
CE	1					
RO	-2.25**	1				
AC	-0.369**	-0.210*	1			
AE	-0.137**	-0.418**	-0.407**	1		
AC-CE	-0.822**	0.006	0.833**	-0.169**	1	
AE-RO	0.071**	-0.870**	-0.086**	0.812**	-0.095*	1

**. Correlation is significant at the 0.01 level (2-tailed).
*.Correlation is significant at the 0.05 level (2-tailed).

Unlike Kolb's study, the CE/AC-CE correlation (0.845) is high and positive in this study. Kolb's study shows high but negative CE/AC-CE correlation (-0.822), indicating that the learning activity on the vertical axis of the learning cycle shifts towards learning by thinking, when the CE score is high. However, this correlation in this study indicates a shift towards learning by experiencing in the learning activity, as the CE score increases. The cross-dimensional scales CE/RO and AC/RO have low correlations as predicted. The CE/AE correlation is moderate in this study, whereas it is low (-0.137) in Kolb's study. The correlation of AC with AE (-0.406) is higher than predicted, which is observed in Kolb's study (-0.407) unlike the prediction as well. With the exception of the negative AC/AE correlation, the scale inter-correlations indicate internal validity by showing excellent correspondence with ELT predictions. The differences may be due to the larger sample size and the sample profile in Kolb's study, which involved individuals from various different disciplines.

6.1.1.2 *Students' Opinions on Student Participation in Project Planning*

These findings are specifically related with RQ1.2 and RQ1.3. The descriptive statistics for the third part of the survey were examined before the analysis of the dataset. There were 119 valid responses and no missing values. The bar charts in Figure 27 and 28 represent the frequencies for each item in SP1 and SP2. Over 50% of the respondents strongly agreed to the use of creative methods (52%), individual

differences taken into account by instructors (52%), and having options (60%) during project planning and strongly disagreed to mere instructor control (50%) and no participation of students (63%) in project planning (Figure 27). Moreover, over 50% of the respondents strongly agreed that they feel motivated (61%), encouraged (53%), excited (55%), and interested (56%) when participating actively and strongly disagreed that they feel alienated from the project (66%) (Figure 28).

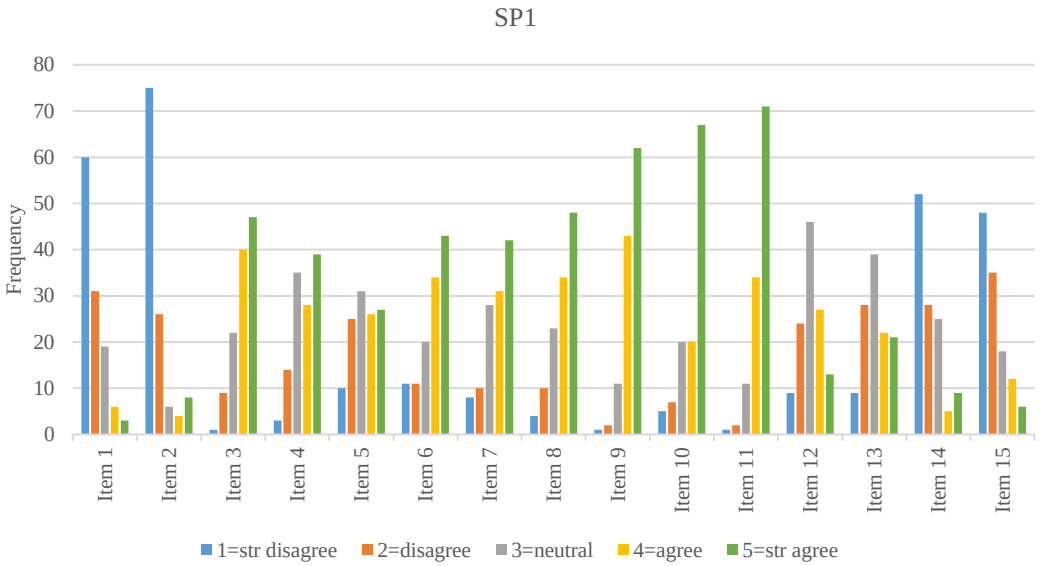

Figure 27. Frequencies of items in SP1.

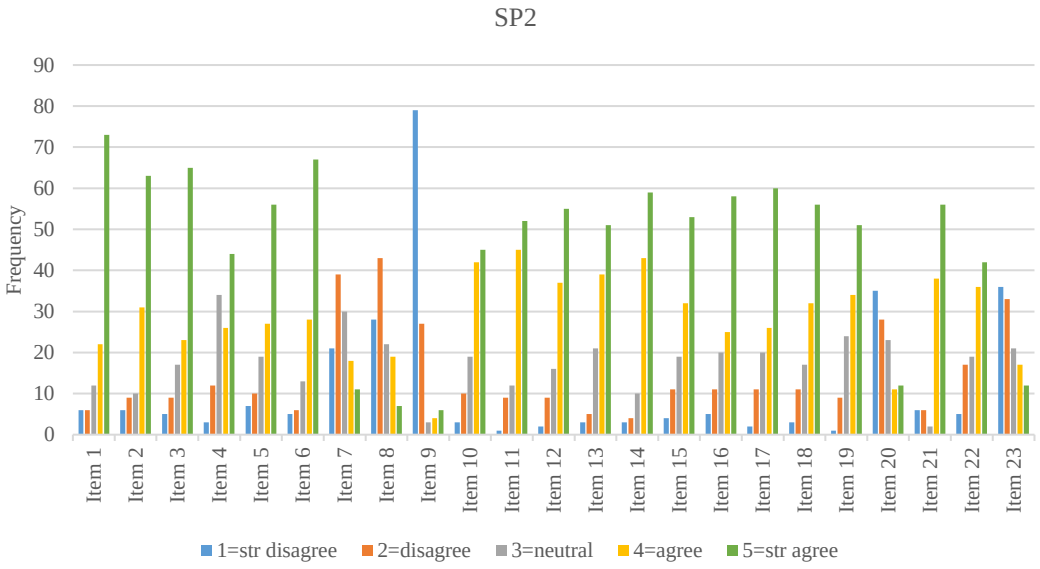

Figure 28. Frequencies of items in SP2.

The means and standard deviations for each item (SP1 and SP2) are presented in Table 6. In SP1, the items that address total instructor control and total student control have the lowest means (< 3), whereas the highest means (> 4) indicate higher preference for the items that address instructor control informed by students' views and needs and that have lower standard deviations (except Item 10) than the others, indicating more consistency among the responses. In SP2, on the other hand, the items that are related to feeling detached from the project and learning process have the lowest means (< 3), whereas the items that are related to more positive feelings, such as interest, motivation, satisfaction, attachment, and making sense of the process have the highest means (> 4). The most significant strong disagreement (Item 9) is observed to be about feeling alienated from the project when active participation occurs. Moreover, the most consistent responses are given to Item 11 (std. deviation = 0.984) and Item 14 (std. deviation = 0.936), both of which address that active participation helps understanding the learning and design processes.

Table 6. Descriptive statistics (SP1 and SP2).

SP1			SP2		
Item	**Mean**	**Std. Deviation**	**Item**	**Mean**	**Std. Deviation**
1	1.83	1.036	1	4.26	1.146
2	1.69	1.155	2	4.14	1.167
3	4.03	0.982	3	4.13	1.168
4	3.72	1.119	4	3.81	1.122
5	3.29	1.265	5	3.97	1.228
6	3.73	1.293	6	4.23	1.100
7	3.75	1.216	7	2.66	1.203
8	3.94	1.115	8	2.45	1.184
9	4.37	0.790	9	1.58	1.054
10	4.15	1.154	10	3.97	1.053
11	4.45	0.799	11	4.16	0.948
12	3.09	1.081	12	4.13	1.021
13	3.15	1.191	13	4.09	1.000
14	2.08	1.225	14	4.27	0.936
15	2.10	1.189	15	4.00	1.135
			16	4.01	1.190
			17	4.10	1.092
			18	4.07	1.103
			19	4.05	1.007
			20	2.39	1.276
			21	4.11	1.111
			22	3.78	1.194
			23	2.46	1.326

In the third subpart (SP3), twenty-two respondents (18,5%) stated that they had participated in project planning in a course before, whereas the other ninety-seven respondents (81,5%) stated that they had not (Figure 29). The twenty-two responses in the fourth subpart, asking for a brief explanation of respondents' participation experiences in the past, were reviewed and it was observed that only four respondents gave relevant responses to the question, however, with no details. One of the respondents mentioned that students had been in charge of their own time planning in the third-year of study, which s/he felt increased sense of ownership and confidence due to knowing the details of the process. The same respondent stated that s/he experienced decreased sense of belonging and a lack of command of the project, when the students were given control of project planning in the fourth-year of study, due to more uncertainties in terms of project focus and due to unfamiliarity with such a process, even though s/he believed that the latter system is more "correct". The other three respondents stated their experiences with voting for the selection of project themes (final decision made by the students), brainstorming for project themes (final decision made by the instructors), and individual time planning for project/design phases. The other eighteen responses were irrelevant and mostly related with engaging in a design studio project, group project (in the design studio) or collaboration projects with non-academic stakeholders. Two of them stated that they had good feelings towards group projects, one of whom stated that s/he felt better when s/he took a step back within the group in the further phases of the project. None of these responses indicates the involvement of students in the pedagogical planning process.

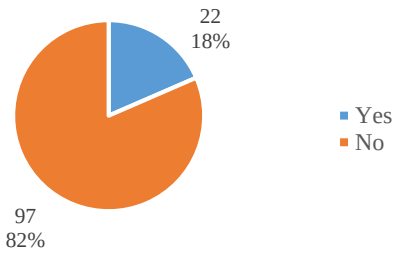

Figure 29. Frequencies of responses for experience in participation (SP3).

Before the analysis of SP1 and SP2, the Kaiser-Meyer-Olkin (KMO) and Barlett's Test was checked for the suitability of the data for the PCA. Table 7 demonstrates the KMO indices, indicating the adequacy of the sample size (KMO > 0.60), and the Bartlett's Test, indicating the strong relationship among the variables and the suitability of the data for the analysis.

Table 7. KMO and Bartlett's test (SP1 and SP2).

		SP1	SP2
KMO Measure of Sampling Adequacy		0.747	0.912
Bartlett's Test of Sphericity	Approx. Chi-Square	498.670	2250.332
	df	105	253
	Sig.	0.000	0.000

Then, the PCA was conducted. Extraction communalities were examined in order to test the unidimensionality of SP1 and SP2. Table 8 shows the communality values for each item in these subparts. Only two items (Item 12 in SP1 and Item 23 in SP2) presented communality lower than 0.5. Even though each item must present communality higher than 0.5 for greater explanatory power for a determined item in the question model (de Barros Ahrens, da Silva Lirani and de Francisco, 2020), these items were retained despite their low communality values, since Item 12 in SP1 is the only item that addresses partial student control over project planning without instructor guidance and Item 23 in SP2 is the only item that addresses guidance from instructors.

Table 8. Extraction communalities (SP1 and SP2).

SP1		SP2	
Item	**Component**	**Item**	**Component**
1	0.697	1	0.810
2	0.734	2	0.823
3	0.554	3	0.675
4	0.652	4	0.720
5	0.602	5	0.759
6	0.505	6	0.782
7	0.605	7	0.778
8	0.719	8	0.827
9	0.708	9	0.585
10	0.715	10	0.702
11	0.594	11	0.615
12	0.494	12	0.770
13	0.689	13	0.787
14	0.679	14	0.798
15	0.731	15	0.783
		16	0.694
		17	0.800
		18	0.660
		19	0.565
		20	0.606
		21	0.817
		22	0.562
		23	0.358

Extraction Method: Principal Component Analysis

The 15 items in SP1 and 23 items in SP2 were computed in order to determine the number of factors to be retained through PCA. Five components in SP1 and four components in SP2 were identified based on Eigenvalue > 1. Table 9 summarizes the extracted factors, explaining 64.514% (SP1) and 70.760% (SP2) of the total variances. In SP1, *Component 1* with Eigenvalue = 4.223 explains the 28.153% of total variance, whereas the following components explain the 12.052% (*Component 2*), 9,495% (*Component 3*), 7.872% (*Component 4*), and 6.942% (*Component 5*) of total variance. In SP2, on the other hand, *Component 1* with Eigenvalue = 11.285 explains the 49.066% of total variance, whereas the following components explain the 9.785% (*Component 2*), 6.734% (*Component 3*), and 5.175% (*Component 4*) of total variance.

Table 9. Eigenvalues and total variances explained (SP1 and SP2).

SP1			
	Eigenvalues		
Component	**Total**	**% of Total Variance**	**Cumulative %**
1	4.223	28.153	28.153
2	1.808	12.052	40.205
3	1.424	9.495	49.700
4	1.181	7.872	57.573
5	1.041	6.942	64.514
SP2			
	Eigenvalues		
Component	**Total**	**% of Total Variance**	**Cumulative %**
1	11.285	49.066	49.066
2	2.251	9.785	58.851
3	1.549	6.734	65.585
4	1.190	5.175	70.760

Since the sample size was 119, factor loads of 0.5 and over were included in the matrix, as suggested for studies with approximately 120 samples (Yaşlıoğlu, 2017). Table 10 demonstrates the factor loads of each item in the components, with values lower than 0.5 being suppressed. Item 6 in SP1 had no meaningful factor loading (< 0.5), which required the removal of the item for further analysis.

Table 10. Factor loading for PCA (Rotated Component Matrix[a]).

SP1						SP2				
	Component						Component			
Item	1	2	3	4	5	Item	1	2	3	4
1				0.793		1	0.705			
2				0.789		2	0.698			
3	0.623					3	0.653			
4		0.738				4	0.817			
5		0.759				5	0.796			
6						6	0.653			
7		0.617				7				0.857
8			0.693			8				0.875
9	0.631					9				0.556
10	0.831					10	0.624			
11	0.699					11	0.507			
12			0.659			12			0.734	
13			0.720			13			0.774	
14					0.800	14			0.730	
15					0.800	15	0.536			
						16		0.659		
						17		0.714		
						18		0.715		
						19		0.723		
						20				0.632
						21		0.739		
						22		0.694		
						23				0.522
Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization a. Rotation converged in 7 iterations						Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization a. Rotation converged in 7 iterations				

In order to ensure meaningful and interpretable components, the internal consistency reliability of the components were tested through the Cronbach's Alpha (Table 11). The results indicate average acceptable internal consistency reliability for SP1 components and average good internal consistency reliability for SP2 components.

Table 11. Internal consistency reliability of components (SP1 and SP2).

SP1			SP2		
Component	Items	Cronbach's Alpha (α)*	Component	Items	Cronbach's Alpha (α)*
1	3, 9-11	0.732	1	1-6, 10-11, 15	0.939
2	4-5, 7	0.663	2	16-19, 21-22	0.900
3	8, 12-13	0.631	3	12-14	0.782
4	1-2	0.592	4	7-9, 20, 23	0.781
5	14-15	0.562			

* $\alpha \geq 0.9$ – Excellent; $0.7 \leq \alpha < 0.9$ – Good; $0.6 \leq \alpha < 0.7$ – Acceptable; $0.5 \leq \alpha < 0.6$ – Poor; $\alpha < 0.5$ – Unacceptable (George and Mallery, 2003).

6.1.1.3 *Relationship Between Students' Learning Styles and Opinions on Student Participation in Project Planning*

The findings presented here are specifically related with RQ1. The correlations between the two combined scores that determine the learning style and the items forming the components, addressing students' opinions on student participation in project planning, obtained in the analysis of SP1 and SP2 were examined. Even though the correlations of each item with the four learning modes were examined as well, it was deemed unnecessary to present them along with the correlations with the combined scores, since they were no significant difference in findings.

The correlations between the two combined scores (AC-CE, AE-RO) in KLSI 3.2 and the five components in SP1 are presented in Table 12. The items, except Item 3, in the five components do not have any significant correlation with AC-CE, whereas none of the items is significantly correlated with AE-RO. Only Item 3 has a 95% significant negative correlation with AC-CE, meaning that the respondents, who tend to rate Item 3 higher, have a tendency towards CE on the apprehension-comprehension axis (perception continuum) of the learning cycle, or vice versa. However, this correlation is low (-0.216) and negligible (<-0.30), according to the rule of thumb for the size of correlation coefficient (Hinkle, Wiersma and Jurs, 2003).

Table 12. Pearson correlations between combined scores and items loaded in SP1 components.

Component	Item	Combined Scores	
		AC-CE	AE-RO
1	3	-0.216*	0.093
	9	-0.170	0.165
	10	-0.149	0.053
	11	-0.092	0.013
2	4	0.034	0.016
	5	0.077	-0.068
	7	0.018	0.013
3	8	0.011	0.141
	12	-0.011	0.034
	13	0.134	0.013
4	1	0.026	-0.045
	2	-0.071	-0.107
5	14	0.052	-0.129
	15	0.044	0.112

*.Correlation is significant at the 0.05 level (2-tailed).

Table 13 demonstrates the correlations between the two combined scores and the four components in SP2. Whereas ten items show negligible or low correlation with AE-RO, none of the items is significantly correlated with AC-CE. Among the items in *Component 1*, Item 1, Item 2, Item 10, and Item 11, have significant (99%) positive correlations with AE-RO and Item 6 has a significant (95%) positive correlation with AE-RO. Whereas these correlations are negligible due to correlation coefficient being <0.30, Item 15 has significantly (99%) positive yet low correlation (0.357) with AE-RO. In *Component 2*, Item 17 and Item 21 are positively correlated with AE-RO, with a significance level of 99%. However, these correlations are negligible as well. Item 16 and Item 22, on the other hand, show low positive correlation (0.30) with AE-RO, with a significance level of 99%. Among the items in *Component 3*, only Item 12 show significant (99%) positive yet negligible correlation (<0.30) with AE-RO. Therefore, the respondents, who tend to rate Item 1, Item 2, Item 10, Item 11, Item 6, Item 15, Item 16, Item 17, Item 21, and Item 22 higher, have a tendency towards AE on the prehension-apprehension axis (process continuum) of the learning cycle, or vice versa. None of the items in *Component 4* is significantly correlated with the combined scores.

Table 13. Pearson correlations between combined scores and items loaded in SP2 components.

Component	Item	Combined Scores	
		AC-CE	AE-RO
1	1	0.019	0.278**
	2	-0.038	0.266**
	3	0.029	0.148
	4	0.038	0.133
	5	-0.029	0.156
	6	-0.068	0.214*
	10	-0.024	0.253**
	11	0.033	0.290**
	15	0.035	0.357**
2	16	-0.097	0.300**
	17	-0.037	0.270**
	18	-0.177	0.174
	19	-0.108	0.121
	21	-0.045	0.247**
	22	-0.059	0.300**
3	12	-0.038	0.266**
	13	0.029	0.148
	14	0.038	0.133

Table 13. (continued)

4	**7**	**-0.163**	**-0.123**
	8	-0.169	-0.118
	9	-0.129	-0.176
	20	-0.100	-0.159
	23	0.003	-0.067

**. Correlation is significant at the 0.01 level (2-tailed).
*.Correlation is significant at the 0.05 level (2-tailed).

Even though the findings in Table 12 and 13 presented above show that the items forming the components show very low (negligible) or low correlations, these correlations are statistically significant. However, there is no statistically significant strong correlation of the extracted components, addressing students' opinions on student participation in project planning, with AC-CE and AE-RO, which are the two combined scores that determine the learning style.

6.1.2 Interpretation of Findings

The statistical findings were interpreted and discussed in relation to the relevant literature. The interpretation of the findings are presented in detail under titles, corresponding with the three subquestions and the main research question in this sub-section.

6.1.2.1 ***Distribution of Students' Learning Styles***

The respondents' learning styles show almost equal distribution in *Initiating*, *Experiencing*, *Imagining*, *Acting*, *Balancing*, *Reflecting*, *Thinking*, and *Analyzing* learning styles on the Kolb's learning style grid, with very low frequency in the *Deciding* learning style. It does not necessarily mean that there are not any students with a tendency to learn by thinking (AC) or doing (AE). It only implies the rarity of the simultaneous dominance of both learning modes ID students. It points out that ID students tend to be less focused on using theories and models to decide on problem solutions and courses of action (Kolb, 2015). They are more likely to think outside the box, be more sensitive to others' feelings, concentrate on interpersonal issues, and deal with ambiguity and uncertainties. Moreover, they are not fully satisfied in situations, in which they engage in technical experiments/applications, simulations, and laboratory assignments. They rather prefer real life situations, creative tasks, interactive group works/discussions, observation, and reflection. The homogeneous distribution of learning styles in eight regions also indicates a great diversity of

personal characteristics, preferences for learning activities, as well as learning strengths and challenges. For instance, there may be students who are more confident in speaking up in groups (*Acting*), whereas some students may prefer to work alone and have socialization issues (*Analyzing*). Similarly, whereas impatience may be an issue for some students, who struggle to control their impulses to act (*Initiating*), others may find it challenging to take action and need time to reflect on and make sense of things (*Reflective*). Well-structured situations with clear directions may be more preferable for some students (*Thinking*), but ambiguous situations may be more engaging and exciting for others (*Imagining*).

In parallel with what the literature suggests, the design studio in ID education is a balanced learning environment, supporting all learning modes (Nussbaumer and Guerin, 2000; Demirbas and Demirkan, 2003, 2007; Bender, 2004; Kolb and Kolb, 2005; Kvan and Yunyan, 2005; Tucker, 2007; Carmel-Gilfilen, 2012; Ayalp and Özdemir, 2016). The distribution of learning styles in all years of study does not indicate a significant clustering in any of the regions. Contrary to the learning styles studies (1996-2016) conducted in the field of interior design and architecture, this study indicates no significantly dominant learning style in ID education. This may be due to a disciplinary difference, despite similar design pedagogy. However, whereas the distribution is more heterogeneous in lower years of study, it gets more homogeneous in the fourth-year with a shift towards the *Balancing* and *Imagining* learning styles. These findings do not necessarily indicate the direction of the shift in each respondent's learning style through years. Yet, it may be indicating that the first three years of the ID curriculum help students develop the abilities to move more flexibly around the learning cycle, work with diverse groups of people, be aware of their feelings and values, listen with an open mind, make creative insights, and imagine the implications of ambiguous situations. However, they need improvement in their decision-making and leadership skills, as well as in showing sustained commitment and mastering at a particular subject. It is important to note that the findings might have been different with a larger sample size. Since an individual's learning style may shift through time (Kolb and Kolb, 2005), it is also assumed that each respondent in this study experiences a shift in his/her learning style until s/he graduates. Discovering the direction of this shift may only be possible in a further longitudinal study.

6.1.2.2 *Students' Opinions on the Level and Form of Student Participation in Project Planning*

Five components were extracted in the analysis of SP1 through the PCA. The inter-related items were clustered in these components, representing students' opinions on the level and form of student participation in project planning, in the search for answers for RQ1.2. The items that were loaded into the extracted components were interpreted and each component was identified with names accordingly:

- *Component 1 – Instructor control informed by students' views and needs*
- *Component 2 – Instructor control by the indirect/passive representation of students' views*
- *Component 3 – Partial student control with/without instructor guidance*
- *Component 4 – Total instructor control*
- *Component 5 – Total student control*

Component 1: Instructor control informed by students' views and needs

This component consists of items that are related to instructors allowing students to participate either in the beginning of or during project planning in order to accommodate their views and needs in the process. These items have means over 4 and have lower standard deviations than the others, indicating that respondents have higher and consistent preference for this level and form of participation than the other levels and forms. The particular item that addresses instructors' consideration of students' individual differences has the highest factor loading among others, showing the importance of accommodation of these differences by instructors in project planning. Accordingly, the form of participation may be direct and/or indirect. In case of direct participation, such as class discussions, all students may not be equally willing to participate actively. Even though this level of participation seems to be very high, it is strongly affected by students' willingness in taking active part. In such cases, it is important to ensure the consensus of all students on the final decision. Moreover, the chance of influencing the instructor's final decision may either be high or low, since the instructor is in control of decision-making and sets the limitations of the participation process. Indirect participation, on the other hand, may be in the form of observing students etc. In this case, instructors' subjective interpretation of students' views and needs is very crucial in final decision-making and how students perceive

the participation aspect of this process. In order to ensure that students feel being heard and involved, it needs to be made apparent to students by instructors that the final decisions are directly/indirectly informed by students, regardless of the level of participation. Otherwise, the participation is claimed, but does not serve its full purpose. There are also cases that the participation is claimed, but not taken into account by the instructor while making decisions. In case of false claim of participation, there is a high chance of leading to a sense of student disengagement and alienation (Mann, 2001; Mitra and Gross, 2009) or lack of interest, willingness, and confidence in participating, when students have doubt about not being taken seriously (Bovill, Cook-Satherand and Felten, 2011).

Component 2 – Instructor control by the indirect/passive representation of students' views

This component is loaded by three items that are related to student participation through voting, representatives, or questionnaires during and/or after the instructor makes certain decisions in project planning. Even though students have some choice and influence (Bovill and Bulley, 2011) through these forms of participation, there is a lower chance of influencing the decision-making process, because some decisions are already made by the instructor and/or the representative students may not represent all students, but rather engage in the process with their personal opinions and subjective interpretations. Therefore, in contrast to *Component 1*, this level of participation is more passive, limited, and controlled, despite the involvement of representatives and/or all students for receiving feedback on already made decisions, such as draft plans. The items in *Component 2* were not rated high (means between 3.29 and 3.75), indicating that students have a preference for indirect/passive participation, yet this preference is not strong. Nonetheless, it is observed they tend to prefer participating through voting and questionnaires (anonymous/non-anonymous) over participating through representatives, indicating that individual statement of views are more preferred than representation of views through a selected number of students. The reason for lower preference for this level and forms of participation may be because it leads to generalized yet questionable outcomes in terms of simplifying and uniforming assumptions due to instructors' and/or representatives' subjective interpretations and may also lead to consensus and sense of ownership issues (Wulz, 1986). Moreover, this may be the indicator of students' lack of feeling actively

involved in decision-making or not being invited to participate actively, even though they may be given options/alternatives to choose among or represented by their peers.

Component 3 – Partial student control with/without instructor guidance

The items forming this component address students being invited to participate in decision-making in project planning either with or without guidance from instructors. It implies a more active level and form of participation than *Component 1* and *Component 2*, since students are given partial control over the planning process and have substantial influence in decision-making (Bovill and Bulley, 2011). Whereas students do not have total control, they are given the opportunity to negotiate and they either have equal say with instructors in the process (co-decision) or have the final say on certain parts of the planning process, systematically guided or unguided by instructors (Wulz, 1986; Bovill and Bulley, 2011). It implies a high level of participation, which requires strong skills for consensus building, communication, and balancing the influence of both parties, as well as clear definition of roles and responsibilities (Wulz, 1986; Thompson, 2009; Jagersma and Parsons, 2011). However, students tend to be neutral about being independently active (no instructor guidance) in the planning process (means of 3.09 and 3.15), whereas they have higher preference for guidance through interactive sessions, i.e. workshops, planned and guided by instructors (means of 3.94). This may be due to students' lack of experience both in design and pedagogical planning, not knowing *what* to learn and *how* to learn, feeling uncomfortable when they are handed control without preparation or guidance, and resisting to change the norm (Shor, 1992).

Component 4 – Total instructor control

This component addresses mere instructor control with no participation/involvement of students in project planning. Whereas instructors have the full authority over decision-making, students are not given any direct/indirect participative opportunity to have influence in the planning process. The two items loaded in this component have the lowest means (1.83 and 1.69), indicating that students tend to have the strongest disagreement about dictated project plans, which are developed by instructors with no interaction with students (Bovill and Bulley, 2011). This may be due to instructors' resistance to handing over the control over the process, lack of training/experience in creating participative opportunities, lack of time investment,

concerns about meeting professional requirements and/or lack of support by the institution and/or educational system (Bovill, Cook-Satherand and Felten, 2011; Delpish et al., 2010; Jagersma and Parsons, 2011).

Component 5 – Total student control

This component is interpreted based on the two items related to students having the full authority over project planning with the highest participation. Even though these items address the highest possible participation, both of the items in this component were rated low (means of 2.08 and 2.10), implying that students tend to disagree with individual and/or collective participation with no involvement/control of instructors in project planning. As mentioned in *Component 2*, having no experience in pedagogical planning, feeling uncomfortable to have the total control with no instructors involved, and resistance to change the norm (Shor, 1992) may cause students not to prefer full independence in planning.

6.1.2.3 *Students' Opinions on Being an Active Participant in Project Planning*

Four components were extracted in the analysis of SP2 through the PCA. The clustered inter-related items represent students' opinions on being an active participant in project planning, in the search for answers for RQ1.3. The items that were loaded into the extracted components were interpreted and each component was identified with names accordingly:

- *Component 1 – Interest, motivation, and satisfaction towards the project and the learning process*
- *Component 2 – Sense of ownership and attachment to the project, learning process, and other individuals involved*
- *Component 3 – Making sense of the pedagogical approach and process*
- *Component 4 – Detachment from the project, learning process, and other individuals involved*

Component 1: Interest, motivation, and satisfaction towards the project and the learning process

This component consists of items nine items that are related to positive feelings towards one's self, the project, and the learning process. "Feeling to be in control" has the highest factor load in this component. The means of the items varied between 3.81

and 4.26 (six of them >4), indicating that students tend to relate taking active part in project planning with feeling more motivated, encouraged, excited, and interested. They also tend to think that active participation facilitates learning, in terms of feeling that they learn, understanding what to learn, as well as being encouraged more to learn. These findings point out the importance of active student participation in developing deeper understanding of the pedagogical content and process with increased engagement, motivation, and enthusiasm (Bovill and Bulley, 2011; Bovill, Cook-Satherand and Felten, 2011), which is positively correlated with the achievement of learning outcomes (Carini, Kuh and Klein, 2006).

Component 2: Sense of ownership and attachment to the project, learning process, and other individuals involved

Six items forming this component address increased sense of ownership, self-confidence, and encouragement to take more responsibility, democratization of the process, as well as strengthened communication both between students and instructors and among students. The items have means varying between 3.78 and 4.11 (five items >4), showing that students tend to relate active participation with increased sense of ownership and attachment. This tendency shows that active participation in project planning increases the possibility for students to develop ownership of their own learning experiences and feel more connected to course objectives (Rudduck and Flutter, 2000; Bovill and Bulley, 2011).

Component 3: Making sense of the pedagogical approach and process

This component has three items, which describe students' opinions on active participation being helpful in making sense of instructors' pedagogical approaches, the learning process, and the design process being learned. It is observed that students have a tendency towards preferring active participation in project planning in order to develop a deeper understanding of the context (means >4), which may be due to the need for making sense of the process they will go (or they are going) through and why. Active student participation is known to be enabling for students to understand learning processes and structures (Rudduck and Flutter, 2000). Therefore, taking an active part may ease students' minds and help them deal with the unknown and uncertainties during the design learning process.

Component 4: Detachment from the project, learning process, and other individuals involved

The five items loaded in this component are related to feeling under pressure, anxious, alienated, and hesitated, as well as believing that only the instructor may lead such a participatory process. The means of these items vary between 1.58 and 2.46, indicating that students tend to disagree that being an active participant leads to developing negative feelings and attitudes in the process of participation. There is a strong disagreement on the alienation from the project when taking an active part in project planning. However, there are also students, who feel alienated, which may be a result of students' unwillingness to participate and/or disengagement due to lack of interest/motivation, false claim of participation, lack of consensus or having doubts about being heard or taken seriously by their instructors (Mann, 2001; Mitra and Gross, 2009; Bovill, Cook-Satherand and Felten, 2011).

6.1.2.4 *Relationship Between Students' Learning Styles and Opinions on Student Participation in Project Planning*

This study shows that there is no significant strong relationship between ID students' learning styles and opinions on student participation in project planning. However, there are still a few correlations between some of the items and two combined scores that determine learning styles. These correlations are important to be discussed, since they reveal how certain tendencies for perceiving and processing an experience in learning are related with how active participation is approached by students with those tendencies.

Regarding the components that are related with students' opinions on the level and form of participation in project planning (SP1), there is one negative significant, yet negligibly low, correlation between students' tendencies towards AC/CE and their opinions. This finding is worth being taken into consideration, since this item explains the first component in SP1 more than the other items and indicates how tendencies for perceiving an experience in learning is related with what level and what form of participation is preferred by students, depending on their tendencies on the perception continuum of the learning cycle. Regarding this, there is one item that stands out among the others in *Component 1*. This item is related with the preference for instructors asking students' ideas prior to project planning and making decisions

accordingly, whereas the other items in the same component are related with involving students' ideas and views during project planning. Students' opinions on this item has a significant relationship with their preferences for learning through feeling or thinking. The findings show that there is a strong preference for informing instructors prior to project planning and those students, who tend to prefer to be given the opportunity to state their ideas for project planning, tend to prefer working with other people and rely on their intuitions and impulses, rather than rational thinking (Korn Ferry and Kolb, 2018). They are likely to be good at dealing with ambiguity and uncertainties, influencing and leading others, listening others with an open mind, building personal relationships, accepting personal feedback, showing empathy, making decisions, planning systematically, and taking action. Even though these students prefer to be involved, some of them are more likely to prefer working alone to get things done, whereas others prefer ongoing communication. Despite the high preference for instructors asking students' ideas prior to project planning and planning projects accordingly, there are also students, who are less likely to prefer stating their ideas to be taken into consideration in project planning. These students tend to isolate themselves more than the others, be more individualistic, and need time to think things through and conceptualize. They are more rational, pragmatic, and decisive, yet less likely to work with others, keep an open mind, and deal with lack of structure. Therefore, it is important for instructors to be aware of these different tendencies and preferences, when communicating with students in order to obtain their ideas prior to project planning.

Examining the components that are in relation to students' opinions on being an active participant in project planning (SP2), some positive significant correlations were found between students' tendencies towards AE/RO and their opinions, yet most of these correlations are negligibly low. These findings are important in the sense that they reveal how tendencies on the perception continuum of the learning cycle are related to how active participation is approached by students with those tendencies. Even though none of the components entirely has a significant correlation with the two combined scores, the correlations between AE-RO and six items in *Component 1*, four items in *Component 2*, and one item in *Component 3* are significant. All correlations are positive, indicating that taking an active part is more preferable for students, who have a tendency towards AE, i.e. learning by doing, or vice versa. Regarding the items

forming *Component 1,* correlated with the AE-RO score, students with this learning tendency are more likely to feel motivated, encouraged, and interested and feel that they are learning, understand what they should learn, and are encouraged to learn more, when they participate more actively. On the other hand, the items forming *Component 2*, correlated with the AE-RO score, specifically address increased sense of belonging and self-confidence and increased communication between one's self and others (instructors and/or students). Students, who have higher preference for learning by doing, tend to agree more with these items. Lastly, one item in *Component 3* differs from the other items in the same component in terms of addressing making sense of the pedagogical approaches of instructors, which is agreed by students with a tendency towards AE more than the students with other learning preferences. Therefore, students, who are more likely to show the ability to get things done, take risks, and influence people and events through action (Korn Ferry and Kolb, 2018), are also more likely to prefer active participation in project planning. They believe that active participation is an experience that allows them to develop positive feelings towards the process and establish better communication and collaboration with other people involved in the process. They are, on the other hand, less likely to observe carefully before making judgements, view issues from different perspectives, and look for the meaning of things. Therefore, it is important to develop ways to facilitate the process in order to balance those students' strengths and challenges.

It is worth noting that the reason for the lack of correlation between students' learning styles and opinions on active participation may be due to the lack of statistically significant correlations between all of the items in the extracted components, which have one or more items that are correlated with the two combined scores, and learning styles. Moreover, the negligible and/or low correlations might have been stronger with a larger sample size and/or with a different sample profile. Another reason that might have affected the findings is that almost 80% of the respondents did not have any experience in participation in project planning. However, it does not necessarily mean that the rest of them are/have been involved in totally dictated learning processes. Whereas this may still be the case, this may also be due to how those students perceive the process.

Even though there is no strong relationship between students' learning styles and their opinions on student participation in project planning, it is still clear that some students

may be unwilling or uncomfortable to participate, as explained in the sets of extracted components in Section 6.1.2.2 and 6.1.2.3. It is important to recognize that willingness to participate is an individual preference and some levels and forms of participation are more preferable for some students. Moreover, students may think that they are not taken seriously or that the process is not participatory, when they remain passive or when the participation is indirect. For instance, it was observed in the pilot study that some students stated no experience in participation, whereas their classmates stated the opposite. Then, it was realized that it was due to the lack of students' consensus on the final decisions. Even though the most active participation possible is not necessarily better and lower levels and more passive forms may be more desirable depending on the context (Bovill and Bulley, 2011), as observed in the findings as well, false claims of participation and lack of consensus are more likely to lead to students' hesitation to participate, lack of trust, or disinterest. Therefore, it is important to ensure that students feel that they are heard, have influence, and come to agree with the majority on the final decisions. Moreover, since 80% of the respondents did not have any experience in active participation in project planning, their opinions on the participation process and on being an active participant may change positively or negatively, if they are given a participative opportunity. The context, level, and form of participation may also influence their opinions as well, depending on whether they suit their preferences or not.

6.2 Student Participation in Pedagogical Planning in PBDL

The findings in relation to the student participation in pedagogical planning in PBDL and the interpretations of these findings are presented in this section.

6.2.1 Findings

The findings are presented under four titles, corresponding with the interviewees' self-assessments and the four subquestions of RQ2. The findings in relation to the first subquestion (RQ1.1) address how the pedagogical processes are conducted by instructors. Then, the findings in relation to the second subquestions (RQ2.2), addressing how students' individual differences are accommodated in PBDL, are presented. Lastly, the findings in relation to the third and fourth subquestions (RQ2.3 and RQ2.4) aim to explain the effects of distance learning during the COVID-19 pandemic in PBDL.

6.2.1.1 *Interviewees' Self-Assessments*

The responses in the self-assessment forms, completed only by 25 interviewees, were examined in order to determine the sample size with maximum variation. The scores for each learning mode of each interviewee were calculated and the results were plotted on the nine-region learning style grid. Figure 30 shows that the preferences are more on the AC side than CE on the apprehension-comprehension axis (perception continuum), whereas two third of the preferences for AE and RO was towards the prehension end of the prehension-apprehension axis (process continuum) among the interviewees.

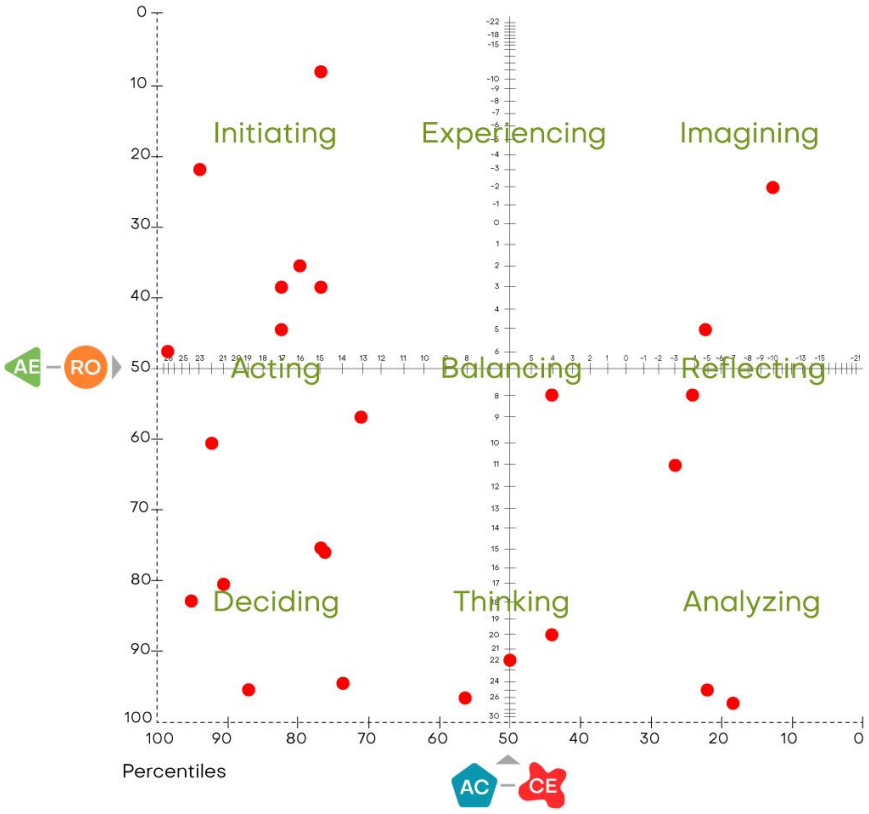

Figure 30. The distribution of the interviewees' learning styles.

Moreover, it was realized that all interviewees were taking on several roles in their courses. The characteristics of ELT's four educator profiles (facilitator: 51, expert: 50, evaluator: 42, and coach: 43) were chosen by the interviewees. The characteristics that were chosen by more than the average number of interviewees belonged to all four educator profiles. It was deemed to be a satisfactory variation for the sample group.

Even though the self-assessment form was not tested for internal consistency reliability due to the limited sample size, it was still helpful in having a general idea about the heterogeneity of the sample group in terms of educator roles. The relationship between interviewees' educator profiles and learning styles was not investigated in this study.

Figure 31 show the interviewees' ratings for the level of student participation in their courses. The figure demonstrates that the majority of the interviewees think that they allow little or no student participation in project planning in their courses. Students are more actively involved in project implementation and assessment, whereas the most active participation is in project implementation.

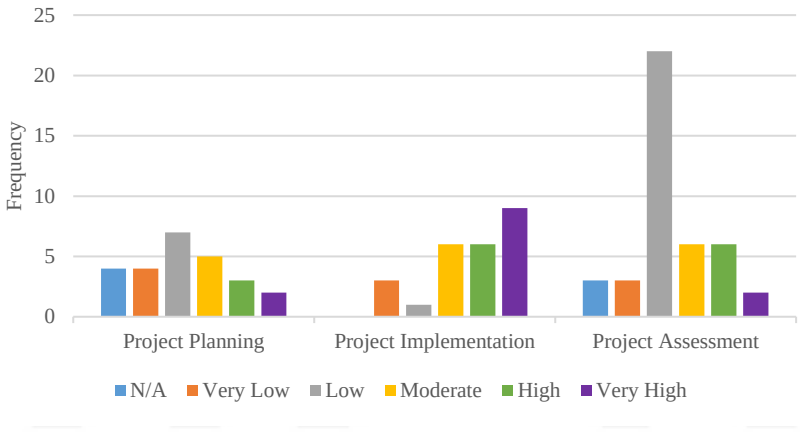

Figure 31. Interviewees' evaluation of the level of student participation.

Even though these results reflect the interviewees' self-assessments, it is an important realization to understand that they perceive their own practices and approaches differently. For instance, the three instructors, who were teaching the same design studio and interviewed as a group, evaluated the participation levels for each project phase differently in the same course. Their responses, respectively, were; Low-Moderate-Low (Int26), Very Low-Moderate-Very Low (Int27), N/A-Very High-N/A (Int28). It was also observed that the level of student participation they rated in the self-assessment forms was higher than they stated in the group interview.

6.2.1.2 *Pedagogical Planning Processes in PBDL*

These findings are specifically related with how instructors conduct pedagogical planning processes (RQ2.1). Under this theme, two sub-themes emerged, addressing the project essentials to be planned and the main considerations in pedagogical planning (Figure 32). The latter sub-theme consists of eight categories in relation to

the planning period, decision-making process, pedagogical considerations, student-, instructor-, profession-, and institution-related considerations, and current life conditions.

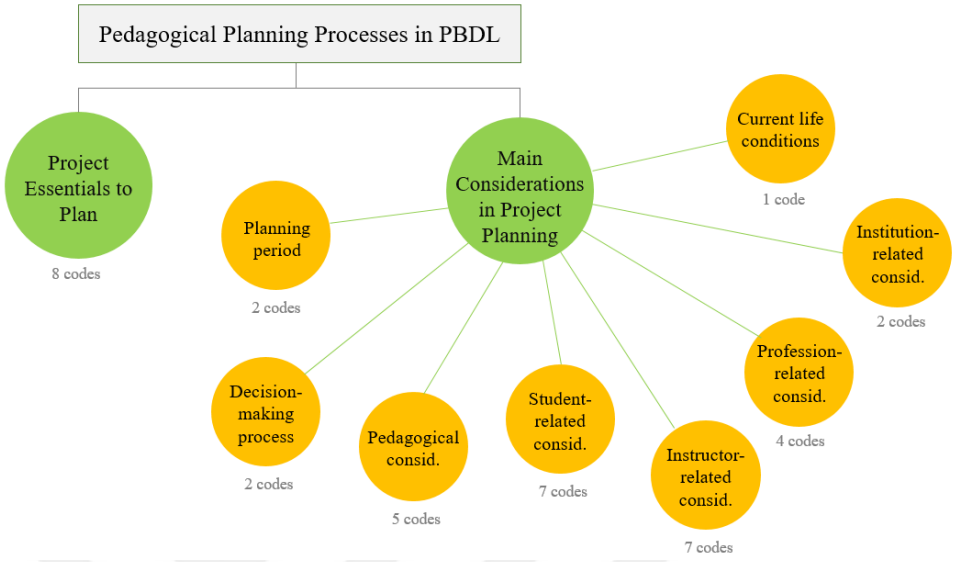

Figure 32. Theme 1.

The code frequencies are presented in Table 14.

Table 14. Code frequencies for Theme 1.

Sub-Theme	Category	Code	f
Project Essentials to Plan		Project theme	96
		Project objectives/goals	78
		Project structure	72
		Project calendar	51
		Project phases and/or activities	51
		Project submission/assessment criteria	30
		Number of projects	27
		Individual/group	15
Main Considerations in Project Planning	Planning Period	Before the semester starts	17
		During the semester (before the project starts)	10
	Decision-making process	Decision-makers	80
		Communication among decision-makers	19
	Pedagogical considerations	Pedagogical approach	188
		Learning outcomes	60
		Critiques/juries	44
		Expert view	2
		Effective use of time and space	1
	Student-related considerations	Students' progress and needs	26
		Students' engagement/motivations	17
		Students' feedback	12
		Students' access to resources	11
		Students' skills	8
		Number of students	8
		Students' special needs	1

Table 14. (continued)

	Instructor-related considerations	Instructors' past experiences	16
		Instructors' own styles/perspectives	10
		Instructors' motivations	8
		Instructors' feedback	8
		Instructors' expertise	3
		Easy follow-up/managing of the process	3
		Distribution of instructors by age and gender	1
	Profession-related considerations	Non-academic project stakeholders	29
		Focus on real life/sectoral experience	13
		Current sectoral/social issues in the world/Turkey	11
		Stakeholders' feedback	1
	Institution-related considerations	Institutional perspective (university/faculty/department)	13
		Department's self-evaluation	1
	Current life conditions	Current life conditions	22

Sub-Theme 1 – Project Essentials to Plan

In the first sub-theme, eight codes emerged. The code frequencies show that the project theme is the most frequently mentioned project essential to plan. The interviewees also mentioned project objectives/goals, project structure, project calendar, project phases and/or activities, number of projects, and whether a project will be an individual or a group project.

Sub-Theme 2 – Main Considerations in Project Planning

- *Category 1 – Planning Period*

This category includes two codes in relation to the project planning process, starting either before or after the semester starts. It was realized that especially if there is more than one project in a semester, final decisions are often made before that particular project starts during the semester, even though certain decisions are made or started to be discussed before the semester starts. Addressing that the project themes are chosen, yet may be revised, based on the predefined learning outcomes, Int11 stated:

> *"Since these outcomes are clearly defined, it is not very important what the project will be. It can change later. I mean, it may change when we get closer to that project but we plan it in the beginning of the semester. We plan what kind of things we will be doing in these three projects".*

Another interviewee, on the other hand, emphasized that, they prefer to get familiar with students to plan the following project after the first one during the semester. Int29 stated that:

> *"In the meetings held among the instructors, either in the middle or beginning of the semester, they sometimes decide only on the first project to get to know students. We did that too. The instructors introduced the students to us and we wanted to give them the first project and plan the second project after we know them."*

- *Category 2 – Decision-Making Process*

In this category, two codes emerged. The interviewees talked about the decision-makers, who take part in the planning process, and how they communicate among themselves, in terms of the nature of the dialogue and the mediums they use. The decision-makers, addressed by the interviewees, were mainly instructors. Non-academic project stakeholders, students, department heads, and other instructors in the department were also mentioned as decision-makers, taking part with course instructors. The findings show that the decisions are made or discussed in formal/informal meetings, department meetings, in the studio and/or through exchanging e-mails or texts.

- *Category 3 – Pedagogical Considerations*

Among the five codes, the pedagogical approach stands out to be the most frequently mentioned consideration in this category. Learning outcomes and critiques/juries are also among the other important considerations while planning projects. Learning outcomes are considered as the basis for projects. Int12, indicating that there is a written document that the learning outcomes are available for the department, stated that:

> *"First, second, third and fourth years are already determined by the department. What type of projects should be given in these years, what should their objectives be, how and which themes should be developed or changed from the first year to the fourth…. They are all discussed in our department meetings and we have a plan as such, in a written table format. We try to follow that as much as possible."*

Int9 supported that practice. However, she mentioned that there is a consensus in the department, yet no written list of learning outcomes. Int9 said:

> *"We all have an idea about what type of learning outcomes should be reached in the second and third years in our mind. But if you ask if there is something written, no. We don't have anything written. It is something we verbally share and know."*

Moreover, seventeen interviewees mentioned critiques/juries, which are directly related with the process itself, as a pedagogical consideration while planning the project schedule/calendar or the format of the critique sessions and juries. There were also one interviewee, who mentioned obtaining academic/non-academic expert views while writing design briefs, and one other interviewee, who specifically addressed the effective use of time and space in the design studio environment.

- *Category 4 – Student-Related Considerations*

This category consists of seven codes. The findings show that students' progress and needs are important considerations, which were specifically mentioned by fourteen interviewees, to take into account while planning projects. It was emphasized that students may have different competency levels, so they plan projects accordingly. Int28 said:

> *"It is better for us to complete the first project and determine the second project depending on students' performances."*

Int2 also pointed out that they sometimes make revisions in the process to ensure the balance of performance in the class, stating:

> *"We had a meeting a while ago, after the jury. The first project has extended too much and there is a little time left for the second project. ....there is a group that will struggle a lot. In order to adapt them to the rest of the class ...we have decided to limit the project more. I mean, the project theme doesn't change but we bring limitations in details so that they can make it more easily."*

Moreover, eleven interviewees addressed that they pay attention to the level of their students' engagement and motivation that may change due to personal interests, life conditions, such as the COVID-19 pandemic, etc. Even though it does not have high

frequency, there were some interviewees who take students' feedback into account in project planning as well. It was also emphasized that especially the COVID-19 pandemic affected students' access to resources, such as materials, people, and internet, which directly affects the project theme, schedule, materials and methods to be used, and submission/assessment criteria in a project. Int23 emphasized students' limited access to materials and support from their peers, which required revisions in the process:

> *"We actually make the plans considering their [students'] conditions but what they complain the most is that since they work on their own… when they were at school, they could exchange materials, tools, and get support from each other. Not being able to do this challenges them a lot and especially towards the end of the semester, they start to feel frustrated with that tiredness. We revise accordingly in order to make it easier for them."*

Similarly, Int17 mentioned that there are sometimes students, who do not have even the basic technological devices to work on their projects, which was critical in planning:

> *"They can shop online but how far can you push the limits? How much can you insist? We struggled a lot to set that boundary last semester. There were students, who didn't have a computer. Since we didn't know how much of it was due to acting arbitrarily, laziness, lack of motivation, or a real situation, it was very flexible last semester."*

Int29, on the other hand, pointed out students' lack of resources for research and social interaction, in addition to facilities, which had an impact on the selection of projects in the course:

> *"We chose two projects among 10-12 other projects that we deemed suitable for them in the meeting. We were more free in the past. We had workshop facilities here, we were always here, and students were always here. But in this pandemic, we chose two projects that they can figure out, experience and collect data at home."*

Four interviewees also emphasized that they take students' skills into account while choosing project themes or assigning them to certain projects. Moreover, six

interviewees pointed out the number of students, due to increased department quotas in recent years, as another consideration in project planning, especially in terms of trying to make more manageable schedules. There was also one interviewee, who pointed out a consideration in relation to students with special needs, particularly learning disabilities, such as autism.

- *Category 5 – Instructor-Related Considerations*

This category consists of seven codes. The findings show that eleven interviewees often emphasized that they rely on their past experiences, since they already have the know-how, which guides the planning process. Int6 stated:

> *"We already have sample projects, but how are you going to deliver it? How are you going to define the phases? All of it is know-how and people develop this in years."*

Similarly, Int11 and Int15 indicated that they benefit from the projects they conducted in the past as well and make revisions on them if needed. Int11 said:

> *"Since these [project] types are clear and have a determined place in the calendar, it is not very important what the product will be. We actually have typical syllabus for them. With small alterations in those syllabus, we expect to achieve the project goal in each."*

Int15 also exemplified how past experiences were helpful during the COVID-19 pandemic.

> *"We haven't created another content. We have some projects ready that we have already tried of course, since we have been doing this for years. Since we thought that it was something we had a full knowledge of and that it aligned with our targeted outcomes, we chose a project for the students that we experienced and could manage under these circumstances, and that would ensure achieving those outcomes."*

In addition to this, one interviewee stated that they had to take some precautions against ethical violations based on their past experiences with their students.

In nine interviews, it was also realized that the interviewees' teaching styles and perspectives affect their planning processes. Moreover, six of them emphasized their

motivations as an important factor in planning, especially when choosing project themes, since they seek learning and experiencing new things as well.

Seven interviewees indicated that they receive feedback from other instructors in the department on the group of students enrolled in their courses in order to learn what type of projects they worked on and the level of their skills and academic performances to plan to manage their expectations and plan accordingly. Int9 stated:

> *"For example, I don't know the students who come to me at first. I have recently met the second-year students and there is no individual feedback I can get from them on what they have done and encountered. But usually, before determining these [project] themes, the instructors of the previous semester are consulted. There is information coming from them about what has been done, what is missing, what should be focused on more. …These aren't directly from students, but more of an information about what has been done with them, conveyed from the previous team."*

Moreover, even though not frequently mentioned, the findings showed that instructors' expertise affects the planning process in terms of the content, how information is conveyed, and how the design brief is written. Three interviewees stated that they find having a written plan, often in the form of a brief, helpful to follow and manage the process, as well as having consensus among instructors, when there are multiple instructors. There was also one interviewee, who specifically indicated that they pay great attention to the age and gender balance within the team of instructors when they are assigning the team of instructors to different sections of a single course.

- *Category 6 – Profession-Related Considerations*

Among the four codes in this category, non-academic project stakeholders, such as companies, public institutions, and non-governmental organizations, become prominent. Thirteen interviewees pointed out the importance of such collaboration projects and put an emphasis on having these collaborations within a certain agreement to achieve educational requirements. Int6 explained it as the following:

> *"Sometimes companies request collaboration. It is considered which level of study's project would be the most suitable for that company. A meeting is held with the company representatives and it is tried to understand what*

they want. Then, it is discussed how much they meet with the educational requirements and what kind of revisions should be made. And the company representatives are instructed on this issue. They are told that they cannot have students work on whatever they want directly and that this is an educational institution and this project has educational purposes. And they are persuaded."

Eight interviewees shared their views on the importance of gaining sectoral experience and getting ready for the real life. They stated that they mostly focus on projects and create briefs that students will experience in real life, rather than conceptual projects. Moreover, being up-to-date in terms of dealing with current sectoral and social issues in the world or in Turkey seems to be another consideration, specifically mentioned by seven interviewees. They are taken into account especially while deciding on project themes, such as projects focusing on new/alternative design approaches, recent technologies in design, pandemic, natural disasters etc., and what skillsets students should acquire. Int1 and Int10 stated their views as follows:

"We found it more important to focus on what is going on in the world and be an up-to-date designer. The other was more old-school. We made this decision together. When we explained it to the department and told them that we find it more beneficial – I mean, the other is beneficial as well but we think this will increase the level of awareness… The department said 'okay' and we changed the system."

"It was the first strategy to lean towards project themes in relation to sustainability that was new in the field in Turkey."

One interviewee also stated that they ask for feedback from collaborator companies and take them into account in planning.

- *Category 7 – Institution-Related Considerations*

There are two codes in this category. Seven of the interviewees addressed the department, faculty and/or university they are affiliated with as being a factor in their planning processes. They mentioned that there are some institutional requirements/perspectives and/or consensus within the department that they take into account in their courses. For instance, Int21 drew attention to the pedagogical approach

that has been adopted by the university that he used to work at and said:

> *"At the university I previously worked, there was a different approach in this project-based design education. It was entirely contrary to the approach like what we used to try to explain all students through wall critiques or group discussions or through examples that was in our tradition at [the other] university."*

Int13, on the other hand, put emphasis on the departmental decisions on the learning outcomes for each year of study:

> *"Actually we created this a long time ago, as a department. We have a process, we thought what skills students should acquire from the first to the fourth year of study."*

At the departmental level, Int9 addressed the department head's influence on pedagogical decisions, unlike the other interviewees:

> *"I think it is our Department Head, who influences all of the decisions made in the beginning. It is more like what we have seen from him, rather than 'this is how it is in design education'."*

Int11, on the other hand, addressed the studio course hours as the faculty's tradition:

> *"It is a 12-hour studio in a week as a result of our tradition in the Faculty of Architecture."*

In addition to this, Int11 specifically pointed out the department's self-evaluation as a consideration in project planning and said:

> *"An evaluation should be made on what our goals were and how much we have achieved them. It is a part of the self-evaluation. It should also be done with the graduated students regularly, in every 4-5 years. …We should renew our curriculum by evaluating the feedback we receive from them. After you renew the curriculum…you can make that decision. …It becomes something that has been planned long time ago. "*

- *Category 8 – Current Life Conditions*

Thirteen interviewees mentioned some challenges and/or circumstances that led them to making revisions in already made project plans or working on the following semester's plan earlier than usual. These current life conditions were mostly related with the transition to distance learning and the effects of the COVID-19 pandemic on students' life conditions and/or wellbeing.

6.2.1.3 *Accommodating the Diversity of Individual Differences in PBDL*

These findings are specifically related with how the diversity of individual differences is accommodated in PBDL (RQ2.2). Under this theme, two sub-themes emerged, addressing individual differences and how they are accommodated (Figure 33). Whereas the first sub-theme consists of two categories, grouping students' and instructors' individual differences, the second sub-theme consists of four categories in relation to guiding/adapting the process considering students' individual differences, students participation in project assessment and project planning, and the effects of student participation in project planning.

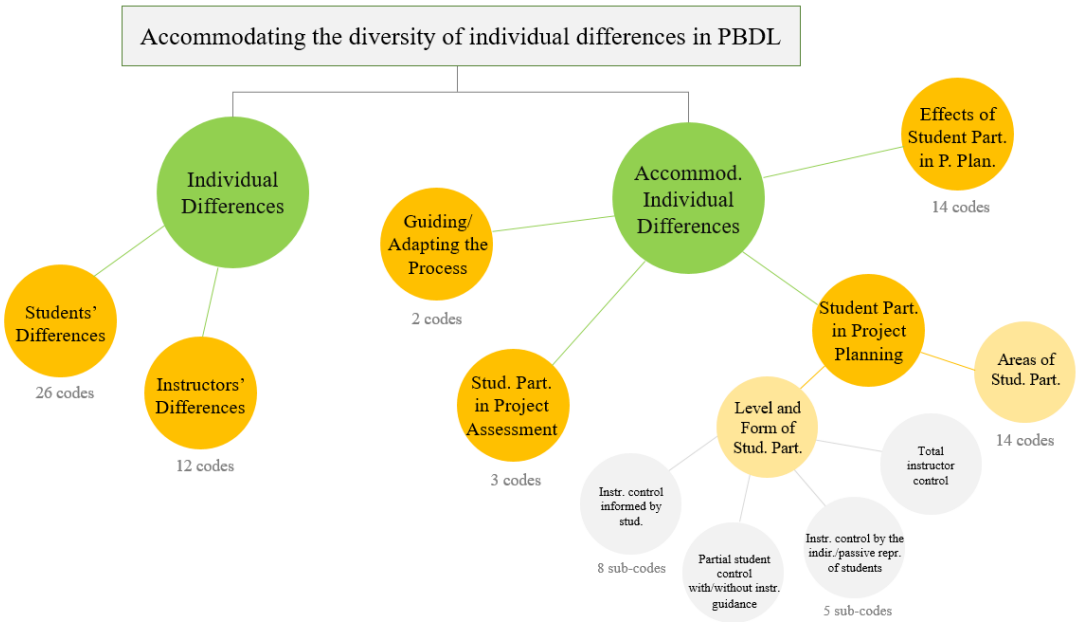

Figure 33. Theme 2.

The code frequencies are presented in Table 15.

Table 15. Code frequencies for Theme 2.

Sub-Theme	Category	Sub-Category	Code	Sub-Code	f
Individual Differences	Students' Individual Differences		Design skills		30
			Process management skills		28
			Working/learning preferences		27
			Awareness level		26
			Interest/curiosity level		25
			Social communication skills		23
			Motivation level		23
			Willingness to interfere/participate in decision-making		22
			Competency level		22
			Academic performance		20
			Ability to take initiative		16
			Personal/family issues		10
			Being attemptive		9
			Maturity level		8
			Propensity to compete		7
			Level of self-discipline/responsibility		6
			Self-confidence level		6
			Propensity to collaborate/work in teams		6
			Risk-taking abilities		6
			Educational background prior to university		**5**
			Introversion/extraversion		4
			Leadership skills		4
			Satisfaction level		3
			Students with special needs		3
			Intellectuality		3
			Foreign students		2
	Instructors' Individual Differences		Communication with students		128
			Acknowledgement/understanding of student participation		107
			Perspectives on design education		41
			Experience in design education		38
			Pedagogical approach		20
			Expertise/skillsets		15
			Professional/design perspective		14
			Sectoral experience		8
			Expertise in pedagogy		4
			Experimental/innovative		3
			Educational background/culture		3

Table 15. (continued)

			Propensity to collaborate/work in teams		2
Accommo-dating Individual Differences	Guiding/ Adapting the Process		Guidance through Individual/Group Critiques		20
			Tailoring the Ongoing Process		8
	Student Participation in Project Assessment		Being jury members		4
			Grading other students' projects		4
			Witnessing instructors' grading process		1
	Student Participation in Project Planning	Level and Form of Student Participation	Instructor control informed by students' views and needs	Observing students' progress and needs	38
				Students' verbal feedback	36
				Students' written feedback/ reflection	14
				Students' requests/ suggestions	13
				Instructors' pedagogical knowledge	10
				Instructors' past experiences	9
				Other instructors' feedback	8
				Course-assessment survey conducted by the university	7
			Partial student control with/without instructor guidance		27
			Instructor control by the indirect/passive representation of students' views	Project-specific surveys	7
				Voting/polling	7
				Student representatives	6
				Choosing among options	3
				Representation by assistants	1
			Total instructor control		4
			Total student control		0
		Areas of Student Participation	Design problem		11
			Individual briefs within a given framework		11
			How the course/project is conducted		9

Table 15. (continued)

	Schedule/activities within class hours	7
	Project themes	7
	Project submission/presentation format	3
	Finding project partners for individual projects	3
	Selecting group members	3
	Distribution of roles/responsibilities	2
	Deadlines	2
	Exercises	1
	Assessment criteria	1
	Number of projects	1
	Resources	1
Effects of Student Participation in Project Planning	More effective learning	4
	Increased motivation	4
	Keeping students on track	3
	Increased sense of ownership	2
	Learning from each other	2
	Making sense of pedagogical considerations	2
	Democratization of the process	1
	Improving collaboration skills	1
	Improving decision-making skills	1
	Better progress and outcome	1
	Closing the gap among students	1
	Self-reflection	1
	Self-awareness	1
	Learning to set project limitations	1

Sub-Theme 1 – Individual Differences

- *Category 1 – Students' Individual Differences*

This category consists of twenty six codes, representing a reach diversity of individual differences that were mentioned during the interviews. All interviewees stated that they do not have a typical student profile, but rather numerous student profiles in terms of their skills, characteristics, and personalities. Regarding the code frequencies, the vast majority of these differences is related to students' design skills, process management skills, working/learning preferences, awareness levels, interest/curiosity levels, social communication skills, motivation levels, willingness to interfere with and

participate in decision-making processes, competency levels, academic performances, and abilities to take initiative. Nine interviewees also stated that some students have some personal/family issues that affect their learning processes, which has increased and/or become more apparent during the COVID-19 pandemic. Moreover, some interviewees (number of interviewees indicated in parentheses) mentioned that students may differ from each other in terms being attemptive (8), maturity level (6), propensity to compete (6), level of self-discipline/responsibility (4), self-confidence level (5), propensity to collaborate/work in teams (2), risk-taking abilities (5), educational background prior to university (3), being introverted/extraverted (4), leadership skills (3), satisfaction level (3), having special needs (3), and intellectuality (2). As an exemplary of many of the abovementioned differences, Int11 stated:

> *"…we realized that we couldn't go into more depth in the projects. The competent students do all of the projects perfectly and the pace of their learning is very fast. But some students cannot keep up with that pace… In time, I have experienced that it [leaving students on their own] is an approach that discriminates studens with diverse learning styles and that creates a huge gap among them. Because whereas there are students, who can find their own ways, there also students, who can't and get messed up. Whereas the competent ones come to you with great projects, others get lost, lose their self-confidence,…and don't even get critiques. I always encountered with fourth-year students, who lack self-confidence and don't know what to do and where to start in the design process, among students with diverse learning styles."*

In addition to these, two interviewees indicated having foreign students in their courses, having cultural and lingual differences, as well.

- *Category 2 – Instructors' Individual Differences*

Even though this research was mainly concerned with students' individual learning differences, the data led the researcher to have a category specifically for instructors' individual differences as well, since these differences affect how they plan and conduct their courses, as well as how they communicate with their students. This category consists of twelve codes in relation to these differences.

The code frequencies show that the most frequently mentioned and observed difference among the interviewees is their communication with their students. This includes their role as educators and the quality of the dialogue they establish with their students. All interviewees addressed various educator roles. Coach, mentor, facilitator, and motivator roles were mentioned. Int4 also stated that her role she takes on changes in each year of study:

> *"I'm a totally different instructor in the first year and in third or fourth year, or in graduate courses. But the first-year students need discipline. This is a life discipline."*

It was realized that instructors may establish more authoritarian and hierarchical relationships and communication with their students as well. Addressing the hierarchy and the absence of student participation, Int1 said:

> *"I guess it is because of our arrogance as instructors. Our mindset is 'we think on behalf of them, we think them more than they do'."*

Int25, on the other hand, pointed out her attitude towards students during projects:

> *"There are students that I force too much, almost until the breaking point and they hate me."*

Hierarchical relationship between instructors and students may be situational within a single course. Int5 indicated an ongoing shift in roles depending on the situation:

> *"When a hierarchical structure, an instructor-student hierarchy is established, ruptures occur. When I look at myself, this keeps changing for me. The authoritarian and friend-like relationships keep changing."*

There were also opposing views on hierarchical relationships within courses. Int10 stated:

> *"When you are both the Department Head and the studio instructor, students do not openly communicate with you since you are hierarchically the one, who is managing the department. ...It was a great experience. It was violent and abusive but when you don't take it personally and approach it as a way and process of learning with love, I mean, when you stay calm, it was a learning process for everyone and it opened the*

communication a lot. I think the main problem is that students can't act like themselves in these studios and I think there is a hidden hierarchical pressure."

Moreover, there were interviewees, who established more open and friendly relationships and communication with their students. Int24 shared his view, putting an emphasis on the importance of balancing the instructor-student relationship, and said:

"There are instructors who they see like their friends. But it is important to balance that friend-instructor relationship. It was more difficult when I was an assistant though. Now I have aged and it has become easier. It is something that an instructor learns in time. Because sometimes when you leave too much space for the student, he steps all over you. Not all students, of course. This is a matter of character too."

The second most frequently mentioned difference among interviewees is the acknowledgement and understanding of student participation. It was observed that whereas there were interviewees, who favor student participation and regard it as an important learning process, there were also others, emphasizing the insufficiency of students' experiences in the field, their immaturity and lack of pedagogical knowledge to make certain decisions. However, the findings show that the interviewees had a varying degree of participatory mindsets. There are two opposing viewpoints quoted below. Addressing a highly participative structure, Int10 stated:

"The method I applied there was something that the instructor wasn't the mere leader alone, but it was rather an inclusive strategy. Co-conducting the process. It was a method, enabling everyone to participate actively. It was more than something hierarchical and it was something, where the instructor wasn't the one who had to be listened but rather a part of the project group."

On the contrary, Int4's viewpoint indicates a much less participative structure:

"I'm a little despot in these issues. Because they aren't adults, because they don't know anything, because they aren't aware of anything… I wish they could. …What they suggest isn't tangible at all. I can't lose time with something that isn't tangible. I'm not that type of person."

The interviewees' perspectives on design education vary as well, especially, in terms of the general practices in design education, how it is approached, and the future of design education. Some of their views (number of interviewees indicated in parentheses) were in line with their professional and/or design perspectives (9), sectoral experiences (7), and intentions to be experimental and innovative (3) in their courses. In eight of the interviews, the areas of expertise and/or specific skillsets of the interviewees were mentioned. Moreover, some interviewees were much more experienced in teaching design compared to the others. The year of teaching experience varied from one to forty-one years. Despite this diversity, there were only three interviewees, who had a few training certifications in relation to learning and/or who studied design pedagogy. There was also one interviewee with fifteen years of teaching experience, who specifically emphasized that the academic staff do not have to receive pedagogical formation at higher education institutions and that she does not have it either. Even though not high in frequency, the interviewees' educational backgrounds and cultures (3) and their propensity to collaborate/work in teams (2) appeared as individual differences as well.

Sub-Theme 2 – Accommodating Individual Differences

- *Category 1 – Guiding/Adapting the Process*

This category consists of two codes, representing the guidance provided by instructors to students through individual and/or group critiques and tailoring the ongoing process so as to ensure the adaptation of students. The code frequencies show that the first strategy is more commonly preferred by the interviewees compared to the latter, based on the responses of thirteen interviewees. Int11 stated:

> *"It is possible to feel students' different learning skills in design education. Why? Because it is a one-to-one education, you give one-to-one critiques. There is a one-to-one interaction and you feel that difference in that interaction. You either set your expectations accordingly or give feedback accordingly. But this occurs very spontaneously in each case."*

Supporting this view, the interviewees emphasized that students have different challenges and struggles in the process and they are individually handled by instructors during critique sessions with a focus on what kind of help or support they need in the process.

Seven interviewees, on the other hand, pointed out another strategy, which is related with tailoring an ongoing process for students. This second strategy is used by instructors with different concerns, yet for easing the adjustment of students in the process. For instance, Int21 shared his experience with a few students with learning disabilities, which he assumed to be mild autism, and said:

> *"We didn't plan the project accordingly, but while conducting the project, we allocate special time for him and pay special attention."*

Int24 mentioned one of his students, who had a very successful academic background, yet lacking practical design skills, and that he modified the process in order to ensure the student's adaptation in the process. Int24 said:

> *"I told him 'you are not going to draw, you are going to work with models'. ...He failed to do that too. Then I told him 'you are going to role-play, you will have a box and do storytelling'. He did it some but I wasn't satisfied with that either. Then I asked him 'Can you write that for me?'. And he did. I made the whole class to write too but I actually did it for him. ...It was awesome!"*

In addition to the abovementioned practices, there are adaptations that are made in the process depending on the circumstances, such as giving extra time if a student has a health problem.

- *Category 2 – Student Participation in Project Assessment*

This category consists of three codes, all of which have very low frequency, indicating that a very low number of interviewees (5) have the intention to involve students in project assessment and regard it as a learning process. The findings show that only four interviewees had an experience in involving students as jury members, where they could actively state their views and give verbal feedback to their peers. Four interviewees also mentioned their practices, in which students took part in grading other students' projects. Lastly, Int10 shared her experience with students while grading projects and said:

> *"When we asked them to participate in the assessment, they stressed out and felt very uncomfortable because it is a very unfamiliar system. So with a spontaneous solution, we made an open assessment, aloud, in front of*

the students."

- *Category 3 – Student Participation in Project Planning*

This category consists of two sub-categories, centered on the level and form of student participation and areas in which student participate.

  - *Sub-Category 1 – Level and Form of Student Participation*

This sub-category consists of four codes, addressing the different level and form of student participation that emerged in the analysis of the quantitative data obtained from students presented in Section 6.1.2.2.

Instructor control informed by students' views and needs. The code frequencies show that instructor control informed by students' views and needs is most commonly practiced level and form of participation in project planning. It has much higher frequency that the others and has eight sub-codes. The findings point out that the interviewees mostly rely on their observations of students' progress and needs in the process and students' verbal feedback. Regarding this, it was realized that these observations and feedback affect either the following project/semester of the same group of students or the following year's group of students. Below are two quotations from Int10 and Int21 that are exemplary of these strategies:

> *"We could make revisions in the following year by observing and listening to them."*

> *"We observe them and decide accordingly. This is their indirect influence. But we also directly… Surveys or meetings focusing on distance education with students, either conducted by us or by the administration and conveyed to us…"*

Moreover, instructors are always the final decision-makers while deciding to what extent these student views will be accommodated in planning depending on whether they are in line with educational requirements. Int8 pointed out that they make decisions based on their observations and sometimes on students' suggestions:

> *"You should be observant as an instructor. How students react, what type of project they enjoy the most, what type of projects they struggle with or do reluctantly… But we also ask them. For example, last week we asked*

questions like what they think about our schedule and the things we have done so far, whether they have any suggestions, what they want to work on etc. The things we will do later may be shaped according to their responses."

Int10, on the other hand, indicated that they make revisions and modifications to finalize plans during projects, if deemed necessary:

"They weren't big modifications. Sometimes dates, submission deadlines, submission criteria etc. required some revisions depending on the project or some students' projects. …We were open to that. If it could relieve the process or there was unexpected occurrences and if we were likeminded – it was very important that both of the instructors came to an agreement, it was our criterion –, we would make modifications.

The findings also show that students' verbal feedback are received either systematically or unsystematically. Asking students about their experiences after a project is completed or asking them what they need in the process in a group discussion or in an informal conversation is one of the ways of receiving student feedback. Another way is to organize meetings for more systematic flow of information from students. It was also mentioned that students sometimes share their opinions or complaints with their instructors without being asked to do so.

It was also realized that students' written feedback/reflection is another form of informing instructors about their views and needs. Three interviewees stated that they ask for keeping journals, writing anonymous informal letters, or essays. Sending online questionnaires is also preferred by others. Students sometimes use digital communication channels or social media to communicate in writing. In addition to these, especially in case of complaints about their instructors or the course, students prefer to write official letters to the department or the faculty for requesting further investigation. Moreover, some students are more attemptive to communicate in order to inform their instructors about their requests and/or suggestions, whereas some students prefer to do it only when they are asked.

Instructors rely on their own pedagogical knowledge and past experiences while planning projects as well, since their know-how and the accumulation of experiences help them identify students' individual differences and how to accommodate them. For

instance, Int6 pointed out the scientific aspect of pedagogical planning:

> *"We think about these scientific things, requirements based on some certain grounds."*

Int5 addressed that instructors' past experiences enable them to identify the patterns of flaws:

> *"Since they were from a system that is totally out of this culture, we could foresee where the flaws would be beforehand."*

Similarly, Int27 indicated that past experiences help them make assumptions and guide them in planning, but they are open to make revisions in the process:

> *"When giving the first project, we say 'upcoming students' competencies and level of knowledge is always 'this', [so] we will give 'this'. Then, as we get to know them, the second project may sometimes change a little."*

Six interviewees mentioned that they receive feedback from other instructors in the department, who worked with that particular group of students in their courses, to learn more about their academic progress and needs. Whereas it is sometimes more systematic and in the form of a department meeting, this information is sometimes conveyed in daily informal conversations among instructors as well. There are also the course-assessment and instructor-assessment surveys that are send to students by the universities, which instructors can review later. However, the six interviewees, who mentioned these surveys, criticized them for not being taken seriously by students and not providing relevant/useful feedback. They emphasized that students complete these surveys just to be able to review their grades at end of the semester, so they do it involuntarily and do not give any relevant and/or adequate response to the questions.

Partial student control with/without instructor guidance. The code frequencies show that the second most frequently mentioned level and form of participation is partial student control in project planning, which was observed to be related with the level of project structure. Moreover, the degree of instructor guidance provided to students varies. Int13 mentioned a loose structure of a fourth-year design studio, which is common in the final year of study. Int13 said:

> *"We haven't given them anything in relation to the brief, except the theme."*

Int11 pointed out a similar structure in graduation projects and providing a framework to guide the process:

> *"Students chose their own projects and companies in the graduation project. They use that initiative, when they are at the last stage, and they even decide on what they will research and what the design approach will be on their own, on the condition to follow the steps and phases within the framework we provide them."*

Int30, teaching an elective course, in which the third- and fourth-year students have substantial control over their own projects, said:

> *"It is a course with no limits. I don't have any limits to what the projects will be or how far the students take their projects. …The only thing I make obligatory to move to the concept phase. It is up to the students beyond that."*

Even though it is not common in the early years of undergraduate education, Int8 mentioned a very loosely structured first-year studio project. Int8 stated:

> *"Everything is possible… Whatever they like. At least they define the problem and for what reason they create it well. Of course, we control it, we don't let them run loose. We filter out the problems and guide them. …They limit themselves as they like or they don't set limits at all. But of course, in the light of what we have previously done."*

The findings demonstrate that the level of project structure and degree of guidance decreases towards upper years of study and drops dramatically especially in graduation projects. However, there is not necessarily a direct correlation between the level of participative opportunities provided by the interviewees and the years of study, regarding these findings. Moreover, it was mentioned that instructors mostly prefer at least to set deadlines/milestones in order to manage the process. There was only one interviewee, who specifically stated that he prefers to assign this responsibility to his students and regard it as a learning process.

Instructor control by indirect/passive representation of students' views. The code frequency is almost similar with the previous level and form of student participation. Five sub-codes emerged under this code. The findings demonstrate that students

indirectly and sometimes anonymously participate in project planning through project-specific surveys, voting/polling and/or student representatives. They are not involved *during* project planning, but mostly for providing feedback on instructors' already made decisions. Whereas student representatives are sometimes officially assigned, there are cases in which they naturally come forward within the class. Moreover, the interviewees mentioned that they provide their students with two or more optional project themes to choose among individually. There was also one interviewee, who addressed research assistants as being representatives of students in some cases, since students tend to find them closer to themselves.

Total instructor control. The code frequency is the lowest for total instructor control. It addresses the opinions of the interviewees, who emphasized that they do not involve students in project planning and there is no student participation at all. However, it was realized that these interviewees actually allow the first level and form student participation, *instructor control informed by students' views and needs*, in their courses but do not regard it as student participation.

- *Sub-Category 2 – Areas of Student Participation*

This sub-category consists of fourteen codes, addressing the areas that students participate in project planning. The findings show that students often decide on their individual design problems within a given design brief. These decisions do not change the project plan, but rather put a focus for students in their own design projects they are working on, which helps projects differ from each other. Similar in frequency, eight interviewees emphasized that students are asked to write their individual briefs, often within a certain framework, in which the submission requirements and/or deadlines are specified by instructors. The interviewees stated that they either announce a theme or a wide problem area especially in the third-year or in the first semester of the fourth-year of study and have students write their own briefs. Despite diverse practices, the graduation design briefs are often written by students and project partners that are usually found by students. Moreover, one of the interviewees stated that she had an experience of involving second-year students in finalizing the design brief through class discussions, even though the students were not responsible to write the brief, but still had a say in the final decisions.

Six interviewees mentioned that students participate in deciding on how the course/project will be conducted, which is not only related with educational considerations, but also with operational and social issues within the course. Students are also involved in choosing project themes and planning schedules and/or activities within class hours during projects in some courses. They are sometimes given the opportunity to choose their group members in group projects as well and distribute the roles and responsibilities among group members.

Three interviewees also mentioned that they take students' opinions and progress into account when deciding on project submission and/or presentation format, if not the criteria. However, there was one interviewee, who stated that they used to conduct surveys with students in order to have an understanding of their skills and views about themselves prior to making decisions on what the assessment criteria should be, as well as the number of projects to be given. Moreover, one interviewee stated that she does not involve students actively in decision-making, but rather likes to discuss the exercises and resources she provides to students in order to improve them further for the following year.

- *Category 4 –Effects of Student Participation in Project Planning*

In this category, there are fourteen codes, all of them addressing positive effects of student participation in project planning. Four interviewees associated student participation with more effective learning and increased academic performance due to changing perspectives. Int8 stated that students' participation helps them make sense of the process:

> *"They learn better when they do it. When the instructors grade it with 70, it isn't effective. But when they engage in that participation, they learn it. I think it is very important to define the problem. It is the core of design. Then, they have an experience in that and know what the process is like. It isn't important how successful they are. It is important to go through that process. That way, it contributes to students' development."*

Supporting this viewpoint, Int10 also put emphasis on changing students' mindsets by allowing active participation and its effect on the level of academic performance:

"They [second-year students] were almost at the level of third-year students. ...It is more related with behavior and mindset, rather than the design content. It changes all."

It was also mentioned that student participation helps increasing students' motivation and engagement in the process, "keeping them on track" as one of the interviewees put it. Increased sense of ownership of projects was specifically emphasized by two interviewees. Moreover, the findings show that the interviewees believed that participation enables students to learn from each other by exchanging knowledge and experiences and to help them make sense of pedagogical considerations, such as why they have to engage in certain things in the course. Int8 stated:

"First, they understand that nothing is like what it seems. For example, they are very surprised when they learn that we know what we will be doing in each class during this 14-15-week period. They think we do whatever we want, talk before the class, and say 'let's do this today'. They think this is the underlying pattern. They don't know that this is a planned process, even though we tell them in the beginning. So, it is enlightening for them to learn it and it gives confidence. Because the exercises we do, especially in the first-year, are confidence-breaking exercises. ...They don't trust and they think 'What are we doing? Where are we going with this? Why are we doing this?'... So, for them to see there is a plan behind it, which has been made intentionally, is good. Not only for today, but also for their future lives in terms of developing this mindset of having plans."

Student participation in project planning also helps democratizing the process, balancing the hierarchical instructor-student relationship. The interviewees also mentioned the positive effects of student participation on improving collaboration and decision-making skills in students, their academic progress, and the quality of outcomes, as well as closing the knowledge and experience gap among students. It is also considered as an opportunity for students to make self-reflection and develop self-awareness. Lastly, Int30 stated that students learn how to set project limitations, which is an important learning experience, through active participation. He said:

"They begin with that enthusiasm, saying 'I have always wanted to do this'. What is nice for me is that students don't know what it is and exactly

where they want it to go. They don't know how difficult it will be either. Since they don't know what it means to work without limits or set their own limits, it is a good learning process in terms of making mistakes."

6.2.1.4 *Effects of Distance Learning During the COVID-19 Pandemic on Pedagogical Planning and Student Participation in PBDL*

These findings are specifically related with the effects of distance learning during the COVID-19 pandemic on pedagogical planning and student participation in PBDL (RQ2.3 and RQ2.4). Under this theme, there are two sub-themes (Figure 34).

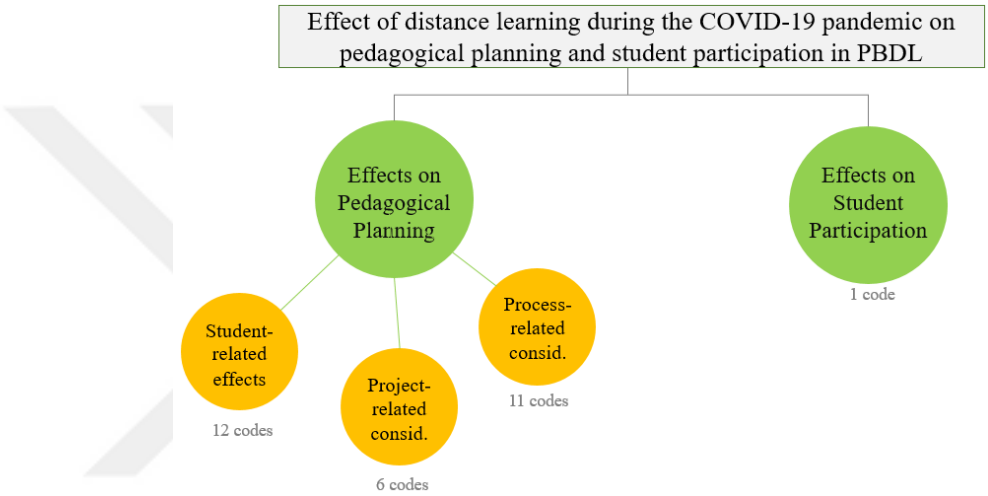

Figure 34. Theme 3.

The code frequencies are presented in Table 16.

Table 16. Code frequencies for Theme 3.

Sub-Theme	Category	Code	f
Effects on Pedagogical Planning	Student-related effects	Limited access to resources	20
		Lower quality of student-instructor communication	18
		Lack of social interaction	17
		Decreased motivation/concentration	12
		Improvement in students' digital representation skills	8
		Increased participation in the course	7
		Increased fatigue	6
		Increased motivation/concentration	5
		Decreased sense of belonging	5
		Identifying students' tendencies/characteristics	4
		Struggle to adapt to digital tools	4
		Decreased participation in the course	3
	Project-related effects	Revisions in submission criteria/format	19
		Lack of transition into physical models	16

Table 16. (continued)

		Revisions in project calendar/course schedule	16
		Successful outcomes	10
		Integration of the pandemic experience into projects	3
		Alternative projects	3
	Process-related effects	Increased use of digital collaboration/communication tools	17
		Alternative ways to deliver knowledge/information	16
		Flexible critique hours through online media	8
		Need for early planning	8
		More group work/projects	5
		Cancellation of juries	4
		Alternative ways to assess students	3
		Better time management	3
		Worse time management / More time consuming	3
		Distribution of responsibilities among instructors	2
		Course hours	1
Effects on Student Participation in Pedagogical Planning		Need for more/immediate student feedback	6

Sub-Theme 1 – Effects on Pedagogical Planning

- *Category 1 – Student-Related Effects*

The first category consists of twelve codes, addressing the student-related factors that affect instructors' already made plans in their courses and/or when making plans for the following project/semester. The code frequencies indicate that the COVID-19 pandemic and distance learning mostly have negative effects on students. The biggest challenge it has brought about seems to be students' lack of access to resources, such as materials, people, and technology, which required a need for making revisions in the plans, especially when it first started in March 2020. The interviewees also mentioned lower quality of student-instructor communication and the lack of social interaction compared to their past experiences with students. Int17 put emphasis on misunderstandings due to the lack of communication and interaction and said:

> *"In remote teaching and face-to-face teaching, what you say is understood as two totally different things. In the studio, you do something and he understands that it is a joke."*

Int30, on the other hand, pointed out the negative feeling this lacking causes and drew an analogy:

> *"It is like an environment that you can never get warm."*

Eleven interviewees emphasized that they observed a decrease in students' motivation and concentration during projects, whereas three interviewees indicated an increase, which seems to be related with individual differences and/or the group dynamic. Int30 said:

> *"It has been better for some. They express it and my observations are the same too. But the majority of them, especially who are more social and want to establish a dialogue more, have been affected negatively. They have started to become more introverted. They think the process has become very didactic. And they are right."*

Moreover, there were opposing views on whether participation in courses increased or decreased as well. Regarding the code frequencies, an increase in participation was mentioned more than a decrease. Int22 said:

> *"Since they can attend from home comfortably, especially the students with the infrastructure, they have participated more and be more focused on the project. The social environment has shifted towards the courses due to the restrictions. There are some positive sides like this."*

On the other hand, the findings show that five interviewees observed increased fatigue and decreased sense of belonging in students, since they are not in the studio and/or university environment. Int8 stated:

> *"I don't think that the environment is easily digestible. People are tired now. You spend the most important year of high school or the prep year at the university in front of a screen. You think you will be in a university environment, but you wake up and you are still in front of a computer. This is not something acceptable or nice. You should acknowledge them to be right. So they don't want to talk."*

Due to the transition to distance learning, students' digital representation skills have been improved, as stated by five interviewees. However, there were also three interviewees, who stated that it was a struggle to adapt to digital tools, since neither

interviewees nor students were familiar with them. Lastly, it was mentioned that it is more difficult to identify students' different tendencies and characteristics during this process. Int26 stated:

> *"I think we aren't able to identify or find the student type, which we described earlier, now. …We couldn't grasp some of the things from students without the university ambience. …There is a motivation problem in students and maybe it makes it difficult for us to identify the ones that might have come forward and tended to think as we would like."*

- *Category 2 – Project-Related Effects*

This category consists of six codes. The code frequencies indicate that the majority of the revisions that needed to be made in project plans was the revisions in the submission criteria and/or format, which was directly related with the lack of transition into physical models due to limited access to workshop facilities and materials. The interviewees stated that they either waived the submission of physical models or lowered their expectations for the quality of models. For instance, Int12 stated that physical models were no longer obligatory during the pandemic:

> *"Our formats have changed. Since students cannot access to workshops and it is even impossible for some of them to supply materials, we don't expect 3D [physical] models. We still encourage them to work with low-tech mock-ups, if they can, but we have shifted to the digital."*

However, Int6 indicated that they still expected students to work with physical models, yet accepted lower displayable quality:

> *"The pandemic has no effects. Only the quality of the requirements have changed. While we used to expect a very good quality model for the exhibition, now we expect the work only in 3D. We didn't expect it to be wonderful or in the displayable quality."*

Even though physical models are an important part of ID education, it was realized that there were interviewees, who were not pessimistic about this lacking. Int19 emphasized that they had already shifted to the digital before the pandemic, due to the increased use of 3D printers:

"Only the mock-up… They do the 3D modelling anyways and 3D printers are used for producing the physical models. So we always collect the projects' production data."

Int7 shared a different solution that they came up with, which had provided successful outcomes:

"It was the first time in design education that there was no [physical] models. We didn't have models, but we did this: Thanks to the 3D software, they embedded the animations they created into a website. Various images, user experiences, relationship with the environment etc… As if they were launching a product… It was creative."

Moreover, revisions in project calendar and/or course schedule had to be made when the pandemic first started, due to the unexpected and uncertain circumstance that affected the entire educational system and the academic calendar with extensions. Int23 stated:

"We were planning to do one more project but changed our minds and extended the existing one, because it was a new experience for us."

Int15 shared a similar experience that led them to making several instant revisions in plans:

"We couldn't imagine that it would take this long back then. We decided to leave it to the make-ups. …It was already the end of our project. We were thinking that we could two projects later, but it didn't go as we expected. After we learned that the school wasn't going to open, …we canceled the last project and gave only one final project."

It was also mentioned by nine interviewees that they achieved successful outcomes despite the challenges. Moreover, two of them stated that they came up with alternative projects, whereas three interviewees integrated the pandemic experience into the projects. None of the interviewees indicated a change in the course/project structure in their courses.

- *Category 3 – Process-Related Effects*

In this category, eleven codes emerged. The most frequently mentioned process-related effects of distance learning during the COVID-19 pandemic were the interviewees' increased use of digital collaboration and communication tools and search for alternative ways to deliver knowledge and information in order to ensure that the course requirements and predefined learning outcomes were achieved. They started to use the learning management tools that their universities provide and/or online platforms, mostly Miro and Zoom. There were both positive and negative experiences that were mentioned in the interviews. Int11 pointed out the effectiveness of using Miro for in-class collaboration:

> *"For collaborative work, Miro is a very effective tool. Being able to see everything on the screen all at the same time…"*

Int16, on the other hand, emphasized the tiredness that the online tools and environments has brought about:

> *"It is more tiring to have meetings in front of a computer. …We can't move, our chairs aren't suitable to sit for long hours. You listen an artificial sound…"*

Unlike other interviewees, only Int19 stated that their department was already familiar with teaching online in PBDL courses:

> *"From the moment it has first started, we were one of the faculties saying 'we will do it the best', even the first department. …When our part-time instructors couldn't come, they would do their classes on Zoom. So our students and we were already used to it."*

It was also mentioned that online workshop sessions were planned for students in order to compensate the lack of face-to-face education, when needed. Six interviewees also allocated extended period of time for critiques or organized additional critique sessions with students. Some of them also preferred to give critiques through e-mails and social media, such as WhatsApp. Two interviewees stated that they had to cancel juries at the end of the semester, during which the pandemic started. Alternative ways of student assessment were also considered. Three interviewees, who were affiliated with the same university, indicated that they started to ask their students to submit project

reports instead of drawing exams.

The findings also show that distance learning and the pandemic necessitated early planning due to the fact that it was a new experience for the interviewees. Two interviewees mentioned that they distributed responsibilities within the team of interviewees during planning and conducting the course. Moreover, in order to increase the interaction and collaboration among students, five interviewees decided to plan more group works and/or projects. In terms of time management, there were two interviewees, who emphasized that distance learning has helped with better time management, whereas there were two other interviewees, who addressed it as being time-consuming and worse time management. Below are quotations from two interviewees, who had opposing views on the issue. Int23 said:

> *"Everyone has an allocated time. They liked it a lot. They say 'we know when our turn is'. This is something that I will keep doing, when we go back to the school."*

However, Int4 stated that they have been experiencing the opposite:

> *"His turn doesn't even come. …we group them, put everything at the same time and have them discuss among themselves in a shorter period of time but the digital environment is very time-consuming and there is no time. It isn't practical."*

Lastly, one of the interviewees mentioned that their course hours decreased due to an institutional decision.

Sub-Theme 2 – Effects on Student Participation in Pedagogical Planning

A very few number of interviewees mentioned the need for immediate feedback from students as an effect of distance learning and the COVID-19 pandemic on student participation. Despite the low frequency, four interviewees stated that they conducted online surveys and/or meetings with students (in the course, department and/or university) in order to understand the current situation and students' concerns at different times during the semester. Only one interviewee stated that he has started to receive more feedback from students during the course, because distance learning has turned their instructor-student relationship into being social media friends. Another interviewee, on the other hand, indicated that they have started to use Zoom polling in

their courses, when needed. There was only one interviewee, who specifically indicated that distance learning and the pandemic have not affected student participation in planning in her course.

6.2.2 Interpretation of Findings

The findings were interpreted and discussed in relation to the relevant literature. The interpretation of the findings are presented in detail under titles, corresponding with the four subquestions and the main research question, in this sub-section.

6.2.2.1 Pedagogical Planning Processes in PBDL

The findings in relation to how instructors conduct pedagogical planning processes in PBDL were examined and discussed with the aim of answering RQ2.1.

The findings indicate a number of dimensions in pedagogical planning that guides the planning of design projects in ID education. Pedagogical planning in PBDL involves multiple decision-makers at an institutional level and is not only concerned with courses in curriculum separately, but also regards the curriculum as a whole within the academic structures of institutions. Therefore, considerations in project planning in PBDL courses cannot be entirely separated from institutional academic requirements and/or traditions. Regarding the limitations of academic structures, some researchers argue that conventional university teaching, focusing on rational objectivity, poses a risk for design, which has a more subjective culture both in teaching and learning, by fragmenting the process and reducing its holistic and iterative nature to a didactic systematic methodological approach (Wang, 2010; Loy and Canning, 2013; Tovey, 2015).

The findings also revealed that this planning process starts before the academic year/semester starts. Whereas course instructors – often a team of instructors for one course – are the main actors in project planning, academic/non-academic stakeholders and/or students may also be involved at different phases and degrees, depending on the project content and aim of the course. The project theme, objectives/goals, structure, number of projects, calendar, phases and activities within the calendar, and submission/assessment criteria are the essentials that require careful planning for each individual/group project within the course syllabus and fitted into the course timetable. The pedagogical approach and learning outcomes predetermined for that particular

year of study and semester guide this process. In this regard, the structure of design briefs in ID education shows similarities with what the literature suggests, both in terms of the content and the process of structuring the design brief (Kapkın, 2010; Rowe and Wong Kwok-Kei, 2011; T. Curry, 2014; D. Demirbaş, 2018).

The design brief of the (first) project or the framework for third- and fourth-year students to write/rewrite their individual design briefs are usually ready by the beginning of the semester, if there is not any intended participatory planning activity with students. In case of having multiple projects in one semester, instructors usually have a general idea about what the projects will be in the beginning, since they already have a certain curricular structure and learning outcomes. In this case, decisions or necessary revisions are made in design briefs following the first one, during the semester before that particular project starts. The findings also revealed that students' progress and needs in learning vary, yet instructors mostly rely on their own observations, past experiences, styles, perspectives, and expertise to decide what students need, which is in parallel with what some studies argue in the literature (Cross, 1982; Green and Bonollo, 2003; Lawson, 2004; Khorshidifard, 2011; van Dooren et al., 2014). They observe students' progress, aim to identify what they academically and/or emotionally need in the process, and make certain decisions or revisions with the know-how they have. Some instructors receive feedback from their students or instructors of the previous year's studio course to identify the needs for planning for the following project, semester or academic year. These findings are in parallel with the literature acknowledging the student-led process of design learning (Lawson and Dorst, 2009), in which students are an inseparable part of the planning process with direct and/or indirect influence on instructors' decisions.

6.2.2.2 Accommodating the Diversity of Individual Differences in PBDL

With the aim of answering RQ2.2, the findings in relation to how individual differences are accommodated in PBDL were examined and discussed.

Individual Differences of Students and Instructors

This study shows that there is a richness in students' personalities, prior learning, cognitive and disciplinary skills, and abilities in PBDL courses and how they perform in the design and learning processes. This diversity of characteristics indicates learning styles, which is a component of many internal factors that provides particular patterns,

characteristics, and norms about individual learning preferences (Sims and Sims, 1995; Guild and Garger, 1998; Kolb, Boyatzis and Mainemelis, 2001). The findings also revealed that students approach to design activities, abstract and/or concrete content features, degree of structure, physical and social characteristics of the learning environment, and degree of involvement in PBDL courses differently, supporting what the learning styles literature suggests (Renzulli and Dai, 2001). Therefore, learning style is a good indicator of individual differences in the learning process, as expected.

In this study, it was aimed to reach a rich variation of opinions, practices, and experiences of instructors in PBDL. The richness of the diversity attracted great attention, which helped having a grasp of instructors' individual differences as well. Even though their learning preferences were not the focus of this research, the findings provided invaluable insights into the influence of their individual differences on pedagogical planning, especially in project planning. Instructors have different educational and professional backgrounds, experience in teaching, educator profiles, perspectives on design and education, and relationships with students. These differences are not directly related with their learning styles, yet they affect how instructors approach their students and decision-making. There are studies in the literature criticizing formal education for the selection of instructional methods based on instructors' own learning preferences (Sternberg, 1990; Guild and Garger, 1998). Even though the findings revealed that instructors' own styles and perspectives have influence on their decisions along with pedagogical considerations, it was also found that instructors intentionally take on different roles in different semesters and years of study in PBDL. The change is situational and depends on the targeted learning outcomes, complexity and scope of projects, and the range of skills that students are expected to develop in that particular course, semester or year. Students' comfort zones are challenged more by increasing the complexity and uncertainty, especially towards upper years of study, as suggested in the literature (Canniffe, 2011).

Accommodating Individual Differences

The findings revealed that instructors have multiple strategies to accommodate students' individual differences in PBDL. The first strategy is to give guidance to students through critiques, which characterizes the continual instructor-student dialogue and/or make adaptations in the ongoing process. This one-to-one dialogue is

quite insightful for instructors to identify students' differences and respond to their needs during projects, which supports the literature indicating the transfer of knowledge and skills by analyzing students' abilities and way of understanding (Schön, 1987; Brusasco et al., 2000). The second strategy is to enable students to participate actively in project assessment as jury members and/or in grading. Lastly, the third strategy is to allow student participation in project planning.

This study shows that students have direct/indirect influence on decisions in the planning process, which can be categorized in three different levels of participation. The most common level and form of participation is instructor control informed by students' views and needs. Within this category, observing students' progress and receiving their verbal feedback (systematically/unsystematically) are the two most common practices. The findings show that instructors are willing to take students' feedback into account only if the feedback matches the pedagogical requirements or what instructors believe is necessary based on their observations and past experiences. Therefore, the degree of students' influence on project plans depends on the subjective interpretation and evaluation of instructors, which poses the risk of false claim of participation that may lead to student disengagement, disinterest, lack of confidence, and alienation (Mann, 2001; Mitra and Gross, 2009; Bovill, Cook-Satherand and Felten, 2011). It is important to ensure that students feel that they have a certain degree of influence and they are taken seriously, because participation is meaningful only if they can benefit from the outcome. This research shows that they are mostly asked to share their insights and/or suggestions at the end of a project or semester, which means their possible influence is only on the decisions that will be made for students, who will take that particular course in the following year. However, by definition, participation is meaningful when the individuals, who are affected by the outcome, are involved in the process.

Even though the previous level of participation is much more common, partial student control with/without instructor guidance is also practiced in PBDL. Compared to the previous level of participation, it implies more active and higher level of participation in decision-making, requiring good consensus-building and communication skills (Wulz, 1986; Thompson, 2009; Jagersma and Parsons, 2011). Either high or low, students have direct influence on the process and the design brief to start the project within a framework that is provided to students. Instructors tend to provide varying

degrees of guidance depending on the degree of project structure. As the structure gets looser, the complexity and uncertainty gets higher and instructors tend to step back more in the process, allowing students to finalize and/or create their own design briefs. Regarding the findings, providing framework, which is the most common practice within this category, can be considered as systematic guidance. This guidance is important in order to compensate students' lack of pedagogical knowledge and experience in design, not knowing what and how to learn, and ensure that they feel comfortable when they are handed control (Shor, 1992). It also requires a balance between instructors' and students' influences and a clear definition of roles and responsibilities (Wulz, 1986; Thompson, 2009; Jagersma and Parsons, 2011).

The findings also revealed that instructors control the planning process by the indirect/passive representation of students' views. They tend to apply project-specific surveys, voting, and polling in order to involve students in choosing between/among predetermined options that do not always have substantial influence on the plan. Students are sometimes given options to choose among for their individual projects, rather than voting/polling for a decision for the entire class. Moreover, whereas students may also state their views through student representatives or sometimes research assistants, it poses a risk of subjective interpretation, simplified and uniformed assumptions, lack of consensus, and sense of ownership issues (Wulz, 1986). Moreover, this may be the indicator of students' lack of feeling actively involved in decision-making or not being invited to participate actively, even though they may be given options/alternatives to choose among or represented by their peers.

Lastly, despite the responses in relation to total instructor control, the findings revealed that it is related to how instructors perceive the involvement of students. It was realized that even though they stated that they do not allow any student participation in planning, their practices are passive participative practices, corresponding with instructor control informed by students' views and needs. Therefore, there was no total instructor control, which may be related with PBDL as being a semi-structured experiential learning process, which is student-led and cannot be totally didactic (Lawson and Dorst, 2009; Crowther, 2013). Similarly, there was no findings, addressing total student control, which is considered to be due to the academic structures of institutions and requirements of formal education.

Considering the three strategies that instructors have for accommodating students' individual differences, it can be concluded that guiding/adapting the process enables students to learn *during* the process without realizing what they learn, acquire, and achieve before making any reflections at the end. Student participation in project assessment allows students to experience a new, different learning process. It requires a high level of critical thinking, especially in active forms, such being jury members, in addition to reflecting not only on his/her own process, but also on the disciplinary requirements through others' works. Student participation in project planning, on the other hand, is a more effective learning process from the beginning compared to the abovementioned ones, when active participation is encouraged and students are aware of their influences on the process. It helps them acquire various skills, including being a more flexible learner, who is capable of activating all learning modes when needed, and develop deeper understanding. Regarding the criticisms against PBDL for being labor-intensive, inefficient due to repetitive work, lacking clarity about what is exactly learned, and lack of students' explicit verbal expression about what they learned (Dorst and Reymen, 2004), involving students more actively in project planning and making it a transparent process, along with an open communication and acknowledgement of individual differences, can be a powerful and effective way to enhance the learning process.

6.2.2.3 Effects of Distance Learning During the COVID-19 Pandemic on Pedagogical Planning and Student Participation in PBDL

With the aim of answering RQ2.3 and RQ2.4, the findings in relation to the effects of distance learning during the COVID-19 pandemic on pedagogical planning were examined and discussed.

Effects on Pedagogical Planning

The radical, immediate transition to online platforms and the uncertainty it has brought about has highlighted the flexibility and adaptability of the design studio pedagogy. It revealed the importance of approaching the design studio not as a physical environment, but rather as an experiential learning process that does not necessarily take place in a physical design studio. The findings show that distance learning was an unfamiliar educational practice for the majority of instructors in ID departments in Turkey prior to the COVID-19 pandemic. For that reason, it was considered to be a

temporary educational practice by instructors and they did not make any permanent changes in the curricular structures or academic requirements. They only adapted their plans to the circumstances that they considered being temporary. However, considering the ongoing pandemic and the emergence of hybrid courses/curriculum, the recent practices in PBDL may be permanent to a certain extent, necessitating even further development of new practices by reconsidering design education as a whole, despite the assumptions that the situation is temporary.

Even though the mandatory transition to distance learning did not radically affect the course structure and/or content in PBDL, project submission requirements and communication means and platforms changed in order to adapt the process to the digital. Revisions and/or adaptations were made either in the process or with more careful, early planning, regarding the pedagogical requirements. Due to limited access to resources, working with physical models (mock-ups/prototypes) shifted to working with digital 3D models and animations that can represent the physicality of designed products. It helped instructors have a grasp of product details in students' project presentations. However, the findings indicate that even though instructors are more flexible in terms of working and presenting with physical models during the pandemic, they still find it very critical and essential to work with models. Despite the studies addressing the shifting focus on the technical qualities of materials of physical mock-ups/prototypes towards sensory, experiential qualities in ID education in the last 30 years (Parisi, Rognoli and Sonneveld, 2017), the expectations are more conventional in terms of physicality of outcomes in the case of Turkey. There is still a strong focus on the material and physical dimension of learning, i.e. engaging with materials (Shreeve, Sims and Trowler, 2010).

The findings also indicate a lack of social interaction and communication due to no physical gathering, which had to be taken into account by instructors when planning during the pandemic. This lacking had negative effects both on students and instructors, necessitating to increase motivation, concentration, engagement, and quality of communication, which are in parallel with the problems of the virtual design studio that the literature suggests (Tuckman, 2007; Sun and Rueda, 2021; Meshur, Alkan and Bala, 2014). It may be due to the lack/absence of public performance and peripheral participation, social aspect of learning (interaction with more experienced students, instructors, experts etc.), and physical studio for teaching and learning as an

interactive part of social learning (Shreeve, Sims and Trowler, 2010), which are important factors that influence students' learning processes. Moreover, it became more difficult to identify students' differences due to the limited/lower quality interaction between instructors and students. It may be caused by the difficulty to observe how each student perceives, interacts with, and responds to the learning environment (Keefe, 1979).

This study shows how instructors have adapted to the existing circumstances and dealt with the short-terms effects of the pandemic in their PBDL courses. However, it is critical to note that the unexpected emergence of the pandemic was a breaking point in design education, yet its long-term effects on PBDL are still unexplored and need to be discussed from many aspects, including how individuals learn and teach design today and in the future, and make suitable pedagogical planning accordingly for the emerging and future circumstances in design education.

Effects on Student Participation in Pedagogical Planning

In terms how pedagogical planning processes are conducted in PBDL, the transition to distance learning during the pandemic did not have any significant effects on the level and form of student participation that instructors allow. There were only a limited number of practices of receiving student feedback on how to proceed in order to deal with the uncertainty of the situation, when the pandemic first started. It was still an ongoing situation when the interviews were conducted. The findings indicated the instructors' need for being directly informed by students more than before, since students' reactions and progress cannot be observed as much effectively as they could in face-to-face education. This points out the difficulty of determining and understanding students' needs and individual differences in the learning process in midst of the uncertainties that the pandemic held, which have already been difficult to deal with. Regarding these findings, student participation in planning processes has the potential to enable instructors to deal with the situation better and provide more suitable and effective learning experiences to students through understanding and accommodating the diversity of individual learning differences, regardless of the spatial qualities of the design studio.

It is inevitable that the pandemic will have long-term effects on student participation as it has affected many areas of life. The pandemic showed that it may not always be

possible to gather individuals physically for participatory activities, yet they can work together on online platforms through various digital tools, even when they are physically spread out in different places and geographies. Such tools and platforms enable large groups, regardless of the group size, to work together without spatial and temporal boundaries. However, technology is not equally accessible to all communities. The findings revealed that there are many students that have very limited access to internet, computer, materials etc. Therefore, it is an important issue to consider students in communities with limited or no access to technology, while considering the possibilities for online participatory activities. It is quite critical to avoid the risk of increasing the gap between students, who have access to engage in such activities and who do not, in order not to contradict with the democratic aspect of participation.

6.2.2.4 Accommodating the Diversity of Individual Learning Differences in Pedagogical Planning in PBDL

This study shows that students with diverse learning styles have direct and/or indirect influence on the decisions made by instructors. Among the multiple decision-makers at an institutional level, instructors are the main decision-makers in pedagogical planning in PBDL courses, taking the whole curriculum into account within the academic structures of institutions. Students are inseparable part of this process, supporting what the literature suggests about design learning as being a student-led process (Lawson and Dorst, 2009), which is an unstructured process of developing a complex, personal system of preferences (Schön interviewed by Goldhoorn, 1991). Even though critiques are the essential feedback mechanism during projects in PBDL courses in order to tailor the ongoing process to individual learning differences for the adaptation of students individually and as a group, students are not always involved in planning processes. Rather than allowing active student participation, instructors mostly rely on their own observations and past experiences, make assumptions about what students need, and make decisions accordingly. It is also common that the students, who are observed and engage in the process, cannot benefit from the decisions made based on the observations made on them, since those decisions are usually made for the next group of students, who will take that particular course in the following semester or academic year. In addition to instructors' subjective interpretation of students' needs, their pedagogical approaches and learning outcomes

guide this decision-making process more than the other considerations as explained in detail in Section 6.2.2.1. This most common way to accommodate students' individual learning differences in pedagogical planning is a passive way of involvement and implies a certain level of didactic attitude due to instructors' predictions and decisions that are made on behalf of students. However, it cannot be argued that it is entirely didactic, since designing takes place in an unstructured process, in which there is always a room left for students even in highly structured project structures, at least in terms of defining design problems. This finding aligns with the flexibility of design pedagogy and supports that PBDL courses apply a semi-structured learning strategy of experiential learning, providing students with the experience of defining an actual design problem and construct knowledge based on experience (Uluoğlu, 1990; Teymur, 1993; Demirbas and Demirkan, 2003; Crowther, 2013). Towards upper classes, students are expected to take more responsibility and initiative in the process, engage especially in writing/rewriting their individual design briefs in a more complex and loose project structure. Moreover, even though receiving feedback from and/or on students is another way of allowing multiple voices/perspectives to be heard and accommodating them in pedagogical planning, this practice is not always systematic and instructors do not always take these feedback into account or make it apparent to students that they make decisions based on these feedback. This poses a risk of students' alienation, demotivation, and disinterest. However, it is important to ensure that students feel being heard and taken seriously in order to be highly motivated and engaged voluntarily in the learning process (Mann, 2001; Mitra and Gross, 2009; Bovill, Cook-Satherand and Felten, 2011), regardless of the level and form of student participation.

Participative opportunities are invaluable for all students and instructors to enhance learning. However, this study shows that the direct participative opportunities provided to students in pedagogical planning in PBDL are very limited due to various reasons, such as pedagogical requirements and institutional constraints in the higher education system, despite the attempts of some instructors. Considering that the undergraduate ID programs are only incorporated within higher education institutions in Turkey, certain academic requirements have to be met for achieving predetermined educational purposes that align with those of institutions'. Even though few in number, the findings revealed that the participative opportunities are provided often within a

framework that is developed by instructors. Providing students with a framework enables instructors to compensate students' lack of pedagogical knowledge and experience through systematic guidance and to ensure that they feel competent and comfortable in the process (Shor, 1992). In parallel with this, the findings show that when students are given the opportunity to participate actively, they are more likely to become attached to the project, learning process, peers, and instructors with increased motivation, interest, and awareness. They can also make sense of the pedagogical approach and process more and develop an increased sense of ownership. However, students have different personalities, backgrounds, cognitive and disciplinary skills, and abilities that imply a diversity of learning styles, which affects their individual preferences to participate actively. The awareness of this rich diversity is critical for instructors in instructional practices in terms of guiding and enabling each student to go through an effective individual learning process, regardless of the level and form of student participation. Regarding these, providing a framework that enables the subjective nature of design to become prominent has the potential to overcome institutional constraints and ensure the systematic accommodation of individual differences in the learning process through instructor guidance for more effective and improved learning practices.

6.3 Discussion

This dissertation investigates how diverse learning styles can be utilized in PBDL in ID education and aims to develop a student participation model. While PBDL courses cannot be separated from institutional academic requirements and traditions, formal education is claimed to be posing a risk for design education in the literature, since it requires fragmenting the design process into steps, which is contrary to the nature of the process, which may vary from one individual to the other (Wang, 2010; Loy and Canning, 2013; Tovey, 2015). Formal education is also criticized for lacking the accommodation of such individual differences in general and for the selection of methods based on instuctors' learning preferences, which exhibits a hierarchical manner (Sternberg, 1990; Guild and Garger, 1998). However, design practice is an undivided whole and cannot be fragmented into separate steps and actions (van Dooren et al., 2014). Both students and instructors approach this nonlinearity and inseparability of the process differently. In addition to the level of disciplinary knowledge and experience, individual learning preferences are an important factor in

this difference, since the design process requires multiple modes of learning, some of which may be more preferable for some individuals. This diversity is an invaluable resource for all students and instructors to learn from each other and develop different viewpoints, since participation is not only to achieve agreement, but also to engage individuals with diverse perspectives in meaningful and purposive adaptation both for individual and group empowerment (Sanoff, 2007). However, the findings of this study indicate that instructors with diverse characteristics make decisions and plans for/with students with diverse characteristics and it is challenging for students to make sense of why they are doing what they are doing. In order to help them make sense of what is exactly learned and express what they learned explicitly, which PBDL is criticized for (Dorst and Reymen, 2004), allowing the highest level of active student participation that is possible within institutional and academic limitations can be a powerful and effective way to accommodate different learning styles and enhance the learning process for all.

Partial student control with substantial influence on decision-making is the most active and highest possible student participation within the regulations and bylaws of the higher education system in Turkey. This level and form of student participation has already been practiced with/without instructor guidance in PBDL in ID education. The findings of this study revealed that it is the second most commonly practiced level and form of student participation, often with systematic instructor guidance. It is mostly seen in upper years of study, with a framework that is provided to students for facilitating them in writing/rewriting their individual design briefs within the limitations set by instructors. The course syllabus is often the most essential consideration, including pedagogical, institutional, disciplinary, and professional requirements, in setting these limitations. Therefore, the level of complexity and structure of the framework varies depending on the year of study. On the other hand, even though students tend to have positive opinions on being active participants in planning processes, having partial control is not commonly preferred by students, especially when there is no systematic guidance. However, they are likely to prefer taking an active part, when they are provided with guidance that can compensate their lack of pedagogical and disciplinary knowledge and experience. Despite the higher number of practices in upper years of study, this study shows that there are exemplary cases with satisfactory and fruitful results even with first- and second-year students.

However, these practices are not always planned with a full awareness of participatory processes and/or made apparent to students, which may lead to missing the opportunity to benefit from its fullest potential.

Partial student control is strongly related with the student-led nature of the design learning process (Lawson and Dorst, 2009). As this study shows, each student goes through a unique learning process, which is unstructured and embodies a complex, personal system of preferences (Schön interviewed by Goldhoorn, 1991). The diversity of students' learning preferences implies the diversity of contributions that each student make in the process, especially in their own projects. Since the design learning process is experiential by nature and adopts a semi-structured learning strategy, it is inevitable that each student is in control of his/her own process, especially in defining an actual design problem (Uluoğlu, 1990; Teymur, 1993; Demirbas and Demirkan, 2003; Crowther, 2013), within a given framework with varying degrees of complexity and structure. It indicates that there is always a room left for students to make individual decisions regardless of the level of complexity and structure of projects. Therefore, each student needs a personal action plan within the scope of a project that s/he is working on in order to lead his/her own process. Design projects require students to understand the project objectives and follow a schedule/timetable to achieve these intended objectives with targeted project deliverables. In that sense, the diversity of students leads to an immense diversity of processes and final designs, all of which aims to achieve a shared purpose. Regarding the findings of this study, these personal action plans are not consciously made by students, yet writing/rewriting individual design briefs can be considered as an example. Moreover, it is clear students and instructors do not perceive such practices and processes as participatory, even when the practice itself requires students to take an active part. Especially students are not aware that each of them makes an individual contribution and takes initiatives to plan and manage their own processes, as well as having direct/indirect influence on both their instructors' decisions and their peers due to the interactive nature of PBDL courses. This lack of awareness causes both parties to fail in taking advantage of the fullest potential of the participative opportunities that such practices hold.

Regarding the aim of this dissertation, partial student control with systematic instructor guidance provides a solid ground for the development of a student participation model in PBDL. It necessitates an open communication along with the accommodation of

individual differences in a transparent planning process. Instructor guidance in this process can be helpful in recognizing, managing, and using available resources to set and achieve a shared purpose as a group and enable students to develop a sense of ownership and increased commitment to the process. Since individual learning processes take place in a collective and interactive learning environment in PBDL, the awareness of the self, others, and processes has the potential to identify one's own personal strengths, weaknesses, needs, goals, and expectations in learning and how each of them contributes to the collective process that is experienced by all. Identifying these helps communicating them explicitly with others in a more effective way, which enriches the continual dialogue between instructors and students that is at the core of PBDL (Schön, 1983; Green and Bonollo, 2003). This dialogue, in the form of critiques, helps instructors to guide each student during projects and make individual adjustments in the process, when needed. If this dialogue is improved through active participation and expands to planning processes, it can ensure that students recognize and acknowledge the existence of different learning styles as well and understand what this diversity implies for each individual in learning. Then, it can be possible to create a knowledge base for everyone involved and reflect on the entire process collectively for the interest of all. In addition to the pedagogical and disciplinary knowledge, giving voice to all students and instructors from all years of study can enrich this knowledge base with the diversity of experiences, expectations, and viewpoints. It also ensures that all individuals feel being heard and taken seriously, which helps building trust among themselves, when they are given equal right to participate and their contributions are taken into consideration.

Being an active participant increases interest, motivation, attachment, and sense of ownership, which accompanies increased self-confidence and a sense of belonging, along with strengthened abilities to deal with ambiguity, take initiatives, make decisions, and negotiate. It also helps making sense of the considerations and requirements in design education, reflecting on one's own experiences and those of others, resolving conflict, making tradeoffs, building consensus, and making an action plan towards achieving individual and common visions. Since these abilities are strongly related with learning styles, how students approach active participation varies, even though the findings of this study indicate highly positive student opinions. Therefore, partial student control empowers all students, regardless of their learning

styles and tendencies towards participation, to take an active part and have substantial influence in planning. It also enables them to develop competency in activating all modes of learning that are identified in ELT throughout this process, especially in decision-making, which ID students lack the most as this study revealed. It is an invaluable learning opportunity for all participants, who have diverse learning styles, as it requires stretching the boundaries of one's own learning preferences (Sims and Sims, 1995). This, in turn, enables them to improve their learning styles by purposefully working with their non-preferred learning modes and become more flexible learners, who can adapt their learning styles to situational demands (Sternberg, 1990; Fleming and Mills, 1992; Kolb and Kolb, 2015; Korn Ferry, Kolb and Kolb, 2018), which the iterative nature of the design process requires. Considering that participation functions well as a source of information and knowledge about conditions, needs, and attitudes and thus improves the effectiveness of decision-making (Sanoff, 2000), active student participation has the potential to discover what an existing situation demands and how to adapt one's self to the process.

CHAPTER 7: STUDENT PARTICIPATION MODEL IN PBDL

A student participation model is proposed with the aim of utilizing individual learning differences for enhancing PBDL in ID education. This model has been developed based on partial student control with systematic instructor guidance in developing, implementing, and assessing an action plan for learning. It aims to involve instructors and students from all years of study as equal participants, who have substantial influence on pedagogical planning through engaging in negotiation and co-decision in planning, implementation, and assessment processes. It is important to invite all individuals, who take part in the learning process and are affected by the decisions made, to participate and yet give them the option to decide whether they prefer to do so. The key is that each participant feels comfortable to contribute their perspectives at his/her level of interest, willingness, and expertise.

It is suggested to use this model in course and/or project planning in each semester of each academic year in ID departments (Figure 35). Each student participant becomes a part of the participatory process as s/he enters the ID department in the first year, then constructs knowledge, and develops various skills on the participation experience by going through the experiential learning cycle in each participatory activity until graduation. All learning modes are activated in the participation process, since participants engage in various activities of experiencing, reflection, analysis, assessment, conceptualization, decision-making, action, and implementation. First, it starts with a participatory group session in the beginning of the semester, that is carried out at the departmental level by inviting all students, who are enrolled in design studio courses in each year of study, and all instructors, who are teaching those courses. In this session, it is strongly suggested to have an external moderator, who will be a neutral participant and is experienced in participatory practices, in order to balance the instructor-student power relations and avoid the refrainment of students. Then, the participation process continues with interim and end-of-semester assessments of the action plan at the course level, where students of each year of study make assessments separately among themselves. If there are students, who do not prefer to participate, in the first group session, it is still encouraged to ask them to take part in the assessment. Thus, they can experience (a lower degree of) participation, enabling them to feel being heard and benefit from the given participative opportunity, which may encourage them to take more active part in following semesters.

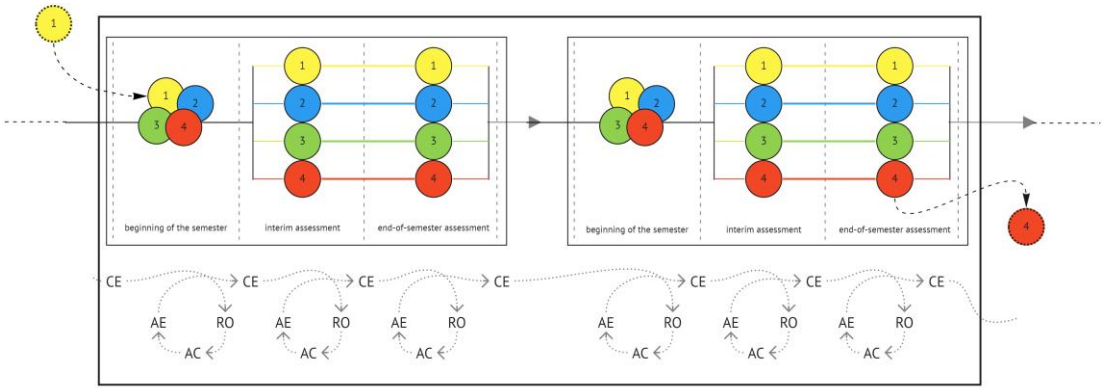

Figure 35. Experiential learning cycle within the timeframe of the participation process.

7.1 Stages of the Model

The student participation model (Figure 36) proposed in this study involves eight stages, all of which are interrelated with each other.

7.1.1 Shared Purpose

It is important that all participants have a shared sense of purpose, helping them relate their roles, experiences, and perspectives with the collective PBDL experience. The shared purpose of this proposed model is to build a sense of community, i.e. a co-deciding learning community, in order to develop, implement, and assess an action plan for PBDL. In this stage, all participants agree on the common purpose, roles and responsibilities, transparency, importance of stating individual standpoints, and acting on consensus throughout the whole process. It is critical to ensure that all participants are aware of who are participating, why they are participating, what each participant stands for, and how they contribute to the course/curriculum/department. Thus, they can recognize why it is critical, special, and unique to participate actively. This recognition is important to create an emotional attachment, inspiration, motivation, and commitment to the process and fosters participants' willingness to engage in the following stages.

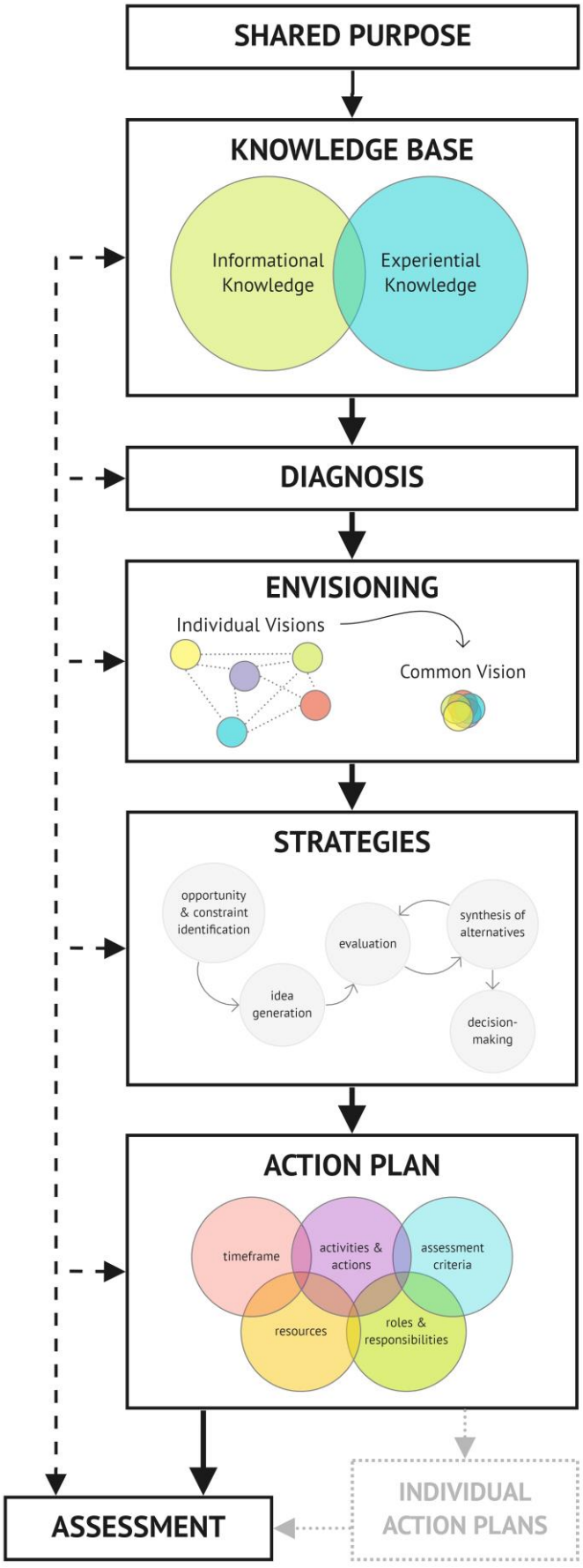

Figure 36. Student participation model in PBDL.

7.1.2 Knowledge Base

This stage entails establishing a knowledge base through facilitating the exchange of informational and experiential knowledge among student and instructor participants from all years of study, aiming the recognition and understanding of the situation and individual perspectives, to act on in further stages. *Informational knowledge* is conveyed by instructors and may cover various issues, including but not limited to pedagogical, institutional, disciplinary, and professional considerations, requirements, and limitations, with a strong emphasis on how they relate to learning outcomes of design studio courses in the department's curriculum. It can facilitate students in making sense of the design process, design pedagogy, objectives of each year of study, and differences among different levels of design studio courses by comparison with each other. It also provides a frame for participants to think through and make sense of their experiences. *Experiential knowledge*, on the other hand, is shared by all student and instructor participants, with the aim of giving voice to each individual to state their personal experiences, needs, and expectations in relation to PBDL. Mixed groups of participants is strongly encouraged to ensure interaction between lower and upper years of study. Former students' experiences of a course are an important guide for others, who are currently enrolled in that particular course. It helps identifying student participants' own individual needs in order to achieve learning outcomes, setting expectations and learning goals, as well as understanding those of others'. Instructor participants also benefit from this interaction in addition to sharing and reflecting on their own teaching experiences. Thus, all participants engage in a collective, systematic reflection and feedback process. Open communication, ensuring that each participant is heard, and transparency of this process are essential to build trust between instructors and students, as well as unveiling the diversity of individual differences.

7.1.3 Diagnosis

The knowledge exchange in the previous stage forms the basis for problem diagnosis. This stage entails the comprehensive interpretation of the knowledge base for identifying the patterns and symptoms that instructors and students are experiencing. It has critical importance to state the problem explicitly and clarify why it is a problem for the effectiveness of PBDL by linking the shared information and experiences.

Thus, it helps discovering the root causes and shape an approach to resolve the problem through either eliminating or reducing those causes. The problem statement is expected to reflect all participants' concerns. Due to the complexity, each group of participants can work on only one year of study. Then, the groups can present their ideas to each other and receive others' opinions. Before moving to the next stage, it is important that all participants build consensus within an allocated time and agree on the diagnosed problem.

7.1.4 Envisioning

In this stage, all participants are invited to imagine the ideal future for PBDL, considering the implications of current practices and possible futures, in order to create one common vision for each year of study, providing a reference point, guidance, and motivation for participants. It is important to take learning outcomes of each year of study into consideration. First, participants are asked to state their individual visions, considering the year of study they belong to. Then, they are encouraged to work together in mixed groups to review and discuss those individual statements for identifying common themes to create the common vision statements. All groups can get together to present their ideas and agree on what the common visions will be for each year of study through group discussions.

7.1.5 Strategies

This stage entails the development of strategies to move students in the direction of the defined common visions. First, it necessitates the identification of opportunities and constraints within the knowledge exchanged in the *Knowledge Base* stage, followed by brainstorming for generating ideas about possible strategies. Then, for the evaluation of ideas, it is encouraged to have a list of criteria, prepared by instructors to be used by each participant. The alternatives that are found to be the most appropriate by the majority are synthesized and combined based on consensus. Then, the synthesized alternatives are re-evaluated before making decisions on what the strategies will be to resolve the identified problem and achieve the common vision. Instructor participants can be consulted in this process, since it is crucial that the strategies align with the pedagogical and disciplinary requirements and constraints. It is also important that all participants come to an agreement on the final decisions after working in small groups and then discussing with the entire group.

7.1.6 Action Plan

For the implementation of the developed strategies, an action plan is needed for each year of study to be implemented in each semester. An action plan includes activities, actions, roles and responsibilities, resources, and timeframe. Specifying the activities, actions, and available resources is important, so that the roles and responsibilities of instructors and students can be clearly defined. The activities and actions may be related to communication issues, design process, learning activities, critique sessions etc. It is also important to decide on the list of criteria to assess the implementation process during the semester. Moreover, a timeframe for implementation is created, specifying deadlines and milestones, in accordance with the academic calendar. The action plan may either be a part of a course syllabus/design brief or be used for developing one, depending on the level of complexity and structure that is required/intended in that particular semester. It is critical that the action plan is developed based on the knowledge shared among participants, reflecting the diversity of individual differences in learning, as well as in teaching, in order to ensure its feasibility, achievability, and effectiveness. It is also important to ensure that the action plan is specific to the situation, flexible, adaptable, and can be monitored. It is expected that all instructors and especially students develop an increased sense of responsibility and ownership on the implementation of the action plans. In order to ensure this, it is suggested to encourage participants from different years of study to work in mixed groups, each focusing on only one year of study, and then discuss their proposals with the entire group to finalize them by reaching consensus. Thus, participants from both lower and upper years of study have a say in each action plan.

7.1.7 Individual Action Plans

Based on the action plans, participants are encouraged to develop individual action plans that are built around their own learning goals. Thus, each participant can self-reflect and adapt the collectively developed action plan of that specific year of study to his/her own individual learning preferences, needs, expectations, and experiences. This stage can be carried out individually after group sessions.

7.1.8 Assessment

This stage implies the assessment of the implementation process of the action plan. It aims to monitor whether the action plan is working as it is intended and to identify

needs for improvement and/or revisions by assessing how students and instructors respond to the actions taken. It is suggested to make an interim assessment and an end-of-semester assessment for each year of study separately in every academic semester. Whereas the interim assessment facilitates the process follow-up, the end-of-semester assessment helps measuring the achievement of learning outcomes of a course. This helps receiving feedback on both the individual and collective processes of learning. Instructors can use this information to make adjustments in the process with students, whereas students can also review their individual learning goals and reflect on their individual action plans in terms of how much they have achieved those goals and learning outcomes. These assessments are strongly encouraged to be systematic by using a list of criteria, prepared in the *Action Plan* stage, and reported. This list of criteria can be revised at this stage, if deemed necessary. Following the collective assessment, revisions can be made on the action plan with the instructor(s) and students in each year of study separately, based on particular needs. It is suggested to share the assessment report in the *Knowledge Base* stage in the participatory group session of the following academic semester, which can also be beneficial to discuss the actions that have been tried before and their results in the *Diagnosis* stage.

7.2 Potential Benefits of the Model

The student participation model proposed in this dissertation uses the participatory approach to catalyze action for more effective PBDL by involving students and instructors as equal participants, who have different levels of experience and expertise, in pedagogical planning. It provides a sustainable participatory infrastructure for the main actors of PBDL and encourages that students are provided with this participative opportunity as they enter the university. It offers democratic practices for developing deep understanding and ownership of participants' own experiences. It allows them share these experiences, identify their needs, and set/manage their expectations in learning by making sense of the design pedagogy and design process. By learning to make tradeoffs, students can still feel valued and heard, even when their ideas are not put into action, since they are given the opportunity to express those ideas, discuss them, and understand why other options are more preferable and/or appropriate in specific situations.

In this model, students are not only involved in the initial planning process, but also in implementation and assessment, which increases the sense of responsibility and ownership Experiencing the benefits of participating can increase engagement, motivation, and enthusiasm for all. It can also motivate and inspire students and instructors, who do not prefer to participate or has just entered the department, to take more active part and use their highest potential to influence the decisions that they are affected by.

The model essentially offers a collective problem-solving and communication model to PBDL courses. It supports participants in becoming more flexible learners by developing an integrated range of learning modes. This process facilitates the development/improvement of various skills and provides the opportunity to practice new skills in a safe, controlled design studio environment. These skills include but are not limited to:

- Dealing with uncertainties and ambiguity
- Lifelong learning
- Consensus-building and conflict resolution
- Problem-solving
- Decision-making
- Team-working
- Communicating with an open mind

Being an active participant enables students to become more aware and knowledgeable about their own strengths and weaknesses in learning and feel more connected to the learning process and course/project objectives. It also raises instructors' awareness of their own approaches in various learning situations. This potentially helps instructors develop instructional methods for providing a wide range of learning opportunities that suit diverse learning styles. In addition to this, using this model and reporting the outcomes can contribute to the improvement of other courses in the curriculum as well, since participation helps achieving transferrable outcomes in design studio courses, which is the core of design education.

Therefore, participants have the opportunity to engage in a range of experiential activities in a participatory structure, within which individual learning differences are recognized, acknowledged, and accommodated. During the process of participation,

they develop mutual trust and learn from each other's experiences, how they respond to different situations that occur in design studio courses, and relate those experiences and responses with different learning preferences and diverse learning opportunities. In that sense, the student participation model helps creating a sense of community, i.e. a co-deciding learning community, which is built around a strong sense of shared purpose, vision, and belonging. It acts as a guidance to achieve learning outcomes and offers participatory ways to monitor individual and collective progress. It also leads to the creation of a culture of participation and participatory learning as students and instructors become more experienced in the implementation of the model.

7.3 Possible Challenges of the Model

Despite the potential benefits, adapting the participatory approach in PBDL may be challenging. It is the shared responsibility of the entire department to establish and sustain the culture of participation and implement the student participation model. It requires the entire department to believe that it is beneficial for improvement, be willing to share the responsibility, and invest time in planning, developing methods and tools, and implementing it. It necessitates a clear definition of expectations from all prospect participants and a proper communication of those expectations. It is also critical to avoid false claims of participation, so that none of the participants has doubts about not being taken seriously or feel left out. In case of there are participants, who need time to develop the language and mindset of participation and/or become more confident in the process, it is important to tolerate and encourage them by giving the opportunity as well. Moreover, there may be cases, in which instructors resist sharing the authority and power with their students, who may also be resistant to such an experience or get lost, confused, and uncomfortable when handed over control. Therefore, appropriate moderation, adequate instructor guidance without dominating the process, observing and exchanging experiences with experienced participants is the key in this process.

In order to overcome the possible challenges, it is suggested to collectively evaluate and reflect on the department's participatory mindset at times and remind the academic staff that it is an ongoing process that can only be transformed in time by repetitive participatory activities. Therefore, it is important to support the academic staff to start with small steps in participatory pedagogical planning, e.g. with more manageable

practices, such as only one part or a few parts of a design brief, rather than starting with writing the entire course syllabus. As individuals get more experienced, the infrastructure and culture of participation will get more solid and sustainable, expanding to a wider range of areas of practice with more complex structures.

CHAPTER 8: CONCLUSION

This final chapter presents the researcher's reflections on the study by summarizing the key findings in relation to the research questions and aim of the study and discussing its contribution to the literature through the proposed student participation model. It also reviews the limitations of the study and proposes potential directions for further studies.

8.1 Overview the Study

Aimed at developing a student participation model, this dissertation concerned with utilizing individual differences in PBDL in ID education. Learning styles (Kolb, 2015; Korn Ferry and Kolb, 2018) were accepted as the main indicator of the diversity of students' individual differences and the participatory approach was adopted regarding the strategic aspects of participation, i.e. participation as a democratic right and a way of knowledge elicitation (Ehn, 2008) in the study. Therefore, both students and instructors, who are the two main actors of PBDL, were involved as a social resource (Manzini and Rizzo, 2011) in the exploration of individual differences, opinions on student participation, and participatory practices in pedagogical planning, which provided invaluable insights from multiple perspectives and aspects.

Looking back on the findings of the survey with students and interviews with instructors, the research questions are revisited below:

- *RQ1. What is the relationship between ID students' learning styles and opinions on student participation in project planning in PBDL?*

This study illustrates that there is no statistically significant, strong relationship between ID students' learning styles and their opinions on student participation in project planning. Yet, some significant but negligibly low correlations has been found. Very briefly, students who have a preference for being involved by their instructors tend to have preference for working with other people and rely on their intuitions, rather than rational thinking. They are also more likely to be deal with ambiguity with an open mind. Moreover, being an active participant is more preferable for students with a tendency towards AE, who tend to learn by doing, take risks, influence people and events through actions. They also develop more positive feelings, when they engage in participatory practices.

- *RQ2. How is the diversity of individual learning differences accommodated in pedagogical planning in PBDL?*

This study shows that students with diverse learning styles have direct and/or indirect influence on the decisions made by instructors, who are the main decision-makers in pedagogical planning in PBDL courses, among multiple decision-makers at an institutional level. Instructors take the whole curriculum into account within the academic structures of institutions and their pedagogical approaches. Learning outcomes guide this decision-making process more than the other considerations. Instructors mostly rely on their own observations and past experiences, make assumptions about what students need. Therefore, it is a passive way of involvement and implies a certain level of didactic attitude due to instructors' subjective interpretations and predictions. Also, students cannot always benefit from such decisions, since these decisions usually affect the next group of students, who will take that particular course in the following semester or academic year. However, there is always a room left for students even in highly structured projects, at least in terms of defining design problems. Especially towards upper classes, students are even expected to write/rewrite their individual design briefs in more complex and loose project structures.

Critiques are the essential feedback mechanism in order to tailor the ongoing process to individual learning differences for the adaptation of students individually and as a group, yet that does not involve planning processes. Receiving feedback for planning, on the other hand, is generally unsystematic and instructors do not always take these feedback into account or make it apparent to students even when they do so. The number of direct participative opportunities in planning is also very limited due to various reasons in the higher education system, such as pedagogical and disciplinary requirements, and institutional constraints. When such opportunities are provided, instructors often provide a framework for guidance, which enables compensating students' lack of pedagogical knowledge and experience.

The above-mentioned findings support the literature on ELT, participation, and design pedagogy, indicating the need to improve the adaptability of ID education to the current and evolving professional and educational demands, which needs to start with increasing students' engagement in the learning process and participation in

pedagogical decision-making processes. In order to ensure this engagement, it is important to acknowledge the diversity of individual differences, needs, and perspectives, when developing instructional methods and/or models, and instead of relying on personal experiences, skills, specialties, and predictions about students, instructors need to adapt more participatory approaches. In addition to the various benefits of participatory practices, student participation in university experiences also enables the development of comprehensive understanding and ownership of one's own learning experiences, in terms of both content and process (Bovill and Bulley, 2011). However, it was found that there is a limited number of studies in the literature, concerning with student participation in pedagogical decision-making processes (Davis and Sumara, 2002; Kuh, 2008; McCulloch, 2009; Bovill and Bulley, 2011; Bovill, Cook-Satherand and Felten, 2011; Jagersma and Parsons, 2011; Rutgers, 2015; D. Demirbaş, 2018; Rutgers, Fass and Chu, 2018), the diversity of learning styles (Lim, 1996; Nussbaumer and Guerin, 2000; Demirbas and Demirkan, 2003; Bender, 2004; Kvan and Yunyan, 2005; Demirbas and Demirkan, 2007; Tucker, 2007; Carmel-Gilfilen, 2012; Ayalp and Özdemir, 2016), and responding to the needs emerging from this diversity in PBDL (D. Demirbaş, 2018), especially in ID education. Therefore, this study contributes to the literature by providing insights into the diversity of ID students' learning styles, how this diversity relates to students' opinions on active participation, and the main considerations of pedagogical planning in PBDL in ID education. Based on these insights, it proposes a student participation model to be used in ID departments, which allows partial student control with systematic instructor guidance in developing, implementing, and assessing an action plan for learning through understanding individual differences, needs, and expectations of the main actors of the design studio and accommodating them in the process.

In summary, this study shows that the richness of individual differences is an invaluable resource for individual and group empowerment (Sanoff, 2007) in PBDL and the systematic accommodation of this rich diversity is possible by bringing students and instructors together in participatory pedagogical planning processes, in which they have a shared sense of purpose and achieve a shared vision through negotiation and building consensus (Wulz, 1986; Sanoff, 2007; Bovill and Bulley, 2011). In the proposed model, partial student control brings the highest level of participation that is possible in formal higher education. It also allows instructors to

provide guidance with their experiences and expertise from the pedagogical and disciplinary viewpoint. The model enables a transparent process and open communication not only between students and instructors, but also among different years of study, by which each individual can influence the decisions that s/he is affected by. Those individuals are also encouraged to take an active part in the implementation and provide systematic feedback. This participative opportunity potentially provides various benefits, such as skill development, developing positive attitudes, and improved curriculum, to both students and instructors by giving them a voice in pedagogical planning, implementation, and assessment. It also facilitates the creation of a culture of participation in ID departments and provides participants with the opportunity to become more flexible learners in time by improving their situational selection of learning modes (Kolb and Kolb, 2013; Kolb, 2015) through active participation.

8.2 Limitations of the Study

During the course of this study, the COVID-19 pandemic has started to spread around the world in March 2020, which has caused inevitable transformations in many areas of life, including design education and even the education system in general. It required immediate adaptation to remote teaching and other changing circumstances in ID education in Turkey as well, such as limited or no physical gathering, lack of access to computers, internet and/or materials for physical modelling, and the digitalization of collaboration/communication among the design studio actors. Some instructors and students have adapted to this new situation faster than others, while others still feel a strong expectation and need for physical interaction. The unexpected occurrence of the pandemic pointed out the importance of understanding the existing situation and what that situation demands from each individual, as well as understanding and responding to individuals' needs, improving their abilities to adapt, and the adaptability of the design pedagogy. Even though instructors have taken immediate action to ensure the continuity of education under the existing conditions of the day that they considered as temporary, those extreme conditions are most likely to have both short-term and long-term effects on individuals, education, and participation. Therefore, it was deemed important to incorporate this issue in the ongoing study, since its implications for ID education were (and are) still unexplored. Then, the research questions were revised so as to involve the effects of the pandemic

on the pedagogical planning and student participation.

Initially, it had been planned to conduct the study with a larger sample size and carry out participatory workshops with another sample group, following the analysis of the survey and interviews, for developing the model through generative sessions before the occurrence of the COVID-19 pandemic. However, it was only possible to reach the sample group online, which limited the sample size possibly due to the increasing number of online research during the pandemic and which led to revising the methods that would be used in the study. Even though the generative sessions could have been carried out on an online collaboration platform, it was decided not to have these sessions due to time constraints and the model has been developed based on the analysis of the data collected through the survey and interviews.

Regarding the findings of the survey, the slight shift that was observed in students' learning styles towards upper years might have been stronger and/or in a different direction, if the study could have been conducted with a larger sample size. It might have been possible to determine the direction of the shift through years by making a comparison among students from different years of study, if the number of respondents from each year of study was higher and similar for obtaining statistically reliable and generalizable findings. Also, the shift in each student's learning style could have been determined in a longitudinal study as well. In addition to this, the relationship between learning styles and opinions on active student participation might have been stronger with a larger sample size and/or with a different sample profile. Even though this relationship was examined based on the correlations between the two combined scores (AC-CE and AE-RO) and the items within each extracted components in this study, a larger dataset would have made it possible to carry out PCA for each learning style separately and make a comparison among the principal components extracted for each.

Moreover, the majority of the students, who responded the survey, stated that they had little or no experience in active participation, despite their positive opinions on the issue. Their opinions might have been different, if they had engaged in participatory processes before. Regarding the participative opportunities that instructors provide in pedagogical planning, on the other hand, a larger sample size and/or using different sampling criteria for choosing instructors with different characteristics, educational backgrounds, and expertise might have provided different findings as well. Therefore,

even though it was possible to obtain statistically reliable results in the survey and gain in-depth understanding through interviews, conducting the study with a larger sample size from a larger number of educational institutions in Turkey might have provided more generalizable findings and invaluable knowledge on the diversity of ID students' learning styles and student participation.

In addition to the above-mentioned limitations, the researcher had the opportunity to spend a year (September 2019-August 2020) as a visiting scholar at the Department of Design at The Ohio State University (Columbus, OH, USA) through TÜBİTAK 2214-A International Doctoral Research Fellowship Program. However, the occurrence of the COVID-19 pandemic brought some limitations to the research, such as the suspension of on-campus classes, limited access to library, and no access to students for hands-on activities. Therefore, it was not possible to conduct primary research at The Ohio State University, yet the academic resources (online and printed) were available and helpful in developing the study further. This experience was quite insightful for the dissertation and brought a different perspective to the study, since the ID Program in the department was mainly focused on design research and participatory/generative/collaborative design. It also provided the opportunity to observe and experience the ID education in a foreign context, which was crucial for the study in terms of observing the similarities and differences in educational and research cultures, as well as in the activities, across countries.

The study was also limited with proposing a conceptual model for student participation in PBDL and did not involve the validation of the model due to time constraints and the lack of financial resources. It might have been possible to improve the model proposal further, if it would have been possible to test the model in several PBDL courses and receive participants' feedback with appropriate methods, tools, and techniques that require time and funding to develop.

Despite the above-mentioned limitations, the findings of the study were quite insightful for developing the model and revealed that active student participation in pedagogical planning is of great value for PBDL and has the potential to enhance ID education.

8.3 Potential Directions for Further Studies

This study shows that systematic inclusion and direct involvement of students in pedagogical planning is promising for enhancing PBDL and becoming more flexible learners by improving learning styles. However, more studies are required to better understand the impacts of active student participation on learning and developing the participatory mindset in order to make the proposed model more useful within the educational context. Some potential directions for further studies are presented below:

Involving Multiple Design Studio Actors

Even though this study is mainly concerned with the two main actors – design students and design instructors – of the design studio, there are various academic and/or non-academic stakeholders, who may be involved in design studio projects. These stakeholders may be companies, non-governmental organizations, professional designers, users etc. Therefore, it is a possible direction for developing the proposed student participation model further so as to involve them as active participants in pedagogical planning as well.

Understanding Perceptual Differences in Participatory Practices

Regarding that not all students and instructors have experience in participatory processes, further studies with a more experienced sample group may provide fruitful insights into the impacts of experience on students' and instructors' opinions on active participation. It is also found out in the study that individuals may perceive participatory practices differently depending on their understanding of the situation, the quality of their participation experience and/or the level of how actively they participated. Therefore, it may be invaluable to study PBDL courses as case studies in order to obtain students' and instructors' perspectives in those particular courses. Comparing how they perceive the level and form of student participation within the same course may provide insight into the perceptual differences, the reasons of these differences, and the possible ways to transform it into a common perception. These case studies may help improving the proposed student participation model by improving communication and interaction among the design studio actors.

Developing Participatory Methods, Tools, and Techniques

Further research is needed for developing appropriate methods, tools, and techniques for the utilization of the proposed model and testing the model in various case studies. Disseminating the results may contribute to the improvement of both the model and its methods, tools, and techniques. Such case studies may be conducted not only in ID education, but also in other design fields, as well as in other disciplines, adopting a project-based pedagogy. Further studies within this context may also focus on the meaning of design, pedagogical and disciplinary differences, and the concept of participation in other design fields and disciplines. Despite the focus on project-based learning, it may also be worth exploring and comparing the applications of the proposed model in practice-based and theoretical courses. In addition to this, more studies may be conducted on how to train instructors as moderators, who are competent in carrying out participatory sessions in an educational context.

Understanding Cultural Differences

Exploring how the proposed model works in different cultures may also be insightful for educators. The culture of participation in communities is a critical issue, which affects individuals' opinions on and willingness to participate. Therefore, in the case of participation in PBDL, it is worth considering that overgeneralized methods and strategies may not work in all communities. Even though it was not the focus of this study, these realizations have been deemed important to further reflect on how to facilitate improved practices in learning and teaching through active student participation in different communities with different cultures of participation and education. Regarding this, conducting the study at a wide range of educational institutions in Turkey and/or abroad may be of great value in future research.

Effects of the COVID-19 Pandemic on Education, Participation, and Design

The COVID-19 pandemic has brought a different perspective to the study. It has been experienced at an extremely large scale, affecting education, participation, and design. Nonetheless, it is still unexplored how these transitions and changes will result in the future. It has posed considerable challenges to higher education, including ID education, which resulted in rethinking the methods and format that suit students the best. It has also shown the importance of digital technologies to be embedded in PBDL. However, it cannot be ignored that digitalization has a potential to increase the inequity

of access to learning, despite its positive implications for the internationalization of educational practices beyond spatial and temporal boundaries. Considering that the participatory approach intends to engage minorities that are mostly left out in communities, it is a critical issue to develop strategies, methods, tools etc. to engage students, who have limited or no access to technology during the times of mandatory distance learning and foreseen hybrid PBDL courses. The interviews that were conducted in this study provided some insights into its effects on student participation and pedagogical planning. However, the implications of remote teaching between March 2020 and September 2021 for the face-to-face education, which has started in September 2021, are still worth exploring in a more comprehensive study in order to understand at least its short-term effects. Therefore, the pandemic has inevitably opened up new discussions in relation to the need for adaptable approaches in PBDL, with the consideration of diverse global, local, and individual needs. Further studies may unfold how individuals' learning preferences adapt to different ways of teaching and participating, and vice versa. In order to ensure a rich diversity of views and perspectives, it is worth taking such discussions further with the participation and interaction of students, educators, policy makers, professional designers, and other stakeholders involved in teaching and learning in higher education.

Considering the fruitful findings of this study despite its limitations and various considerations that have been left out of the scope of this dissertation, it is hoped that it inspires design educators and researchers to investigate new inclusionary ways to bring the design studio actors together in pedagogical planning and enable them to take an active part, contribute to learning with their own unique ways, and acknowledge individual differences.

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Appendix A. Survey

PROJE TABANLI TASARIM ÖĞRENİMİNDE FARKLI ÖĞRENME BECERİLERİ OLAN ÖĞRENCİLERİN KATILIMI / PARTICIPATION OF STUDENTS WITH DIFFERENT LEARNING STYLES IN PROJECT-BASED DESIGN LEARNING

(Source: [redacted]

Bu tarama çalışması, İzmir Ekonomi Üniversitesi Tasarım Çalışmaları Doktora Programı'nda, Doç. Dr. Ö. Osman Demirbaş danışmanlığında yürütülen "Proje Tabanlı Tasarım Öğreniminde Farklı Öğrenme Becerileri Olan Öğrencilerin Katılımı: Endüstriyel Tasarım Eğitimi için Bir Model / Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education" adlı doktora tezi kapsamında gerçekleştirilmektedir. (Proje tabanlı tasarım öğrenimi, proje uygulamalarıyla sürdürülen süreç odaklı tüm uygulamalı endüstriyel tasarım derslerini ifade etmektedir.)

Bu tarama çalışmasında elde edilen veriler, proje tabanlı tasarım öğreniminde öğrenme farklılıklarına dayalı bir öğrenci katılımı modeli geliştirmek üzere kullanılacaktır. Tüm veriler yalnızca tez kapsamındaki araştırma ve ilgili akademik yayınlarda kullanılacak olup, kişisel veriler anonim ve gizli tutulacaktır.

Anketin dili hem Türkçe hem İngilizce olup, anket süresi yaklaşık 15 dakikadır.

Araştırma ile ilgili yorumlarınız, sorularınız ve/veya detaylı bilgi için, [redacted] üzerinden iletişime geçebilirsiniz.

İşbirliğiniz ve ayırdığınız zaman için şimdiden teşekkür ederim.

Sevi Merter

This survey is conducted within the scope of the doctoral dissertation, "Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education", with the supervision of Assoc. Prof. Dr. Ö. Osman Demirbaş in Design Studies Ph.D. Program, İzmir University of Economics. (Project-based design learning refers to all process-oriented applied industrial design courses that are carried out with project applications.)

The data acquired through this survey will be used to develop a student participation model based on learning differences in project-based design learning. All data will only be used in the research within the scope of the dissertation and related academic publications. All personal information will be kept anonymous and confidential.

The language of the survey is both Turkish and English and the duration of the survey is approximately 15 minutes.

Please contact via [redacted] for your comments, questions and/or detailed information about the research.

Thank you for your collaboration and time.

Sevi Merter

* Gerekli / Required

1. BÖLÜM: KİŞİSEL BİLGİLER / PART 1: PERSONAL INFORMATION

1. Üniversiteniz / University *

2. Giriş Sınavının Türü / Type of Entrance Exam *

	Merkezi Sınav / Central Examination
	Özel Yetenek Testi / Aptitude Test

3. Sınıfınız / Year of Study *

4. Yaşınız / Age *

	17 yaş ve altı / 17 and under
	18-24 yaş / 18-24
	25-34 yaş / 25-34
	35 yaş ve üstü / 35 and over

2. BÖLÜM: LSI (ÖĞRENME BİÇEMLERİ) / PART 2: LSI (LEARNING STYLES) ***(Tüm hakları saklıdır. / All rights reserved.)***

Aşağıda her birinde dörder cümle bulunan on iki durum verilmiştir. Lütfen her durum için verilen dörder cümleyi size uygunluğu açısından kendi aralarında 1'den 4'e kadar sıralayınız. Her rakamı her sütunda yalnızca bir kez kullanabilirsiniz. / Twelve statements, each containing four sentences, are given below. Please rank the four sentences given for each statements from 1 to 4 in terms of their suitability for you. You can use each number only once in each column.

4- En uygun / Most like me 1- En az uygun / Least like me

	1	2	3	4
1. Öğrendiğim zaman ..... / When I learn .....*				
hislerimi göz önüne almaktan hoşlanırım. / I like yo deal with my feelings.				
fikirler üzerinde düşünmekten hoşlanırım. / I like to think about ideas.				
bir şeyler yapıyor olmaktan hoşlanırım. / I like to be doing things.				
izlemekten ve dinlemekten hoşlanırım. / I like to watch and listen.				
2. En iyi ..... öğrenirim. / I learn best when .....*				
dikkatle izlediğim ve dinlediğim zaman / I listen and watch carefully.				
mantıksal düşünceyi temel aldığım zaman / I rely on logical thinking.				
içgüdülerime ve hislerime güvendiğim zaman / I trust my hunches and feelings.				
bir şeyler elde etmek için çok çalıştığım zaman / I work hard to get things done.				
3. Öğrenirken ..... / When I am learning .....*				
sonuçları bulmaya çalışırım. / I tend to reason things out.				
yapılanlar konusunda sorumlu olurum. / I am responsible about things.				
sessiz ve çekingen olurum. / I am quite and reserved.				
güçlü hislerim ve tepkilerim olur. / I have strong feelings and reactions.				

4. ..... öğrenirim. / I learn by ..... *				
Hislerimle / feeling				
Yaparak / doing				
İzleyerek / watching				
Düşünerek / thinking				
5. Öğrendiğim zaman ..... / When I learn ..... *				
yeni tecrübelere açık olurum. / I am open to new experiences.				
konulara her yönden bakarım. / I look at all sides of issues.				
öğrendiklerimi analiz etmekten ve parçalarına ayırmaktan hoşlanırım. / I like to analyze things, break them down into their parts.				
denemekten hoşlanırım. / I like to try things out.				
6. Öğrenirken ..... / When I am learning ..... *				
gözlemci bir insanım. / I am an observing person.				
aktif bir insanım. / I am an active person.				
sezgisel bir insanım. / I am an intuitive person.				
mantıklı bir insanım. / I am a logical person.				
7. En iyi ..... öğrenirim. / I learn best from ..... *				
gözlemlerden / observation.				
kişisel ilişkilerden / personal relationships.				
akılcı teorilerden / rational theories.				
uygulama ve denemelerden / a chance to try out and practice.				
8. Öğrendiğim zaman ..... / When I learn ..... *				
çalışmamın sonuçlarını görmekten hoşlanırım. / I like to see results from my work.				
fikirleri ve teorileri severim. / I like ideas and theories.				
harekete geçmekte acele etmem. / I take my time before acting.				
kişisel olarak o işe dahil olduğumu hissederim. / I feel personally involved in things.				
9. En iyi ..... öğrenirim. / I learn best when ..... *				
gözlemlerime güvendiğimde / I rely on my observations.				
hislerime güvendiğimde / I rely on my feelings.				
öğrendiklerimi uyguladığımda / I can try things out for myself.				
fikirlerime güvendiğimde / I rely on my ideas.				
10. Öğrenirken ..... / When I am learning ..... *				
çekingen biriyim. / I am a reserved person.				
kabul eden biriyim. / I am an accepting person.				
sorumluluk sahibi biriyim. / I am a responsible person.				
akılcı biriyim. / I am a rational person.				
11. Öğrendiğim zaman ..... / When I learn ..... *				
katılımcıyımdır. / I get involved.				
gözlemekten hoşlanırım. / I like to observe.				
yapılanları değerlendiririm. / I evaluate things.				
aktif olmaktan hoşlanırım. / I like to be active.				
12. En iyi ..... öğrenirim. / I learn best when ..... *				
fikirleri analiz ettiğimde / I analyze ideas.				
yenilikçi ve açık fikirli olduğumda / I am receptive and open-minded.				
dikkatli olduğumda / I am careful.				
pratik olduğumda / I am practical.				

3. BÖLÜM: PROJE PLANLAMASINDA ÖĞRENCİ KATILIMI / PART 3: STUDENT PARTICIPATION IN PROJECT PLANNING

1. Aşağıdaki ifadeleri proje planlamasında öğrenci katılımı seviyelerine ve biçimlerine yönelik görüşlerinize bağlı olarak 1'den 5'e kadar derecelendiriniz. / Please rate the following statements about your opinions on levels and types of student participation in project planning from 1 to 5.

1-Kesinlikle katılmıyorum	2-Katılmıyorum	3-Kararsızım	4-Katılıyorum	5-Kesinlikle katılıyorum
1-Strongly disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly agree

		1	2	3	4	5
1	Bir projenin planlanmasında ders yürütücüleri bütün kararları yalnızca kendileri vermelilerdir. / Instructors should make all decisions themselves in project planning. *					
2	Bir projenin planlanmasında öğrencilerin katkısı/katılımı gerekli değildir. / Students' contribution/participation is not necessary in project planning. *					
3	Ders yürütücüleri, proje planlamasına başlamadan önce öğrencilerin fikirlerini alıp, projeleri bu fikirler doğrultusunda planlamalılardır. / Instructors should ask students their ideas prior to project planning and plan projects accordingly. *					
4	Ders yürütücüleri, proje planının taslağını öğrencilerin oylamasına sunmalılardır. / Instructors should put the draft project plan to students' vote. *					
5	Ders yürütücüleri, projeleri temsilci öğrenciler ile bir araya gelerek planlamalılardır. / Instructors should plan projects by meeting with student representatives. *					
6	Ders yürütücüleri, proje planlamasını tüm öğrenciler ile bir araya gelerek tartışmalılardır. / Instructors should discuss the project plan with all students. *					
7	Ders yürütücüleri, proje planlamasını yaparken tüm öğrencilere anket uygulamalılardır. / Instructors shoıld apply questionnaires to all students while planning a project. *					
8	Ders yürütücüleri, proje planlamasını yaparken öğrenciler ile interaktif oturumlar (çalıştaylar) gerçekleştirmelilerdir. / Instructors should hold interactive sessions (workshops) with students while planning a project. *					
9	Ders yürütücüleri, proje planlamasını yaparken öğrenciler ile yaratıcı yöntemler uygulamalılardır. / Instructors should apply creative methods with students while planning a project. *					
10	Ders yürütücüleri, proje planlamasını yaparken öğrencilerin bireysel farklılıklarını dikkate almalılardır. / Instructors should take into account individual differences of students while planning a project. *					
11	Ders yürütücüleri, proje planlamasında öğrencilere seçenekler sunmalılardır. / Instructors should provide students with options in project planning. *					
12	Ders yürütücüleri, proje planlamasını kısmen öğrencilere bırakmalılardır. / Instructors should leave project planning partly to students. *					
13	Ders yürütücüleri ile öğrenciler eş karar verici olmalı ve proje planlamasında tüm kararları birlikte vermelilerdir. / Instructors and students should be co-decision-makers and make all decisions together in project planning. *					
14	Bir projenin planlanmasında bütün kararları her öğrenci kendisi vermelidir. / Each student should make their own decisions in project planning. *					
15	Bir projenin planlanmasında bütün kararları öğrenciler birlikte vermelilerdir. / Students should make all decisions collectively in project planning. *					

2. Aşağıdaki ifadeleri proje planlamasında "aktif katılımcı" olma konusundaki görüşlerinize bağlı olarak 1'den 5'e kadar derecelendiriniz. / Please rate the following statements about your opinions on being "an active participant" in project planning from 1 to 5.

1-Kesinlikle katılmıyorum	2-Katılmıyorum	3-Kararsızım	4-Katılıyorum	5-Kesinlikle katılıyorum
1-Strongly disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly agree

Proje planlamasında aktif katılımcı olmak … / Being an active participant in project planning …		1	2	3	4	5
1	... beni motive eder. / ... motivates me. *					
2	... beni cesaretlendirir. / ... encourages me. *					
3	... beni heyecanlandırır. / ... excites me. *					
4	... kontrolün bende olduğumu hissettirir. / ... makes me feel in control. *					
5	... bana yetkin olduğumu hissettirir. / ... makes me feel competent. *					
6	... proje sürecini benim için ilgi çekici kılar. / ... makes the project process interesting. *					

7	... beni baskı altına sokar. / ... puts pressure on me. *					
8	... beni endişelendirir. / ... worries me. *					
9	... beni projeye yabancılaştırır. / ... alienates me from the project. *					
10	... bana öğrendiğimi hissettirir. / ... makes me feel I am learning. *					
11	... neler öğrenmem gerektiğini anlamama yardımcı olur. / ... helps me understand what I should learn. *					
12	... ders yürütücüsünün/yürütücülerinin eğitime yaklaşımlarını anlamama yardımcı olur. / ... helps me understand the teacing approach(es) of my instructor(s). *					
13	... öğrenme sürecini anlamama yardımcı olur. / ... helps me understand the learning process. *					
14	... tasarım sürecini anlamama yardımcı olur. / ... helps me understand the design process. *					
15	... beni daha fazla öğrenmeye teşvik eder. / ... encourages me to learn more. *					
16	... aidiyet duygumu arttırır. / ... increases my feeling of ownership. *					
17	... özgüvenimi arttırır. / ... increases my self-confidence. *					
18	... beni daha fazla sorumluluk almaya teşvik eder. / ... encourages me to take more responsibility. *					
19	... süreci demokratikleştirir. / ... democratizes the process. *					
20	... düşüncelerimi ve fikirlerimi proje yürütücüsü ve/veya öğrenciler önünde ifade etmekten çekinmeme neden olur. / ... causes me to refrain from expressing my thoughts and ideas in front of course instructors and/or students. *					
21	... ders yürütücüsü/yürütücüleri ile aramdaki iletişimi kuvvetlendirir. / ... strengthens my communication with course instructor(s). *					
22	... diğer öğrenciler ile aramdaki iletişimi kuvvetlendirir. / ... strengthens my communication with the other students. *					
23	... yalnızca bu süreci ders yürütücüsünün/yürütücülerinin yönlendirmesi ile mümkündür. / ... is only possible with the guidance of course instructor(s) in this process. *					

3. Daha önce ders kapsamında bir proje planlamasına dahil oldunuz mu? / Have you ever participated in project planning in a course before? *

	Evet / Yes
	Hayır / No

4. Bu deneyiminizi kısaca paylaşır mısınız? (Örneğin, hangi projenin hangi aşamasında nasıl dahil oldunuz? Rolünüz neydi? vs.) / Could you share your experience briefly? (For example, in which phase of which project and how did you participate? What was your role? etc.) *

Appendix B. Informed Consent Form

KATILIMCI BİLGİ VE ONAM FORMU / INFORMED CONSENT FORM

(Source: [redacted])

Bu görüşme, İzmir Ekonomi Üniversitesi Tasarım Çalışmaları Doktora Programı'nda, Doç. Dr. Ö. Osman Demirbaş danışmanlığında yürütülen "Proje Tabanlı Tasarım Öğreniminde Farklı Öğrenme Becerileri Olan Öğrencilerin Katılımı: Endüstriyel Tasarım Eğitimi için Bir Model / Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education" adlı doktora tezi kapsamında gerçekleştirilmektedir. Görüşmenin amacı, proje tabanlı derslerde ders yürütücülerinin proje planlama süreçlerini, öğrenme farklılıklarına sahip öğrencilerin bu süreçlere nasıl dahil edildiğini ve öğrenme süreçlerine yaklaşımlarını anlamaktır. Elde edilen veriler, proje tabanlı tasarım öğreniminde öğrenme farklılıklarına dayalı bir öğrenci katılımı modeli geliştirmek üzere kullanılacaktır.

Görüşmeye katılım tamamıyla gönüllülük esasına dayanmaktadır. Görüşmeler herhangi bir teknik aksaklık olmaması durumunda Zoom üzerinden gerçekleştirilecek olup, görüşme esnasında veri toplama ve dokümantasyon amacıyla video ve ses kaydı alınacaktır. Yazılı, sesli ve/veya görsel hiçbir malzeme bilimsel amaçlı olmayan çalışmalarda ve/veya mecralarda kullanılmayacaktır. Tüm veriler yalnızca tez kapsamındaki araştırma ve sonrasındaki akademik yayınlarda kullanılacak olup, kimlik bilgileri ve benzeri tüm kişisel veriler anonim ve gizli tutulacaktır.

Görüşme, genel olarak kişisel rahatsızlık verecek ve/veya kişisel verilerin ihlaline sebep olacak aktiviteler içermemektedir. Ancak, görüşme esnasında sürdürülen aktivitelerin içeriği, uygulama biçimi ya da herhangi başka bir nedenden ötürü rahatsızlık duymanız halinde, katılımı sonlandırabilirsiniz. Böyle bir durumda, araştırmacıya, görüşmeyi sonlandırmak istediğinizi söylemeniz yeterli olacaktır.

Görüşme süresi yaklaşık 45 dakikadır.

Araştırma ile ilgili yorumlarınız, sorularınız ve/veya detaylı bilgi için, [redacted] üzerinden iletişime geçebilirsiniz.

İşbirliğiniz ve ayırdığınız zaman için şimdiden teşekkür ederim.

Sevi Merter

This interview is conducted This survey is conducted within the scope of the doctoral dissertation, "Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education", with the supervision of Assoc. Prof. Dr. Ö. Osman Demirbaş in Design Studies Ph.D. Program, İzmir University of Economics. The aim of the interview is to understand instructors' project planning processes in project-based courses, how students with learning differences are accommodated in these processes, and their approach towards learning processes. The data acquired through this interview will be used to develop a student participation model based on learning differences in project-based design learning.

Participation in the interview is entirely on a voluntary basis. Unless there is any technical problem, interviews will be conducted via Zoom and video- and audio-recorded for documentation purposes. None of the written, audial and/or visual materials will be used in non-scientific studies and/or media. All data will only be used in the research within the scope of the dissertation and related academic publications. All personal information will be kept anonymous and confidential.

The interview does not contain any activities that may be disturbing for individuals and/or cause the violation of personal data. However, in case of disturbance due to the content, application of the activities carried out during the interview or any other reasons, you may terminate your participation. In such a case, you may simply tell the researcher that you want to end the interview.

The duration of the interview is approximately 45 minutes.

Please contact via [redacted] for your comments, questions and/or detailed information about the research.

Thank you for your collaboration and time.

Sevi Merter

* Gerekli / Required

Yukarıda verilen bilgileri okudum ve anladım. Bu çalışmaya tamamen gönüllü olarak katılmayı kabul ediyorum. Verdiğim bilgilerin, bilimsel amaçlı yayınlarda kullanılmasını kabul ediyorum. / I read and understood the information given above. I voluntarily accept to take part in this study. I accept the use of the information I provide in scientific publications. *

	Evet / Yes
	Hayır / No

Katılımcı Adı Soyadı / Interviewee's Name and Last Name *

Appendix C. Interview Guide

ÖĞRETİM ELEMANLARI İLE DERİNLEMESİNE GÖRÜŞME KILAVUZU / INTERVIEW GUIDE FOR IN-DEPTH INTERVIEWS WITH INSTRUCTORS

KATEGORİLER	**SORULAR**
(Giriş)	*Teşekkür ve bilgilendirme* Eğitimci olarak deneyimi Yürütülen dersler (stüdyo ve/veya diğer proje tabanlı dersler)
translation **(Introduction)**	*Thanking and informing* Experience as an educator Course being instructed (studio and/or other project-based courses)
Pedagojik planlama	Projelerin planlama süreci - Pedagojik açıdan - Ders izlencesi ve brief hazırlanması açısından - Pandemi (ile uzaktan eğitim) etkisi? Geçen dönemde kazanılan deneyimler bu dönemi nasıl etkiledi?
translation **Pedagogical planning**	Planning process of projects - From the pedagogical aspect - From the course syllabus and brief preparatoion aspect - The effect of the pandemic (and distance learning)? How have the experiences gained last semester effected this semester?
Öğrenci katılımı	Proje planlama sürecinde öğrencilerin rolü - Pandemi sürecinin öğrencilerin bu süreçteki rolüne etkisi *(Öğrenci katılımı var ise) Bildiğiniz gibi her bireyin farklı öğrenme becerileri ve tercihleri var. Buna göre bazı öğrenme süreçleri belirli öğrenciler için daha kolay bir süreçken, kimileri için çok zorlayıcı olabiliyor.* Proje planlama sürecinde farklı özellikteki öğrencilerin katılımı (doğrudan/dolaylı) Aktif (veya daha çok) katılımcı olma konusunda ön plana çıkan öğrenci profili/özellikleri - Pandemi sürecinin etkisi Öğrencilerin "karar verici" rolünde katılımına yönelik görüşleri Öğrenci katılımının tasarım eğitimindeki önemine yönelik görüşler

translation	**Student Participation**	The role of students in project planning - The effect of the pandemic on students' role in this process *(If there is student participation) As you know, individuals have different learning abilities and preferences. Therefore, whereas some learning processes are easier for certain students, some learning processes are more challenging for others.* Participation of students with different characteristics in project planning (direct/indirect) Student profiles/characteristics standing out more in terms of active (or more active) participation - The effect of the pandemic Opinions on the participation of students as "decision-makers" Opinions on the importance of student participation in design education
(Öz Değerlendirme)		*Teşekkür + Bağlantı paylaşımı* [redacted] *Forma ilişkin açıklama* *Sorular/yorumlar*
translation	**(Self-Assessment)**	*Thanking + Sharing the link* [redacted] *Explaining the form* *Questions/comments*

Appendix D. Self-Assessment Form

DERS YÜRÜTÜCÜLERİ ÖZ DEĞERLENDİRME

(Source: [redacted])

Bu anket, İzmir Ekonomi Üniversitesi Tasarım Çalışmaları Doktora Programı'nda, Doç. Dr. Ö. Osman Demirbaş danışmanlığında yürütülen "Proje Tabanlı Tasarım Öğreniminde Farklı Öğrenme Becerileri Olan Öğrencilerin Katılımı: Endüstriyel Tasarım Eğitimi için Bir Model / Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education" adlı doktora tezi kapsamında gerçekleştirilen derinlemesine görüşmelerin sonunda, görüşmeye katılan ders yürütücülerinin öz değerlendirmesine yönelik olarak hazırlanmıştır.

İşbirliğiniz ve ayırdığınız zaman için şimdiden teşekkür ederim.

Sevi Merter

This survey has been prepared as a self-assessment form for instructors, who have been interviewed within the scope of the doctoral dissertation, "Participation of Students with Diverse Learning Styles in Project-Based Design Learning: A Model for Industrial Design Education", with the supervision of Assoc. Prof. Dr. Ö. Osman Demirbaş in Design Studies Ph.D. Program, İzmir University of Economics.

Thank you for your collaboration and time.

Sevi Merter

* Gerekli / Required

Ad Soyad (araştırmada gizli tutulacaktır) / Name Last Name (will be kept confidential in the study) *

Ders yürütücüsü olarak bir proje sürecindeki rolünüzü nasıl tanımlarsınız? / How do you define your role during the course of a project as an instructor? * *(Birden fazla işaretlenebilir / Multiple choice is possible)*	
	Sıcakkanlı ve olumlu / Warm and affirming
	Yansıtıcı ve otoriter / Reflective and authoritative
	Objektif ve sonuç odaklı / Objective and results-oriented
	Uygulamacı, işbirlikçi ve destekleyici / Applied, collaborative, and supportive
	Öğrencilerin ilgi alanlarını, motivasyonlarını ve öz bilgilerini açığa çıkaran / Draws out students' interests, motivations, and self-knowledge
	Öğrencilerin konuya ilişkin bilgilerini organize etmelerine ve üzerine düşünmelerine yardımcı olan / Helps students organize and reflect on the knowledge base of the subject matter
	Kaliteli sonuç için performans gereklilikleri belirleyen / Sets the performance requirements for quality results
	Öğrencilerin kendi hayat deneyimlerinden öğrenmelerine yardımcı olan / Helps students learn from their life experiences
	Kendi kendine öğrenmeyi teşvik eden / Encourages self-learning
	Konuya ilişkin bilgiyi ders anlatımları ve metinler ile aktaran / Communicates knowledge of the subject matter through lectures and texts
	Öğrenmenin değerlendirilmesi için performans faaliyetleri düzenleyen / Creates performance activities to for evaluate learning
	Öğrenciler ile birebir çalışan / Works one-on-one with students

	Kişisel ilişkiler kuran ve küçük gruplar halindeki diyaloglarda kolaylaştırıcı / Creates personal relationships and facilitates dialogues in small groups
	Konuyu örnekler, analizler ve sistematik modeller ile anlatarak eleştirel düşünceyi teşvik eden / Encourages critical thinking through examples, analysis, and systematic models
	Performans gerekliliklerinin karşılanması için öğrencilerin bilgi ve becerilerini uygulamada uzmanlaşmalarına yardımcı olan / Helps students master in practicing their knowledge and skills to meet performance requirements
	Bağlama yönelik geri bildirim sağlayarak kişisel gelişim planı oluşturulmasına destek olan / Supports creating personal development plans by providing feedback within context
	Diğer... / Other…

Ders yürütücüsü olarak bir proje sürecinde öğrenci katılımını ne derece sağladığınızı düşünüyorsunuz? / What is the level of student participation that you enable during the course of a project as an instructor? *

	Yok (N/A)	**Çok Düşük (Very Low)**	**Düşük (Low)**	**Orta (Moderate)**	**Yüksek (High)**	**Çok Yüksek (Very High)**
Projenin planlanması sürecinde / In the project planning process						
Projenin uygulanması sürecinde / In the project implementation process						
Projenin değerlendirilmesi sürecinde / In the project assessment process						

Öğrenme Biçemleri Envanteri (LSI) / Learning Style Inventory (LSI) *

	İngilizce (original versiyon) / English (original version)
	Türkçe çeviri / Turkish translation

ÖĞRENME BİÇEMLERİ ENVANTESİ / LEARNING STYLE INVENTORY ***(Tüm hakları saklıdır. / All rights reserved.)***

Aşağıda her birinde dörder cümle bulunan on iki durum verilmiştir. Lütfen her durum için verilen dörder cümleyi size uygunluğu açısından kendi aralarında 1'den 4'e kadar sıralayınız. Her rakamı her sütunda yalnızca bir kez kullanabilirsiniz. / Twelve statements, each containing four sentences, are given below. Please rank the four sentences given for each statements from 1 to 4 in terms of their suitability for you. You can use each number only once in each column.

4- En uygun / Most like me 1- En az uygun / Least like me

	1	**2**	**3**	**4**
1. Öğrendiğim zaman ..... / When I learn .....*				
hislerimi göz önüne almaktan hoşlanırım. / I like yo deal with my feelings.				
fikirler üzerinde düşünmekten hoşlanırım. / I like to think about ideas.				
bir şeyler yapıyor olmaktan hoşlanırım. / I like to be doing things.				
izlemekten ve dinlemekten hoşlanırım. / I like to watch and listen.				
2. En iyi ..... öğrenirim. / I learn best when .....*				
dikkatle izlediğim ve dinlediğim zaman / I listen and watch carefully.				
mantıksal düşünceyi temel aldığım zaman / I rely on logical thinking.				
içgüdülerime ve hislerime güvendiğim zaman / I trust my hunches and feelings.				
bir şeyler elde etmek için çok çalıştığım zaman / I work hard to get things done.				
3. Öğrenirken ..... / When I am learning .....*				
sonuçları bulmaya çalışırım. / I tend to reason things out.				
yapılanlar konusunda sorumlu olurum. / I am responsible about things.				
sessiz ve çekingen olurum. / I am quite and reserved.				
güçlü hislerim ve tepkilerim olur. / I have strong feelings and reactions.				
4. ..... öğrenirim. / I learn by ..... *				
Hislerimle / feeling				
Yaparak / doing				

İzleyerek / watching				
Düşünerek / thinking				
5. Öğrendiğim zaman ..... / When I learn ..... *				
yeni tecrübelere açık olurum. / I am open to new experiences.				
konulara her yönden bakarım. / I look at all sides of issues.				
öğrendiklerimi analiz etmekten ve parçalarına ayırmaktan hoşlanırım. / I like to analyze things, break them down into their parts.				
denemekten hoşlanırım. / I like to try things out.				
6. Öğrenirken ..... / When I am learning ..... *				
gözlemci bir insanım. / I am an observing person.				
aktif bir insanım. / I am an active person.				
sezgisel bir insanım. / I am an intuitive person.				
mantıklı bir insanım. / I am a logical person.				
7. En iyi ..... öğrenirim. / I learn best from ..... *				
gözlemlerden / observation.				
kişisel ilişkilerden / personal relationships.				
akılcı teorilerden / rational theories.				
uygulama ve denemelerden / a chance to try out and practice.				
8. Öğrendiğim zaman ..... / When I learn ..... *				
çalışmamın sonuçlarını görmekten hoşlanırım. / I like to see results from my work.				
fikirleri ve teorileri severim. / I like ideas and theories.				
harekete geçmekte acele etmem. / I take my time before acting.				
kişisel olarak o işe dahil olduğumu hissederim. / I feel personally involved in things.				
9. En iyi ..... öğrenirim. / I learn best when ..... *				
gözlemlerime güvendiğimde / I rely on my observations.				
hislerime güvendiğimde / I rely on my feelings.				
öğrendiklerimi uyguladığımda / I can try things out for myself.				
fikirlerime güvendiğimde / I rely on my ideas.				
10. Öğrenirken ..... / When I am learning ..... *				
çekingen biriyim. / I am a reserved person.				
kabul eden biriyim. / I am an accepting person.				
sorumluluk sahibi biriyim. / I am a responsible person.				
akılcı biriyim. / I am a rational person.				
11. Öğrendiğim zaman ..... / When I learn ..... *				
katılımcıyımdır. / I get involved.				
gözlemekten hoşlanırım. / I like to observe.				
yapılanları değerlendiririm. / I evaluate things.				
aktif olmaktan hoşlanırım. / I like to be active.				
12. En iyi ..... öğrenirim. / I learn best when ..... *				
fikirleri analiz ettiğimde / I analyze ideas.				
yenilikçi ve açık fikirli olduğumda / I am receptive and open-minded.				
dikkatli olduğumda / I am careful.				
pratik olduğumda / I am practical.				

Appendix E. Sample Learning Style Document

Your learning style is

Deciding

Learning Strengths	Learning Challenges
- Problem-solving - Evaluating ideas and solutions - Setting goals - Making decisions	- Thinking 'out of the box' - Sensitivity to people's feelings - Dealing with ambiguity

The Deciding style is characterized by the ability to use theories and models to decide on problem solutions and courses of action. It combines Abstract Conceptualization (AC) and Active Experimentation (AE).

If Deciding is learning style, you are likely to:

- be good at finding practical uses for ideas and theories
- have the ability to solve problems and make decisions based on evaluating solutions to questions or problems rationally
- identify flaws and mistakes in concepts and ideas by testing them in the real world
- set clear goals, evaluate and then decide on the best path to achieve them
- be efficient and focused and avoid being distracted by what you consider to be tangential facts or information, but sometimes missing important information or solving the wrong problem
- focus on technical problem-solving when working with others
- concentrate on helping others to solve their problems efficiently and effectively, rather than on their feelings and interpersonal issues
- be seen as focused, pragmatic, rational and decisive
- learn best in situations in which you can experiment with new ideas, simulations, laboratory assignments and practical applications
- prefer teachers who set clear standards and goals and evaluate with problems and questions that have right or wrong answers

Kolb D. and Kolb, A. (2018). *Kolb's Learning Style Inventory 4.0 Facilitator's Guide*. Experience Based Learning Systems, Inc.

(Page 1/5)

LEARNING STYLES IN
KOLB'S EXPERIENTIAL LEARNING THEORY

EXPERIENTIAL LEARNING THEORY

Kolb's Experiential Learning Theory (ELT) emphasizes the combination of experience, perception, cognition, and behavior in the learning process. ELT defines learning as "the process whereby knowledge is created through the transformation of experience". The theory explains the process of experiential learning through a four-stage learning cycle (Figure 1), which involves four adaptive learning modes that require opposite sets of abilities that are continually chosen by learners in learning situations. The knowledge is formed and learning results through the learner's continuous act of resolving the dialectic conflicts between the two opposed modes of each dimension as he or she moves through the stages of the learning cycle.

Individuals approach learning situations differently by continually making choices among the set of abilities they to use for prehension and transformation as they move through the stages of the learning cycle. These dominant prehension and transformation preferences imply the individual learning style. No learning style is better than the other. Learning style is not a fixed trait but rather a dynamic state that may shift through time, development, and situation. It is a habit of learning that is shaped by experience and individual choices. Modification or adaptation of approaches may be needed for an individual in some learning situations. This flexibility may be either an automatic and unconscious or an intended and conscious mode of adaptation to the learning situation. Whereas some individuals are often consistent in their preferences, there are also "flexible learners", who exhibit a tendency to change their preferences depending on the task or situation.

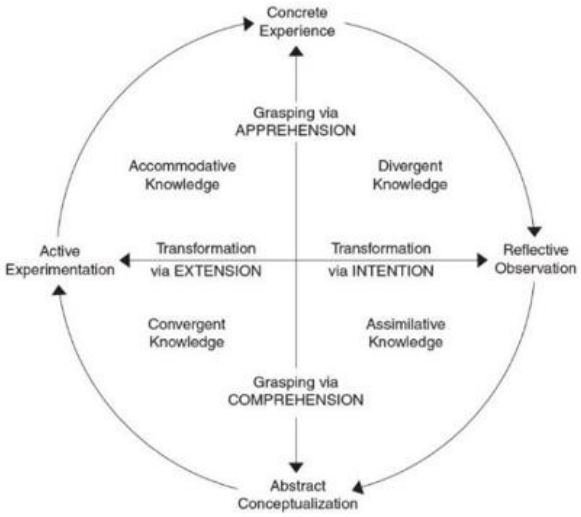
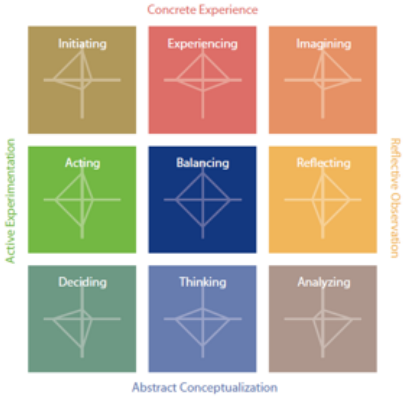


Figure 1. Structural dimensions underlying the process of experiential learning and the resulting basic knowledge forms

THE NINE MOST COMMON LEARNING STYLES



The **Initiating** style	initiating action to deal with experiences and situations.
The **Experiencing** style	finding meaning from deep involvement in experience.
The **Imagining** style	imagining possibilities by observing and reflecting on experiences.
The **Reflecting** style	connecting experiences and ideas through sustained reflection.
The **Analyzing** style	integrating ideas into concise models and systems through reflection.
The **Thinking** style	disciplined involvement in abstract reasoning and logical reasoning.
The **Deciding** style	using theories and models to decide on problem solutions and courses of action.
The **Acting** style	a strong motivation for goal directed action that integrates people and tasks.
The **Balancing** style	adapting by weighing the pros and cons of acting versus reflecting, and experiencing versus thinking.

ETHICAL BOARD APPROVAL

İZMİR EKONOMİ ÜNİVERSİTESİ

SAYI : B.30.2.İEÜ.0.05.05-020-*080* 26.11.2019

KONU : Etik Kurul Kararı hk.

Sayın Doç. Dr. Ö. Osman Dermibaş, Sevi Merter

"Farklı Özellikte Öğrenciler için Proje Tabanlı Tasarım Öğrenim Modeli: Endüstriyel Tasarım Eğitimi Örneği" başlıklı projenizin etik uygunluğu konusundaki başvurunuz sonuçlanmıştır.

Etik Kurulumuz 02.09.2019 tarihinde sizin başvurunuzun da içinde bulunduğu bir gündemle toplanmış ve projenin incelenmesi için bir alt komisyon oluşturmuştur. Projenizin detayları alt komisyon üyelerine gönderilerek görüş istenmiştir. Üyelerden gelen raporlar doğrultusunda Etik Kurul 25.11.2019 tarihinde tekrar toplanmış ve raporları gözden geçirmiştir.

Sonuçta 25.11.2019 tarih ve 102 numaralı Etik Kurul "Farklı Özellikte Öğrenciler için Proje Tabanlı Tasarım Öğrenim Modeli: Endüstriyel Tasarım Eğitimi Örneği" konulu projenizin etik açıdan uygun olduğuna oy birliği ile karar verilmiştir.

Gereği için bilgilerinize sunarım.

Saygılarımla,

Prof. Dr. Filiz Başkan

Etik Kurul Başkanı

Sakarya Caddesi, No:156 35330 Balçova - İzmir / TÜRKİYE • Tel: 0 (232) 279 25 25 PBX • 444 4 938 • Faks: 0 (232) 279 26 26
www.ieu.edu.tr • info@ieu.edu.tr

CURRICULUM VITAE

PERSONAL INFORMATION

Date/Place of Birth: [redacted]

EDUCATION

- **Master of Design (MDes) in Design Studies**

  İzmir University of Economics, İzmir, TURKEY

  Thesis Title: "A Participatory Product Design Process with Children with Autism Spectrum Disorder"

  Thesis Advisor: Assoc. Prof. Dr. Deniz HASIRCI

  September 2012-January 2015

- **Minor in Sociology**

  Middle East Technical University, Ankara, TURKEY

  September 2009-June 2012

- **Bachelor in Industrial Design (BID)**

  Middle East Technical University, Ankara, TURKEY

  September 2006-June 2012

WORK/TEACHING EXPERIENCES

- **Visiting Scholar**

  Department of Design, College of Arts and Sciences, The Ohio State University

  Columbus, OH, USA

  (TÜBİTAK 2214-A International Research Fellowship Programme for PhD Students)

  September 2019-August 2020

- **Lecturer**

  Department of Industrial Design, Faculty of Art and Design, Yaşar University İzmir, TURKEY

  Courses: Introduction to Design II; Industrial Design I-II-V; Graduation Project; Design Thinking; Experimental Design; Design Research Methods and Writing; Design Competition Projects; Portfolio Design

  November 2017-present

- **Research Assistant**

  Department of Industrial Design, Faculty of Art and Design, Yaşar University
  İzmir, TURKEY
  Assisted courses: Basic Design I; Industrial Design I-II-V; Graduation Project
  October 2012-November 2017

- **Industrial Designer**

  Ankira Electronic, METUTech
  Ankara, TURKEY
  April 2011-February 2012

PUBLICATIONS

- **International**

Guvenir, C., Merter, S. and Bagli, H. B. (2019). "Upside Down: A "Flipped" Design Thinking Course". *DRS Learn X Design: 5th International Conference for Design Education Researchers*. Ankara, Turkey, 09-12 July 2019.

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- **National**

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